Using Digital Tools to Improve Vocabulary in Fourth-Grade Primary School Students

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Abstract

The purpose of this study was to improve the vocabulary of fourth-grade primary school students through action plans based on digital tools. The study was conducted within the framework of participatory action research design, one of the qualitative research approaches. The participants were 32 fourth-grade students from a public elementary school in Konya during the spring semester of 2023. The study started with a pre-test using Bulut's (2013) vocabulary test to assess the students' vocabulary levels. This led to the development of four action plans consisting of eight activities focusing on different fields of Turkish learning domains (listening, speaking, reading, and writing). These action plans were implemented over an eight-week period. Following the intervention, a post-test was conducted, and the pre- and post-test results were compared to assess the students' progress. Additionally, qualitative data, including observation notes, digital diaries, teacher and student interviews, video recordings, and research meetings, was analyzed to gain insight into the implementation process. The results indicated an improvement in students' vocabulary skills. The use of digital tools suitable for various learning domains and the incorporation of diverse text types in the activities fostered student engagement, enjoyment, and a comprehensive approach to vocabulary development. Furthermore, the implementation of group strategies positively influenced students' motivation and willingness to learn.

Keywords: Vocabulary, Turkish learning domains, Educational technology, Digital tools, Primary school students

Introduction

Vocabulary represents one of the most critical components of language development. The collective words that an individual knows, comprehends, and uses constitute their vocabulary (Akyol & Temur, 2013). As such, active vocabulary ought to be employed in both written and oral expressions in accordance with their meaning. Nonetheless, if the meaning is not fully understood or can only be inferred from the context, the words are part of the passive vocabulary (Yıldız et al., 2010). To ensure that vocabulary becomes a permanent part of one's knowledge, it is essential for the individual to actively use the acquired words. This process starts at an early age and is modulated by a plethora of factors.

Various elements, such as a child's environment, school experience, and family dynamics, influence their vocabulary development (Biemiller, 2006). Indeed, these aspects shape the lexicon that children acquire over time (Hoff, 2003). Notably, the vocabulary that a child acquires during and even before their elementary school years exerts a direct influence on their language abilities, reading comprehension, and consequently, their overall academic achievement (Marulis & Neuman, 2010). A substantial and diverse vocabulary is instrumental in facilitating children's reading comprehension (Dickinson, Golinkoff, & Hirsh-Pasek, 2010). Proficient vocabulary allows children not only to comprehend the content of the texts they read more effectively but also to establish connections across different texts. In a study by Ouellette (2006), it was found that the breadth and depth of elementary students' vocabularies directly influenced their reading comprehension skills. Similarly, Kayıran and Ağaçkıran (2018) identified vocabulary as a crucial determinant of reading comprehension. In essence, when children recognize and understand the words within the texts they read, their capacity to comprehend the overall text significantly improves. These findings provide critical insights for educators, suggesting that language teaching methodologies should incorporate strategies designed to broaden children's vocabulary.

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The extent of a child's vocabulary can critically influence their academic achievement (Snow et al., 2007). The successful acquisition of reading, writing, and other academic skills depends on the possession of an extensive vocabulary. Understanding the meaning of a word and using it appropriately in context can help children succeed at school (Stahl & Nagy, 2006). Additionally, a rich vocabulary can expedite the process of foreign language acquisition. Both national and international literature substantiate a robust correlation between students' proficiency and vocabulary in a foreign language and their native language vocabulary (Cunningham & Stanovich, 1997). The significance of vocabulary extends beyond mere academic achievement; it also bolsters children's social and emotional development (Crain, 1991). The more extensive students' vocabularies, the more effectively they can articulate their thoughts and emotions. Moreover, children with a comprehensive vocabulary may possess an enhanced ability to interpret the thoughts and feelings of others, fostering empathy and facilitating healthier social interactions (Rubin et al., 2006).

Given the crucial role vocabulary plays in language development, it is imperative for educators and families to implement strategies aimed at enriching children's vocabulary. Such strategies might encompass exposing children to texts of varying genres and complexity, engaging them in word games, and promoting the use of a diverse range of words in everyday conversations (Biemiller & Boote, 2006). Digital tools can also be employed in implementing these strategies, as technology has been widely acknowledged to play a significant role in language instruction and vocabulary development (Castek et al., 2012; Kervin & Derewianka, 2011; Neuman et al., 2011). Technology-supported strategies, compared to traditional vocabulary instruction techniques, can render children's vocabulary learning more efficient and engaging (Larson et al., 2012). Notably, multimedia and interactive learning applications facilitate the depiction of word meanings in multiple modes, thereby simplifying the learning process (Mayer, 2009; Segers & Verhoeven, 2009). The incorporation of technology in language learning can augment children's reading comprehension by providing them access to a wider vocabulary (Castek et al., 2012; Proctor et al., 2007). Research substantiates that technology plays a significant role in language teaching, enhancing students' vocabulary and language proficiency (Saka et al., 2014; Başal, 2015).

A host of technology-supported strategies can be employed to broaden the vocabulary of elementary school students. Digital tools can introduce an appealing dimension to children's language learning. For instance, digital storytelling empowers students to craft their own stories and present them in a digital milieu. This process can bolster vocabulary development by offering opportunities to delve into the meanings of words and incorporate them into their own work (Robin, 2008; Yang & Wu, 2012). Digital game-based learning strategies foster vocabulary learning and stimulate children's motivation (Hsu et al., 2008; Rabu & Talib, 2017; Zou et al., 2021). As children acquire new words and their meanings through games, they can also enhance their social skills (Kucirkova, 2014). Augmented reality (AR) technology provides a novel approach to language learning. By enriching vocabulary learning with diverse visual and auditory cues, AR applications can facilitate more effective word acquisition (Hsu, 2019).

This study can contribute significantly to the field by focusing on several distinctive aspects compared with existing literature. These unique features are as follows:

- Studies on primary school vocabulary focus on determining students' frequency of word use (Armut, 2019; Hildreth, 1953; İpek Eğilmez, 2010; Karadağ & Kurudayıoğlu, 2010; Ma & Mei, 2021; Ryder & Slater, 1988; Sealey & Thompson, 2004; Sever & Çetinkaya Özdemir, 2018), creating word lists for students (Keklik, 2011; Say et al. 2002), and identifying vocabulary in textbooks (Aru & Ertem, 2014; Harmon et al., 2000; Karadağ et al., 2005; Maden, 2020; Tragant et al., 2016). The studies aimed to identify the frequently utilized words by primary school students and determine their types and frequency in textbooks. In this study, texts appropriate for the fourth grade of primary school were selected with the joint decision of the primary school teacher, an expert faculty member, and the researcher. These selected texts are presently incorporated in the fourth-grade textbooks recommended by the National Education Ministry.

- While experimental designs are commonly used in studies to enhance the vocabulary of primary school students (Acat, 2008; Bulut, 2013; Çevik & Tosunoğlu, 2020; Maududi et al., 2018; Tanrıverdi, 2019; Tuğyan, 2010; Varan, 2017), there are lesser studies based on action research (Akram et al., 2022; Amalia, 2020; Demirci & Baş, 2016; Nazara, 2019). In this study, we prioritized the use of action plans tailored to accommodate students' learning needs. This approach addressed more effectively the learning needs that emerged during the process.

- In the studies for primary school level in the literature, vocabulary has generally been examined limited to one or a few learning domains (Anılan et al., 2011; Bulut, 2013; Çevik & Tosunoğlu 2020; Demirci & Baş, 2016; Duru, 2007; Hidayat & Yulianti, 2020; Karadağ & Kurudayıoğlu, 2010; Kultas & Ulusoy, 2022; Maududi et al., 2018; Özcan, 2020; Singil, 2008). In contrast, this study examined vocabulary development across all learning domains (listening, speaking, reading, and writing), thereby providing a holistic view of vocabulary acquisition.

- Studies on developing the vocabulary of primary school students generally use several text types in the literature (Çevik & Tosunoğlu, 2020; Demirci & Baş, 2016; Kultas & Ulusoy, 2022; Sever & Çetinkaya Özdemir, 2018), while studies involving three text types are less common (Anılan et al., 2011; Bulut, 2013). This study, however, used three different text types (story, informational, and poetry) to analyze student performance based on different text types.

- While most studies in the literature often employ only one or two instructional strategies (Göçer, 2009; Kultas & Ulusoy, 2022; Yıldırım, 2010; Varan, 2017), this study incorporated multiple instructional strategies simultaneously. This approach was aimed at enriching students' experiences and enhancing their engagement with classroom activities.

The purpose of this study was to improve the vocabulary of fourth-grade primary school students through action plans based on digital tools. In line with this overarching purpose, the study sought to address the following research questions:

1. What is the existing vocabulary levels of the fourth-grade students?

2. Through what types of action plans can the vocabulary of these students be improved?

3. What are the participant students' perceptions of the implementation process?

4. How have the implemented action plans influenced the students' vocabularies?

This article aims to enhance the vocabulary of fourth graders in primary school through the implementation of action plans that use digital tools. Current literature on vocabulary development concentrates heavily on experimental designs that explore a handful of learning domains and text types, thereby leaving a gap in the research. However, this article adopted a qualitative approach and addressed vocabulary across all learning domains. Various text types were used, and a substantial number of teaching strategies were employed, contributing to the article's unique perspective. The article will assist researchers in addressing vocabulary in a comprehensive manner, offering an instance of action research, and effectively integrating digital tools into lessons. For educators, it will supply concepts on teaching tactics that address all Turkish learning domains and employ technology efficiently. Ultimately, the techniques delineated in the article are expected to improve students' vocabulary.

Method

This study was undertaken using an action research design, a qualitative research paradigm that emphasizes implementation, collaboration, and discussion. This research design pivots around the researcher and practitioner discerning the root causes of existing problems and potential solutions (Norton, 2018; Yıldırım & Şimşek, 2021). Collaborative action research converges educators from schools and universities to tackle educational issues. The purpose of this approach is to ensure active participation by all stakeholders in the knowledge creation process and to transform research findings into actionable insights (Derince & Özgen, 2021; Gürgür, 2017; Mills, 2011). In this study, the primary school teacher and the researcher collaborated to enhance the vocabulary of fourth-grade primary school students. The action research process typically comprises a sequence of iterative and cyclical phases (Mertler, 2014; McNiff & Whitehead, 2010; Mills, 2011). The action research cycle implemented in this study is illustrated in Figure 1.

Figure 1. Action Research Process

Identifying the Research Topic

The initial step involves identifying a specific problem that researchers and other stakeholders are aware of or experiencing. This can be accomplished through a range of methods, such as a review of existing literature, observation of situations, or interviews with community members (Herr & Anderson, 2005). The focus of this study emerged when a primary school teacher (Teacher T.) informed the researcher of her students' deficiencies in reading comprehension. Both the researcher and the teacher agreed to comprehensively investigate the issue. Relevant literature was reviewed, field experts were consulted, and students' performance was analyzed in detail. Consequently, it was concluded that enhancing students' vocabulary would be an appropriate solution. This is because an extensive vocabulary facilitates text comprehension and interpretation, thereby enhancing the reader's ability to recognize words and their interrelations quickly and accurately (Stahl & Nagy, 2006).

Considering the researcher's prior experience and the relevance of the research topic, it was decided to employ an action research design for the study. Following the acquisition of the necessary ethical permissions, the aim was to become more familiar with the study group. The study group comprised fourth-grade students attending a public school in the Meram district of Konya, with 18 girls and 14 boys. Among the 32 students in the study group, 11 (7 girls and 4 boys) were foreigners. These are Syrian students who speak Turkish well enough to participate in classroom activities. Four students were excluded from the study due to irregular attendance. The school, situated in a moderately socio-economic area, has three floors and operates a full-day education program. It comprises 25 classrooms, a multipurpose hall, and a library. The classroom where the research was conducted was equipped with a smart board, a bookshelf, a printer, a teacher's desk and chair, three bulletin boards, and student desks and tables.

Preparing Action Plans

Following the identification and understanding of the problem, the process of action planning started. This typically involves discussions and dialogues regarding strategies and actions that can be put into effect to address the issue (Bargal, 2008). Preliminary action plans were devised based on the outcomes of the students' pre-tests, pertinent literature, the primary school teacher's input, and the insights of an expert faculty member. The primary school teacher's (Teacher T.) readiness to employ digital tools led to the inclusion of such tools in the action plans. The researcher and expert lecturer have asserted that Turkish learners can enhance their vocabulary across all learning domains. From a developmental perspective, listening vocabulary precedes speaking vocabulary, which is then followed by reading vocabulary and finally writing vocabulary (Snow et al., 1998). As individuals begin to employ these different forms of vocabulary in their daily lives, an overall vocabulary is developed. Following several meetings, it was agreed that the action plans should adhere to the framework of Turkish learning domains and that activities should be conducted with digital tools. Accordingly, activities were designed based on four draft action plans (listening-based, speaking-based, reading-based, and writing-based). The digital tools selected in relation to the learning domains underwent a final review before the weekly implementation. Figure 2 depicts the action plans and activities conducted during this study.
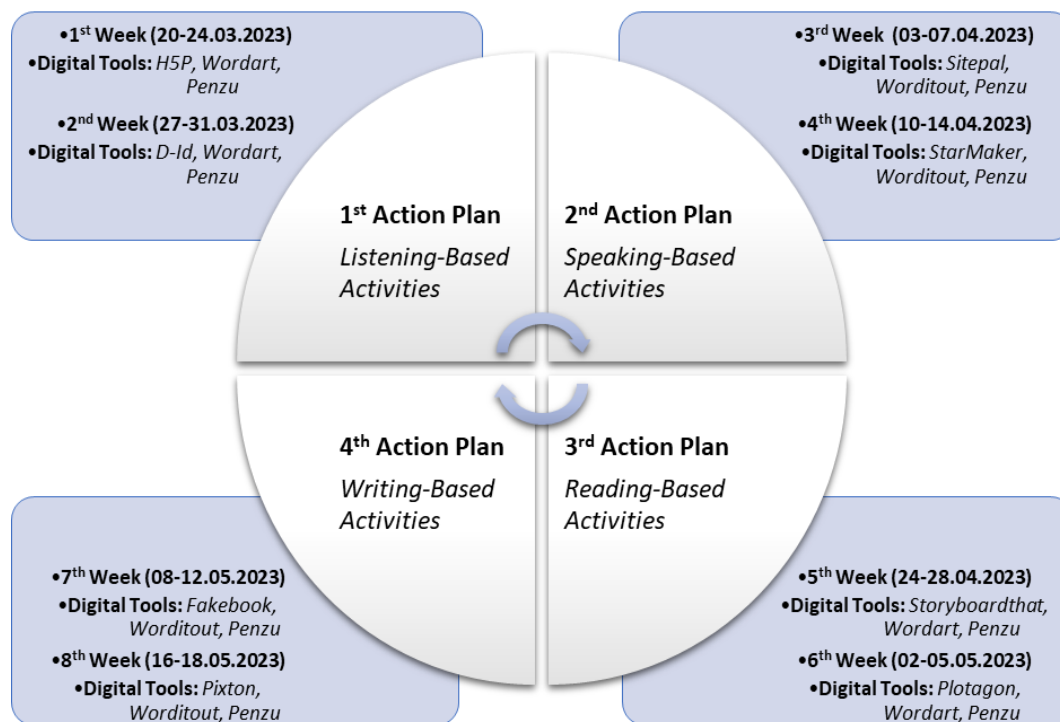
Figure 2. The action plan process of the research

1st Week (20-24.03.2023) — Digital Tools: *H5P, Wordart, Penzu*
2nd Week (27-31.03.2023) — Digital Tools: *D-Id, Wordart, Penzu*

1st Action Plan — *Listening-Based Activities*

2nd Action Plan — *Speaking-Based Activities*

3rd Week (03-07.04.2023) — Digital Tools: *Sitepal, Worditout, Penzu*
4th Week (10-14.04.2023) — Digital Tools: *StarMaker, Worditout, Penzu*

4th Action Plan — *Writing-Based Activities*

3rd Action Plan — *Reading-Based Activities*

7th Week (08-12.05.2023) — Digital Tools: *Fakebook, Worditout, Penzu*
8th Week (16-18.05.2023) — Digital Tools: *Pixton, Worditout, Penzu*

5th Week (24-28.04.2023) — Digital Tools: *Storyboardthat, Wordart, Penzu*
6th Week (02-05.05.2023) — Digital Tools: *Plotagon, Wordart, Penzu*

Implementing Action Plans

Once action plans have been developed and approved, the process of implementation starts. This typically involves the execution of the plan over a specific period and the collection of data throughout this duration (McNiff & Whitehead, 2010). In this study, action plans were carried out by the teacher between 3/20/2023 and 5/18/2023, three days a week, during the fourth and fifth periods. Although the primary school teacher implemented all activities in the action plans, the researcher visited the classroom occasionally to conduct observations. Each action plan was carried out for 12 hours, culminating in 48 instructional hours. Before the implementation of the action plans, the primary school teacher and the researcher held meetings (at times face-to-face, at others online) to discuss the principles governing the execution of the plans. In particular, they repeatedly reviewed the use of digital tools. The classroom where the research occurred is equipped with smart boards onto which the Pardus operating system is installed. As some applications are challenging to operate on this system, digital tools were incorporated into the activities by running them on the teacher's computer and connecting it to the smart board.

Evaluating Data

The evaluation of practices typically involves analyzing and assessing the collected data. This evaluation informs the next phase of the research process and often kickstarts a new cycle of problem identification, action planning, and action implementation (Stringer, 2013). In this study, the activities implemented from the action plans and the collected data were analyzed and evaluated. Although action research aligns with the interpretivist paradigm, the positive paradigm's quantitative data collection techniques can be employed. Statistical analysis aids in understanding and interpreting the results derived from the action research process's quantitative data (Aslan, 2018; Karatay & Taş, 2021). Quantitative data were gathered with the vocabulary test (Bulut, 2013) to determine students' vocabularies in the pre- and post-test processes. The test developer calculated the average difficulty of the test as .59 (medium difficulty) and its reliability (KR-20 value) as .93. In this study, the average difficulty of the test was calculated as .57 and the reliability (KR-20 value) was calculated as .91. The Shapiro-Wilk test was used initially to determine if the groups' scores met the normality assumption. Based on the results of the test (Skewness = 0.14; Kurtosis = -.94; $p > .05$), it was observed that the data had a normal distribution ($p > .05$) (Tabachnick & Fidell, 2012). Quantitative data were analyzed using the Jamovi 2.3.21 statistical program, and the paired measures t test was employed to analyze students' pre-test and post-test results. Qualitative data were collected through observation notes, digital diaries, conversational interviews with teachers and students, video recordings, and research meetings.

Observation notes enable the researcher to document in detail the situations, events, people, and interactions encountered during fieldwork. These notes are subsequently used in the data analysis and interpretation processes. Observation notes assist the researcher in recalling their experiences and observations in the field, thereby enriching the research findings and providing more detail (Curry et al., 2009; Tong et al., 2007). Noteworthy points were noted as reminders throughout the research. The data from the observation notes was employed in creating action plans and interpreting the results.

A digital diary can serve as a tool for participants to document their experiences and thoughts. These diaries enable participants to record their experiences in real time, offering the researcher rich and detailed data (Janssens et al., 2018; Jarrahi et al., 2021). Throughout the research process, reflective diaries were maintained by primary school teachers, researchers, and students. However, these reflections were conducted using the digital tool Penzu. This digital tool provides an effective writing space for daily communication of feelings and thoughts. Students who had access to computers and tablets used these tools to write their diaries, while others accessed their family members' smartphones at home for this purpose.

Conversational interviews can be either unstructured or semi-structured. In such interviews, participants are given the freedom to express themselves, while the researcher may ask questions to gain in-depth clarification and understanding. Conversational interviews are typically conducted on an individual basis, although occasionally they can be conducted in group settings (Akman Dömbekci & Erişen, 2022; Polat, 2022). Throughout the research process, in conversational interviews with the students, open-ended questions were predominantly used to elicit participants' thoughts on the implementation of action plans. These interviews also sought feedback on the usefulness and interest of the class activities and participants' suggestions for additional activities to be implemented.

Video recording can be a potent tool in qualitative research, offering a wealth of data that can be thoroughly analyzed (Noble & Smith, 2014). Qualitative research captures the complexity of human behavior and experiences, and video recording facilitates this process (Neale et al., 2005). Throughout the research process, all classroom activities were recorded on video. The video recordings proved highly convenient for repeatedly examining various aspects such as the level of students' participation, their reactions, the effectiveness of teaching activities, classroom dialogues, and similar factors.

Research meetings played a crucial role in guiding the researcher during the design and implementation of action plans, identifying significant issues that may have been overlooked, and seeking solutions to challenges encountered. These meetings took place between the researcher and the primary school teacher, sometimes in person and sometimes online. Additionally, when necessary, a faculty member specializing in Turkish teaching was also involved in these meetings.

The qualitative data obtained in this study were analyzed using a systematic analytical approach proposed by Miles and Huberman (1994). This approach involved analyzing the data, relating them to the research questions, verifying the obtained results, and interpreting the findings. During this process, significant points were initially identified by carefully reviewing the video recordings following the completion of each week's action plans. Factors such as the successful implementation of action plans or encountering difficulties were considered at this stage. Subsequently, comments on the implementation of the action plans were subjected to detailed analysis using various data, sources such as observation notes, digital diaries, and conversational interviews. These methods facilitated a comprehensive understanding of the effectiveness of the action plans, participants' experiences, and potential areas for improvement. The study's qualitative data and analyzed findings were reviewed by a faculty member with expertise in qualitative research methodology. The expert's correction and recommendation guidelines were used to structure the study's findings.

To ensure the robustness of the research, various methods such as the research cycle, field observation, researcher experience, member supervision, and data triangulation were employed (Gürgür, 2017; Ocak & Akkaş Baysal, 2020). This study emphasized the weekly cycle of the action plan and provided detailed descriptions of the included activities. Observation notes were used to enhance the comprehensibility of the research process. By increasing transparency and reproducibility, observation notes enable the researcher to furnish detailed information about the research process, thereby facilitating other researchers in replicating the same or similar studies (Keith et al., 2017; Neale et al., 2005). The fact that the researcher conducted his Ph.D. study using an action research design in the field of Turkish language teaching helped mitigate potential adverse situations that could have arisen during the research. Meetings conducted before and following the weekly implementation of the action plans ensured comprehensive management of the research in all aspects. The use

of a wide array of data collection tools (pre- and post- test applications, video recordings of action plans, observation notes, digital diaries, chat-style interviews) provided a diverse and rich source of data.

Results

The general structure of the results section in this study, which aimed to enhance the vocabulary of fourth-grade primary school students through action plans based on digital tools (web tools), is illustrated in Figure 3.
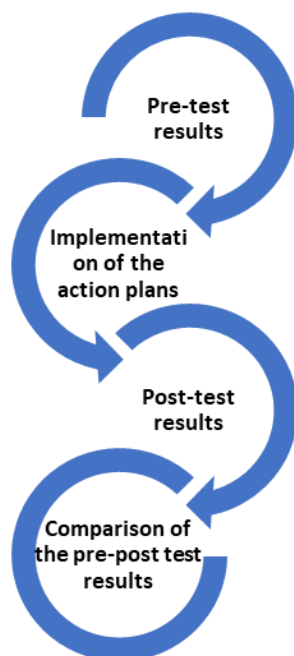

Figure 3. The general structure of research results

Figure 3 demonstrates that the discussion begins with the presentation of the pretest results (addressing the first research question). Subsequently, the opinions of the researcher, primary school teacher, and study group regarding the action plans and the activities derived from them are discussed (addressing the second research question) along with the implementation of these action plans (addressing the third research question). Finally, the post-test results will be presented, and a comparison will be made between the pretest and post-test results (addressing the fourth research question).

Pre-test Results

The pre-test was conducted on March 15, 2023, as part of the study. The students in the study group were given two class periods for pre-test measurements. During this process, any unclear items in the data collection instrument were explained to the students. Table 1 displays the results of the pre-test, which reflect the current vocabulary level of fourth-grade students.

Table 1. Pre-test results on students' vocabularies

	N	X̄	Minimum	Maximum	Sd
The study group	32	60.01	38	76	10.1

According to the data presented in Table 1, the mean vocabulary score for the students in the study group was 60.01. The vocabulary measurement form ranged from a minimum score of 38 to a maximum score of 76. Before the administration of the pre-test, the students were reassured that the exercise was not an exam and were encouraged to approach it calmly. One student's reflection on this process was recorded in Penzu as follows:

> "I felt excited before I began solving the test given by our teacher. However, my teacher assured me that this was not an exam, which helped alleviate my anxiety. He explained that it was simply an activity. As a result, I could focus better while reading the questions. In the afternoon class, we answered different sets of questions..." (Student 15, Girl, 16.03.2023).

Implementation of the Action Plans

Four action plans and a total of eight activities under these plans were implemented within the scope of the research purpose. Action plans and their activities are discussed below in the order of their implementation.

1st Action Plan: Listening-Based Activities

The objective of this action plan was to enhance students' vocabulary through listening activities that involved discerning words with unfamiliar meanings. *During the first week of this action plan*, the researcher played the poetic text *Yavru Ahtapot Olmak Çok Zor* (It's Hard to be a Baby Octopus) for the students. Following the listening session, the words that students were unfamiliar with were documented using the digital tool Wordart, and the students were then prompted to guess the meanings of these words. Subsequently, the researcher presented a video prepared for the poetic text using the H5P digital tool. This tool enables the creation of interactive video content. Within the video, various question-based activities were integrated at specific timestamps, allowing students to engage in the activities when prompted. The appropriate features for this purpose, such as Add Text, Add Short Answer Questions, Add Single Choice Questions, and Add Multiple Choice Questions, could be selected. When the designated timestamp was reached, the question or text of interest could be entered in the corresponding field. Further customization options included determining whether to pause the video and specifying the duration of the interaction on the screen. As the students watched the video, they also completed the activities that were embedded within it. The successful completion of these activities required careful listening to the poetic text. Following this exercise, the words recorded in the Wordart digital tool were projected onto the screen. This tool allowed students to edit the words, selecting desired shapes, fonts, layouts, and styles. This was done to increase students' interest and encourage them to share the meanings they had guessed for the words. The primary school teacher expressed his enthusiasm and observations regarding the first week of the action plan in his diary entry:

> "We started the first week of the study, and although I did not show it to the students, I was more excited than they were. I was curious to see their reactions as they engaged in activities prepared using digital programs. While I typically use Web 2 tools, this time they took center stage. While some students readily participated in the activities, I had to try to encourage others to engage." (Teacher T., 22.03.2023)

One student's reflection highlighted the importance of the listener paying attention and taking notes while listening:

> "We started doing activities on the computer. In the activity where we watched the poetic text on the screen, the video asked us questions by stopping in between. At first, I did not pay full attention, so I could not answer. But in the following questions, I always followed the video well and listened. Sometimes I took short notes. In fact, our teacher always told us this. But this time I understood what he meant." (Student 4, Girl, 21.03.2023)

In the second week of the action plan, the teacher read the *Bayrak* (Flag) poetic text multiple times in a clear and emphatic manner in the classroom. Words with unknown meanings were immediately recorded. Afterwards, the students were shown an audio recording of the poetic text created using the D-id digital tool. This tool allows the use of virtual avatars to voice characters, with options for different languages and genders. The program enables the avatars to have lip and facial movements that align with the content of the text, and the output is in video format. The students watched the video of the recitation of the poetic text prepared in this way, with words of unknown meanings recorded in the previous lesson displayed in the digital tool Wordart. The students then guessed the meaning of these words. In the final lesson, students who had read the poetic text clearly and emphatically had their voices recorded. These recordings were uploaded to the selected avatar in the D-id program and played back to the students. The students were divided into groups, with each group assigned a different stanza to read, and they were asked to vocalize it using different characters in the digital tool. The students evaluated the vocalizations they heard through a group evaluation form. It was observed that students who listened to their own voice through the chosen avatar became aware of the comprehensibility of the content they were listening to. This was reflected in their diary entries:

> "It was nice to create my own virtual character. It was very exciting to listen to the poetic text in my voice in class. Now I know what I have to pay attention to to make the poetic text understandable." (Student 15, Girl, 31.03.2023)

"I enjoyed this week's activity. We had the avatar we created with our teacher read poetic texts in our own voices, and we listened to them. While listening, we noticed that some of our friends read the poetic texts much more beautifully." (Student 28, Boy, 01.04.2023)

The researcher, who was present in the classroom as an observer, made the following observation regarding the second action plan and suggested points to consider in order to encourage more active student participation:

"The purpose of the activities should be better explained, and we should make the students more actively involved. To achieve this, we can make them integral parts of the activity." (Observation note, 30.03.2023)

2nd Action Plan: Speaking-Based Activities

The objective of this action plan was to enhance students' vocabularies through conversation-based activities. *In the first week of this action plan*, the text *Kar Taneleri Biliminin Tarihi* (History of the Science of Snowflakes) was narrated to the students by a virtual character from Sitepal. The topic was subsequently discussed in the classroom with the teacher. Sitepal is a digital tool that allows the selection of 2D and 3D virtual characters or the creation of original characters using uploaded images. The character's appearance, including hair structure and color, visible facial features, choice of accessories, and clothing, can be customized based on the selected or created character's structure and gender. A suitable background can also be chosen. Real or virtual characters can be made to speak by typing text into the digital tool, recording audio using a computer microphone, making a phone call, or uploading a pre-recorded voice file. Through this digital tool, conversations between different virtual characters, prepared in advance to reflect various perspectives using the six-hat thinking technique, were conducted on the topic of the *Impact of Technology on Our Lives*. Words that were not understood during these conversations, particularly words with unknown meanings, were transferred to the Worditout digital tool and displayed on the screen. Students were asked to guess the meanings of these words based on context and then look up the dictionary definitions. Following this, the students formed groups of six, and each group selected a topic for conversation. Special attention was given to incorporating newly learned words into their speeches. The students prepared speeches on their chosen topics using the six-hat thinking technique. The teacher taught the students this technique by using the speeches of different virtual characters on Sitepal. Each student represented one of the six hats: white hat (neutral), red hat (emotional), black hat (pessimistic), yellow hat (optimistic), green hat (creative), and blue hat (conclusive). Audio recordings of the students' speeches, based on the color of the hat they chose, were made and uploaded to the avatars along with their visuals. These speeches were listened to in the classroom in the order of the groups, and students were evaluated using the Speech Peer Evaluation Form. Active participation was observed in this activity. The primary school teacher provided the following reflection on the matter:

"Although it took some efforts to get students to understand the six-hat technique, I appreciated the willingness of my students during the application. I noticed that some of my students had a talent for role-playing. S12E, in particular, used tone of voice and emphasis intonation exceptionally well. I plan to incorporate this technique into my teaching frequently in the coming years." (Teacher T., 09.04.2023)

The diary entries of S12E, who excelled in the activities during this week, are as follows:

"It was enjoyable to assume different personalities this week. I enjoy imitating others, and I had the opportunity to do so in class. My teacher allowed me to upload my own photo to my virtual character, and when my friends saw it, they really liked it." (Student 12, Boy, 08.04.2023)

In the second week of the action plan, the teacher delivered a speech about April 23rd, National Sovereignty Day, and Children's Day. Background music was played during the speech, and the difference between the speech with and without music was discussed with the students. Key words related to the topic (such as national sovereignty, parliament, full independence, and Children's Day) were displayed on the screen using the Worditout digital tool, and their meanings were explored. This tool allows for the selection of different fonts, text and background coloring, text alignment, letter sizing, and word frequency determination. The students were instructed to come prepared to read a poetic text about April 23rd, National Sovereignty Day, and Children's Day in the next lesson. During the lesson, the students' poetic texts were recited with background music using a karaoke microphone. Words with unknown meanings in these poetic texts were identified, and students were asked to guess their meanings using Worditout. The lyrics of the children's song *Atatürk Çocukları* (Atatürk's Children) were distributed to the students, who were then asked to read them aloud.

Subsequently, the students listened to the song and were encouraged to sing it into the microphone using the StarMaker karaoke application. Each line of the song was sung by a different student, with the entire class joining in the chorus. A Worditout digital tool was used to identify unknown words in the song and find their meanings. All students enthusiastically participated in this karaoke activity. The students' sentiments on the topic were recorded in their diaries:

> "The music activities were very enjoyable. We read poetic texts, learned new ones, and sang the children's song. It was a fantastic day for me." (Student 9, Boy, 14.04.2023)

> "My teacher's speech was very moving, especially with the background music. I recited the poetic text *Bu Vatan Kimin?* (Who Owns This Homeland?) with the music playing. The song *Atatürk Çocukları* (Atatürk's Children) in the last lesson was wonderful. I felt both emotional and entertained this week." (Student 19, Girl, 14.04.2023)

The researcher who observed the classroom activities made the following note regarding the students' participation and the next action plan:

> "The participation in the second action plan was much better. The topics we emphasized in the meeting with the primary school teacher at the end of the first action plan seem to have been effective. However, to fully engage the students in the activities, they need to thoroughly understand the application of the digital tools. In our upcoming action steps, the teacher should introduce the digital tool more effectively and provide examples to ensure active student involvement." (Observation note, 07.04.2023)

3rd Action Plan: Reading-Based Activities

The objective of this action plan was to enhance students' vocabularies through reading-based activities. *During the first week of this action plan*, the students received a text titled *Sağlıklı Beslenme* (Healthy Eating) and were instructed to read it silently and make note of any words whose meanings they did not know. Subsequently, a cartoon version of the text was distributed to the students using the Storyboard digital tool. This tool allows for selecting appropriate backgrounds and characters for the content and enables the addition of text with speech bubbles. External images can also be incorporated if needed. Storyboard that allows for the individual download of finished cartoons, sharing on social media, conversion into a GIF (Graphic Interchange Format) or presentation file, and direct printing of the storyboard. The text prepared with this digital tool was read aloud to the students once. Then, the students were divided into groups (six groups) according to the number of paragraphs in the text. Each group read their assigned paragraph aloud together in unison. This process continued until the entire text was completed. After the reading, the content of the text was discussed, and the students were asked if they were able to find the meanings of the words they initially did not know. These words were then transferred to the Wordart digital tool and projected on a board. Some of the projected words' meanings were guessed, while others were looked up in the dictionary to complete the process. Students who enjoyed reading with the Wordart digital tool shared the following in their diaries:

> "Our teacher first asked us to read the text normally. Then he had us read the cartoon version with lots of pictures. Both versions were beautifully illustrated, and it was enjoyable to read the illustrated version. My friends and I tried to read more expressively so that we would stand out when reading as a group. I used to find reading boring before, but I really enjoyed it during this activity." (Student 21, Girl, 28.04.2023)

One student's reflection emphasized the anticipation for the next activity, as the activities in the action plans have been captivating:

> "We engage in more fun and different activities with our teacher every week. We had a great time as a class. When it is time for these lessons, I feel excited to see what kind of work we will do this time." (Student 16, Boy, 27.04.2023)

In the second week of the action plan, the teacher provided the story text *Kim Korkar Kırmızı Başlıklı Kızdan?* (Who's Scared of Little Red Riding Hood?) to the students, instructing them to read it silently and make notes of any words whose meanings they did not know. Subsequently, an animation prepared beforehand using the digital tool Plotagon was shown to the students. Plotagons enable the creation of fun animation by selecting scenes and characters based on the content of the subject. The characters in the story can be made to speak

through the program, and external sound files can also be added. After watching the animation a few times, characters from the story were assigned to the students, who then read their assigned parts aloud following the progression of the text. Next, the students went to the blackboard and performed a reading theater using the appropriate tone of voice, gestures, and facial expressions. This activity cultivated the habit of reading with emphasis and intonation that aligned with the content of narrative texts. Subsequently, the students were asked to guess the meanings of the words they had initially noted based on the context of the story. These words and their meanings were projected on the screen using the Wordart program, and their meanings were discussed one by one. In this second activity of the third action plan, it was observed that the students were able to guess the meanings of previously unknown words more easily after the activity. The primary school teacher noted the following in his diary:

> "Participation in this week's activities was good. I noticed that my students could guess the meanings of unknown words quicker than in previous weeks. The story was read while following the animated video. Then, a reading theater was conducted. All of these activities helped the students understand the story better and guess the meanings of the words more easily." (Teacher T., 05.05.2023)

One student reflected on the importance of stress and intonation in reading:

> "Our teacher always reminded us to pay attention to our tone of voice while reading the story. He suggested that we read using a tone of voice appropriate to the story. We realized the significance of this when we read the animated video in class. We understood it even better when we acted out the story on the board." (Student 23, Girl, 05.04.2023)

Before the final action steps, the researcher who observed the classroom as an observer made the following note to encourage more active utilization of words with unknown meanings:

> "In each main activity, we identified words with unknown meanings that appeared in the texts used, using digital tools. In the last lesson, these words were practiced with digital tools such as Wordart and Worditout. However, our main objective is to enable students to actively incorporate these words into their vocabulary. Therefore, in the final action plan, it would be beneficial to include these words in writing activities. We should discuss this in the meeting with Teacher T." (Observation note, 05.05.2023)

4th Action Plan: Writing-Based Activities

The objective of this action plan was to enhance students' vocabularies through writing-based activities. *In the first week of this action plan*, the informative text *İstiklal Marşı Şairi* (Poet of the Turkish National Anthem) was distributed to the students, who were instructed to read it silently and make note of any words whose meanings they did not know. The text provided information about the life of Mehmet Akif Ersoy. Following this, the profile of Mehmet Akif Ersoy, created using the digital tool Fakebook, was projected onto the screen for the students to examine. Fakebook is a digital tool similar to a social media application. By entering the name of the person, their profile photo is automatically generated. Information such as the date and place of birth, date and place of death (if deceased), and names of family members can be added, along with the names and profile photos of friends. Messages containing important moments of the person's life can be created, as can messages from friends on the person's page. Comments can be added below the messages to further explore the person. A background image can also be set as the profile picture. The created profile can be shared digitally or printed directly. The following day, the students were divided into groups and tasked with researching and writing about individuals they shared with, such as Aziz Sancar, Aşık Veysel Şatıroğlu, Mozart, and Leonardo da Vinci. In the lesson, the students used their notes to create social media profiles for these individuals using the Fakebook digital tool. Throughout this process, the students independently created profiles based on their research. In the final lesson, words with unknown meanings were projected onto the board using the digital tool Worditout. The activity concluded with the students guessing the meanings of these words and conducting further research using dictionaries.

Teacher T., who found the Fakebook digital tool highly functional, reflected in his diary as follows:

> "The Fakebook program suggested by Teacher Mehmet was a brilliant idea for this activity. Allowing the students to create their own Fakebook profiles instead of simply researching and writing about individuals was very effective. The students remained engaged and, at the same time, gained a better

understanding of the characteristics of the person they were researching. Overall, I believe we had an impressive lesson." (Teacher T., 12.05.2023)

The reflections from students who found the use of the Fakebook digital tool effective in texts describing the lives of important individuals and in activities requiring students to research about these individuals are as follows:

"We read about the life of Mehmet Akif Ersoy multiple times and identified words whose meanings we did not know. I thought there would be no activity this time, but our teacher surprised us by creating a Fakebook profile for this person. We explored his life on his profile and read his posts. It helped me understand his life better. That is how our teacher kept us engaged." (Student 2, Girl, 09.05.2023)

"Before class, my friends and I researched Aziz Sancar's background. I even downloaded his profile picture. In class, we had a lot of fun creating a Fakebook profile for him. We could make posts in his voice and write comments below them. It allowed us to share what we learned during our research humorously." (Student 25, Boy, 12.05.2023)

In the second week of the action plan, a list of words with unknown meanings that had been noted until that point was compiled and displayed on the board. It was announced that a story-writing activity would be conducted using these words, with the story being written on the digital tool Pixton and transformed into a comic book. The teacher presented the comic book he had prepared on the board, introducing the program and having the students read it. Pixton is a digital tool that allows teachers to create online lessons for students to create comic books by designing settings and characters. The tool also includes assessment features. After registering the students in the digital classroom, the topic of the story was discussed and decided upon with their input. The brainstorming method was used to generate ideas about what should be included in the story. The characters were then determined, followed by the establishment of the time and place. The storywriting process began with an emphasis on incorporating the words from the list of unknown words. The first story was collaboratively created by the entire class under the guidance of the teacher. Appropriate settings and characters were created, and speech bubbles for the characters were written to introduce the story's initiating event. The story was reviewed multiple times during the lesson, and at the end, it was read aloud to the students. For the next lesson, the students were asked to create their own comic book using the digital tool before coming to school. Students without internet access at home were provided with pre-prepared comic book printouts with blank speech bubbles. These students could fill in the printouts as desired while still being encouraged to incorporate words from the vocabulary list. In the final lesson, the students shared their comics with the class, and the comics were read and corrected. At the end of the lesson, self-assessment forms were distributed to the students to evaluate their writing performance. Through this activity, students began to discover the joy of writing. One student expressed their thoughts on this in their diary:

"Writing activities in the classroom were always the same. We usually just finish a story or come up with a title. Sometimes we write about our thoughts on a topic. But this time, we created characters and settings that matched the theme. We wrote based on the visuals. We turned it into an illustrated novel. I never felt bored while writing; in fact, it was quite enjoyable." (Student 31, Girl, 18.05.2023)

Post-test Results

After observing the progress in his students' vocabulary development throughout the research process, Teacher T. informed the researcher that he felt it was no longer necessary to continue with in-class applications. Consequently, a joint decision was made to administer the posttest. The researcher noted the following observation regarding this:

"In the writing-based action plan, it was evident that the students were incorporating words emphasized previously. Teacher T. expressed her delight with the comic books created by her students, saying, 'My little writers bring me joy.' He mentioned that he witnessed noticeable progress in the final activity. During the evaluation meeting for this action plan, we will discuss whether to proceed with a new action plan or proceed with the post-test." (Observation note, 18.05.2023)

The post-test for the study was conducted on May 22, 2023. The students in the study group were given two class periods for post-test measurements. The students were provided with an explanation of unfamiliar aspects of the data collection tool used in this process. The post-test results, which indicate the current vocabulary level of the fourth-grade students, are presented in Table 2.

Table 2. Post-test results on students' vocabularies

	N	$\overline{X}$	Minimum	Maximum	Sd
The study group	32	71.1	46	96	12.1

According to Table 2, the average vocabulary score of the students in the study group was 71.22. The lowest score on the vocabulary measurement form was 45, while the highest score was 88.

Comparison of the Pre-Post Test Results

The comparison of pre- and post- test scores is shown in Table 3.

Table 3. The comparison of pre- and post- test results on students' vocabularies

	N	$\overline{X}$	Sd	t	p
Pre-test	32	60.1	10.1	11.7	0.001
Post-test	32	71.1	12.1		

According to Table 3, there is a statistically significant difference in the students' vocabulary pre-post test scores in favor of the post-tests [$t(31)=11.7$, $p<0.01$]. This indicates that the action plans implemented in the study were effective in developing the students' vocabularies. The average vocabulary of the students improved from 60.1 before the research to 71.1 at the end of the research.

In addition to these quantitative results, the qualitative data obtained in the research showed that the action plans implemented were generally effective in developing students' vocabulary, and the students willingly participated in these activities. Some students expressed their opinions on this matter, such as:

"I enjoyed participating in the activities in these lessons. Although it took me some time to get used to them in the first week, I became more comfortable with the activities afterward. It was nice to have two teachers in our class. I felt like we were a special class." Student 3, Boy, 22.05.2023

"We did a lot of different activities in class. I had a lot of fun. I even looked forward to the days when these lessons would occur. Playing games, reading poetic texts, singing songs, creating cartoons, writing comics, and becoming a writer were all very enjoyable experiences." Student 22, Girl, 22.05.2023

The primary school teacher also reflected on the overall evaluation of the teaching activities implemented in the research:

"What started as a conversation with teacher Mehmet about improving my students' reading comprehension turned into a practical application. Through this study, I have gained a better understanding of the importance of vocabulary in human life. Although I had previously used web tools in my classroom, I have learned to use them more effectively. Designing and implementing activities based on web tools that cover all areas of Turkish language teaching contributed greatly to my students. They had fun and actively participated in the activities while simultaneously achieving our goals." Teacher T., 23.05.2023

Conclusion and Discussion

The purpose of this study was to improve the vocabulary of fourth-grade primary school students through action plans based on digital tools. The results of the study indicate that the activities implemented in the action plans, which used digital tools, were effective in developing students' vocabularies. Numerous studies have emphasized the potential of digital technologies in enhancing vocabulary learning (Chun & Plass, 1996; Godwin-Jones, 2010; Hwang et al., 2016; Kırkgöz, 2011). Multimodal approaches and interactive features offered by digital tools have been shown to significantly contribute to vocabulary learning (Mayer, 2005; Mayer & Moreno, 2003; Paivio, 1991). Online activities provide opportunities for expanding students' vocabulary knowledge (Akkoyunlu & Yılmaz-Soylu, 2008).

The results of this research also emphasize the significance of providing students with clear explanations regarding the purpose, stages, and anticipated outcomes of classroom activities before they are implemented. This practice aligns with constructivist learning theory (Bruner, 1996; Piaget, 1973; Vygotsky & Cole, 1978)

and the principles of transparency in education (Wigfield & Eccles, 2000; Wiggins & McTighe, 2005). By providing students with a clear understanding of the activities, their expectations are better addressed, leading to increased motivation and willingness to participate (Brophy, 2013).

Active participation of students in activities has been observed to enhance their understanding of new vocabulary. Making activities engaging and enjoyable further promotes active participation. Fun and interactive learning experiences facilitate deep and effective learning (Gee, 2003; Prensky, 2001; Resnick, 2004). The use of digital tools in this research contributes to creating such experiences. Digital technologies offer effective means to provide engaging learning environments (Merchant, 2012). In related literature, digital environments and technological tools have been found to have a positive impact on participation in language education studies (Kukulska-Hulme & Shield, 2008).

Engaging students in the activities of the action plans not only promotes active participation but also enhances their retention of vocabulary over a longer period of time. By adopting a student-centered approach, in line with constructivist learning theory, students take responsibility for their learning experiences (Piaget, 1973; Vygotsky & Cole, 1978). This student-centered approach allows for deeper learning and better comprehension (Hmelo-Silver et al., 2007). In this study, students demonstrated their performance and assumed different responsibilities during the implementation of activities related to digital tools, fostering their active engagement in the learning process.

Unlike many studies that often focus on a single learning domain or a few learning domains for vocabulary instruction (Anılan et al., 2011; Bulut, 2013; Çevik, 2011; Demirci & Baş, 2016; Kultas & Ulusoy, 2022), this study developed students' active vocabularies across all learning domains. Addressing multiple learning domains increases the opportunity to cater to students' individual abilities and learning styles (Gardner, 1983; Sternberg, 2003). This approach enriches students' learning experiences and enhances their vocabulary development more effectively. Each of the four action plans in this study specifically targeted different learning domains and employed appropriate digital tools for engaging activities.

The use of digital tools in activities related to the listening domain effectively engaged students in active listening processes. The H5P digital tool, used for creating interactive videos in this study, encouraged students to listen attentively in order to successfully complete the activities embedded in the videos. Literature suggests that employing the H5P digital tool can improve students' listening skills and provide meaningful learning experiences (Dhini & Ardiasih, 2021). The interactive features of this digital tool are particularly effective in teaching new vocabulary and verbs to students (Prades-Yerves, 2022). Various studies have emphasized the capacity of digital tools to enhance listening skills (Chinnery, 2006; Vandergrift & Goh, 2012). Additionally, it was observed that students took notes while listening, further supporting their active engagement in the listening activities.

Indeed, engaging students in speaking activities through the use of digital tools provides them with active engagement in the learning process, leading to more willing participation and increased accuracy in using vocabulary. In this study, students used the digital tool Sitepal to create virtual characters and deliver prepared speeches using the six-hat thinking technique. This level of control over their own speech allowed students to effectively incorporate vocabulary words into their speeches and pay attention to tone of voice and emphasis. Digital platforms focused on vocalization have proven to be beneficial in foreign language learning (Jiang et al., 2022), and text-to-speech programs like Sitepal offer an effective way for students to grasp vocabulary through dictation (Chiang, 2019). The role of digital technologies in developing speaking skills has been widely reported in the literature (Blake, 2013; Warschauer, 1996; Golonka et al., 2014).

When reading texts in a digital environment using various reading techniques, students demonstrate faster comprehension of vocabulary. Digital technologies offer numerous methods and techniques designed to improve students' reading skills (Saine, 2012; Korat, 2010). In this study, the Plotagon digital tool was used for the reading theater technique, creating an animated environment where students read the dialogues of selected characters. By focusing on correct pronunciation, stress, and intonation while reading, students were better able to infer expressions from the contextualized dialog. Literature highlights Plotagon as a pedagogical tool that contributes to students' vocabulary development and provides a meaningful and enjoyable learning environment (Faradisa, 2021). Studies in the literature indicate that the use of digital tools in the reading process positively contributes to students' vocabulary learning, reading comprehension, and willingness to participate in reading activities (Fesel et al., 2018; Mol et al., 2009; Nielen et al., 2018; Zhou & Yadav, 2017).

Indeed, traditional pen and paper writing activities can become monotonous for primary school students, resulting in short and uninspired pieces of writing. Differentiating the writing environment, as done in this study, can address these challenges. By using digital tools such as Fakebook and Pixton, students are provided with engaging platforms to reflect on and present their oral production and written research (Anson, 2021; Metcalf et al., 2016). Creating a profile of the person they were researching using Fakebook not only made the activity enjoyable but also provided a permanent record of their work. The process of creating a digital profile allowed students to delve deeper into the content they were writing about. Similarly, using Pixton to create a comic book offered students the opportunity to create original content while strengthening their understanding and reflection of various elements of the text. With each element of the story requiring determination or creation in the digital tool, students are actively engaged in the writing process. The use of digital tools in creating comics in the classroom has been found to enhance vocabulary development and provide an alternative teaching method (Castillo-Cuesta et al., 2022; Darsalina et al., 2016). Furthermore, it is well known that digital tools play a crucial role in developing writing skills (Warschauer, 2009; Graham & Perin, 2007). These tools can improve students' abilities to organize text, express their thoughts, and apply grammar effectively.

In this study, action plans consisting of activities supported by digital tools were implemented over an 8-week period in a public school classroom. The results show that these action plans had a positive impact. However, despite the emphasis on the positive impact of digital tools in education, Selwyn (2016) has a more critical perspective on the use of technological tools in education. Selwyn states that the use of technology in education does not always increase student achievement, and sometimes it can decrease the quality of education. Therefore, he emphasizes the need for careful planning and a strategic approach for the effective use of digital tools in education. Also, considering the limitations of this study, caution should be exercised in generalizing the results given the duration of the study and the number of participants. Hattie (2009) stated that many studies in education are usually conducted with limited sample groups, and therefore generalizing the results can sometimes be problematic. Long-term and large sample studies have shown that the impact of digital tools on language learning provides more accurate and consistent results. For example, in a large meta-analysis examining the contribution of technology to language learning, Grgurovic et al. (2013) showed that technology-enhanced language learning led to a significant increase in student achievement compared to traditional language learning. However, they found that this effect varied depending on the type of technological tools, duration, and frequency of use.

Recommendations

- Conducting action research in various school settings with similar or different action plans can provide a broader understanding of vocabulary development. This will allow for the exploration of vocabulary improvement from a more holistic perspective and provide insights into effective strategies in different educational contexts.

- Providing in-service training to teachers on action research design can equip them with the necessary knowledge and skills to conduct research in their classrooms. This will enable teachers to actively engage in problem-solving and continuous improvement within their own educational settings.

- Future studies can explore the relationship between vocabulary development and other components, such as reading comprehension or higher-order thinking skills. Investigating these aspects together can provide a comprehensive understanding of how vocabulary learning contributes to overall language proficiency and cognitive development.

Conflicts of Interest

No potential conflict of interest was reported by the author(s).

Ethical Approval

Ethical permission (02.06.2020, 2020/45) was obtained from the Necmettin Erbakan University Social Sciences and Human Research and Publication Ethics Committee institution for this research.

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