Necmettin Erbakan Üniversitesi *Ereğli Eğitim Fakültesi Dergisi* 5*/Özel Sayı (2023), 191-216 | Araştırma Makalesi*

Anlamsal Haritalamanın Etkisi Üzerine Bir Araştırma Çalışması: Dijital ve Kağıt Tabanlı

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Öz

Bu çalışmanın amacı, anlamsal haritalama stratejisinin dijital ve dijital olmayan araçlar kullanılarak kelime edinimi üzerindeki etkisini karşılaştırmaktır. Dokuz Eylül Üniversitesi Yabancı Diller Yüksekokulu'nda çeşitli bölümlerde öğrenim gören 42 öğrencinin katılımıyla yarı deneysel bir araştırma tasarımı gerçekleştirilmiştir. Çalışmada "Dijital Anlamsal Haritalama Grubu" ve "Kâğıt Tabanlı Anlamsal Haritalama Grubu" olmak üzere rastgele oluşturulmuş iki deney grubu bulunmaktadır. Uygulama süreci 6 hafta sürmüştür. Karma desen temelinde, çalışmanın nicel verilerini elde etmek için araştırmacı tarafından geliştirilen ön test ve son test kullanılmıştır. Çalışma süresince her iki grup da aynı okuma parçalarını kullanmış ve dijital/kâğıt tabanlı farklılığı dışında aynı prosedürleri uygulamışlardır. Uygulamanın başarısını değerlendirmek amacıyla, ön ve son testlerden elde edilen sonuçları karşılaştırmak için T-testi kullanılarak istatistiksel analiz yapılmıştır. Çalışmanın nitel verilerini elde etmek için de araştırmacı tarafından hazırlanıp uzman görüşü alınarak düzenlenen yapılandırılmış görüşme soruları kullanılarak her gruptan beşer kişi olmak üzere 10 katılımcı ile uygulanmış ve öğrencilerin anlamsal haritalama stratejisini kullanma motivasyonlarına yönelik bilgi toplanmıştır. Nicel veri analizi, öğrenme sonuçları açısından iki grup arasında anlamlı bir fark olmadığını göstermiştir. Bu sonuç göz önünde bulundurulduğunda anlamsal haritalama stratejisinin hem dijital hem de dijital olmayan araçlarla kullanılmasının yeni kelime edinimi için verimli sonuçlar ortaya koyduğunu söylemek mümkündür. Bununla birlikte, nitel verilerin sonuçları ise, dijital anlamsal haritalama stratejisini uygulayan öğrencilerin kelime gelişimi için daha fazla istek gösterdiğini ortaya koymuştur. Bu sonuca göre, dijital anlamsal haritalama kullanılırken, teknoloji kullanmaya daha alışkın olan öğrencilerin daha yüksek motivasyona sahip olduğu söylenebilir. Bu da çalışmadaki katılımcıların dijital yerliler olmaları ve dijital araçlara aşinalıkları ile ilgili olarak yorumlanabilir.

Kısacası, çalışmanın bulguları hem dijital hem de kâğıt tabanlı anlamsal haritalama stratejilerinin kelime öğrenimini geliştirebileceğini göstermektedir.
*This research was adapted from the master's thesis named "The Effects of Semantic Mapping Strategy on Learning Performances of Prep students: Digital vs paper-based" prepared by the first author under the supervision of the second author.

Anahtar Kelimeler

Anlamsal Haritalama Stratejisi, Dijital Anlamsal Haritalama, Kâğıt-tabanlı Anlamsal Haritalama, Dijital olmayan, Dijital Yerliler

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A Research Study into the Impact of Semantic Mapping: Digital vs Paper-based

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Abstract

This study aims to compare the effect of semantic mapping strategy on vocabulary acquisition using digital and non-digital tools. A quasi-experimental design was carried out with the participation of 42 students studying in various departments at Dokuz Eylül University, School of Foreign Languages. Two experimental groups were randomly formed as "Digital Semantic Mapping Group" and "Paper-based Semantic Mapping Group". The implementation process lasted six weeks. Based on mixed method research design, for the quantitative part of the study, data was collected by the pre-test and post-test developed by the researcher. Both groups used the same reading texts during the study and applied the same procedures except for the digital/paper-based difference. To evaluate the success of the implementation, statistical analysis was performed using T-test to compare the results obtained from the pre/post-tests. In order to obtain the qualitative data of the study, structured interview questions prepared by the researcher and edited by taking expert opinion were applied with 10 participants, five from each group, and information about students' motivation to use the semantic mapping strategy was collected. Quantitative data analysis showed that there was no significant difference between two groups in terms of learning outcomes. Based on this finding, it is possible to say that using the semantic mapping strategy with both digital and non-digital tools yields efficient results for new vocabulary acquisition. However, the findings of the structured interviews revealed that students who applied the digital semantic mapping strategy showed more enthusiasm for vocabulary development. Based on this result, it can be said that students who are more accustomed to using technology have higher motivation when using digital semantic mapping. This can be interpreted in relation to the participants in the study being digital natives and their familiarity with digital tools.

Keywords

Semantic Mapping Strategy, Digital Semantic Mapping, Paper-based Semantic

Mapping, Non-digital, Digital Natives

Citation

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Introduction

Learning, retaining, and applying the meanings and uses of new words can be difficult when learning a language. As a result, students tend to employ various strategies. One of them is the semantic mapping strategy. It makes this process simpler for language learners and makes it easier for them to comprehend, remember, and utilize new concepts. Since the semantic mapping strategy enables language learners to place words in semantic contexts and connect them to underlying knowledge networks, it plays a significant role in language learning and vocabulary learning procedures (Bouchard, 2005). As a result, word meanings become easier to learn and remember.

Semantic mapping strategy could stand out as one of the most effective learning sources. Rosário (2021) claims that semantic mapping is a helpful learning approach because it enables students to see, classify, and notice how words and ideas are connected to one another semantically because of their connections and interactions. Learners are given the opportunity to remember, organize, and visually represent the information read by using the semantic mapping strategy. By participating in such an activity, learners are encouraged to consider their prior knowledge of the subject, and it provides a useful way to improve important words and phrases and help them incorporate the new language into their existing schemata (Heimlich & Pittelman, 1986). Semantic mapping also aids learners in learning new words by organizing known words into a network of words with relevant semantic features.

One of the most important areas in which technology is used is education (Çoklar & Çalışkan, 2019). With the advance in technology, learners' strategies have also changed in response to the incorporation of digital resources in second and foreign-language instruction. In order to create semantic maps in digital settings, learners have started using a variety of tools and online resources (Armstrong, Tucker & Massad, 2009). A significant change in their choices is highlighted by their rising enthusiasm for using internet resources to learn languages.

Semantic Mapping Strategy

Many experts and scholars have provided numerous definitions of semantic mapping. For instance, semantic maps are described by Heimlich and Pittelman (1986) as graphics that show learners how words are interrelated. Additionally, they assert that the semantic mapping strategy is not new; it has been around for years under several names, including semantic webbing, semantic networking, and plot maps. According to Silberstein (1994), semantic maps are techniques that enable learners to show their understanding of the relationships between concepts in a text by developing a semantic map. Semantic Mapping is described by Antonacci (1991) as a picture of a conceptual

relationship and an image of knowledge. Lewis (1993, p. 118) also defines semantic mapping as "the main way of organizing lexical content because there is an explicit organizational principle and coherent real-world context, and it has obvious advantages or randomly occurring vocabulary". For Bromley (1992), semantic maps or webs are visual representations of information categories and their connections.

Heimlich and Pittelman (1986) regard the semantic mapping approach as an example of a visual organizer. To further explain, graphic organizers are used by educators as tools to assess students' prior understanding of a topic or text in groups or individually. They are used inside the text to illustrate the significance of the material and its organizational structure, which improves learning. These methods make it easier to identify conceptual linkages using spatial visualizations. Furthermore, it is thought that graphic organizers help learners connect new material to their prior knowledge and structure thoughts and concepts. In essence, they give students the ability to organize information visually and graphically, highlighting the links between different pieces of information.

The use of this strategy has been found to improve vocabulary and reading comprehension by researchers (Al-Otaibi, 2011; Heimlich&Pittelman, 1986; Oxford&Crookall, 1989; Situmorang, 2017; Rosário, 2021). Employing this strategy, it is possible to determine the meaning and content of the words used in a text. According to Badr (2017), the semantic mapping technique is applied in the classroom by writing on the board several joined circles, squares, ovals, or lines among some of the essential words that need to be learned and some related words that are already comprehended. A core idea or a key concept is included in semantic maps, associated with the categorized concepts that are related to the main idea or key concept.

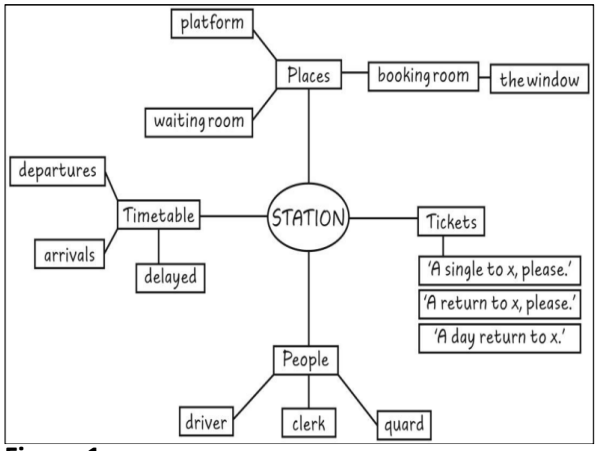

Figure 1.

An example of semantic mapping (Scrivener, 2011, p. 202)

The process starts with learners writing a topic or key idea in the middle box, and then they add relevant subheadings to the surrounding boxes. Following that, they compile and organize the words under these subheadings, creating a relationship by a line between each new word and the relevant box. The technique suggested may offer learners advantages over traditional lists. This is because it can imitate how human thoughts construct lexical item networks. To give an example, as Figure 1 shows, consider the word "station" as the main word. Corresponding subheadings might include "places," "timetable," "people," "things to buy," and so on.

Digital Semantic Mapping Strategy

Typical areas of semantic mapping usage in language teaching include vocabulary retention (Stoller & Grabe, 1993), general vocabulary development, pre- and post-reading, and study skill technique (Heimlich & Pittelman, 1986). In addition to these areas, as technology developed, the application of software for semantic mapping strategies attracted the attention of educators and learners in a variety of industries. The necessity of incorporating digitalization into the field of education has been highlighted, especially in recent years, by the widespread appeal of technology, which captures the younger generation and takes up a substantial amount of their time. Thus, this software has begun to find its place in the field of language education. Computer applications in education have made it possible to design environments that are both more effective and efficient for learning and teaching (Kaleci & Cihangir, 2019).

Semantic Mapping has many applications in and out of the classroom. Teachers and students use digital semantic mapping as a method of instruction and learning to arrange information and concepts in a way that is simple to

understand and place in context (Bhattacharya&Mohalik, 2020). By integrating text and images, digital semantic maps demonstrate the connections between ideas, words, and information, which create a visual and concrete output.

Stanley (2013) claims that utilizing digital or computer-based materials can considerably improve students' vocabulary development. This is due to the interesting and creative presentations that these materials provide, which in turn help students remember words more effectively. These materials' interactive layout enables students to interact with words and phrases directly, which further encourages vocabulary acquisition. Digital semantic maps are seen to be efficient as well as engaging since they depend upon employing incredibly rapid and specialized computer software that includes pictures, colours, and illustrations appealing to the reader according to Naghmeh-Abbaspoura et al. (2019). The learners' good feelings toward English can be related to the emphasis of digital semantic maps on the straightforward and adaptable use of colours, forms, and images in unique digital ways.

Additionally, when teachers expertly guide their students in using digital learning tools appropriately and smoothly incorporate them into the curriculum, the students not only improve their existing knowledge but also develop the crucial practice of lifelong learning. This ability is transferable outside of the classroom and is useful in a variety of settings. It is important to note that using digital semantic maps to study vocabulary gives students a special way to express themselves and build visual links between concepts and lexical items. Essentially, this strategy increases productivity by simplifying the idea development, analysis, information organizing, and retrieval processes.

As a result of all these aforementioned characteristics, digital semantic maps have become widely used in almost every field as they can be easily and quickly built by using software. The most well-known software programs for digital semantic mapping include MindManager, MindGenius, FreeMind, Inspiration, MindMeister, and MindView (Armstrong, Tucker&Massad, 2009), as well as Xmind, Mindjet, MindGenius, Mindomo, Coggle, TheBrain, and Padlet (Bhattacharya & Mohalik, 2020).

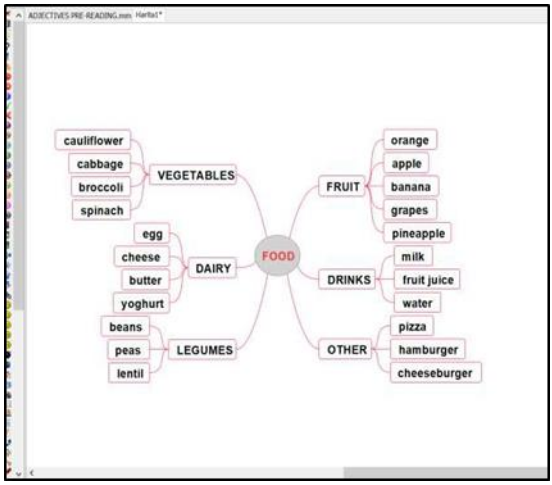

Figure 2.
An example of digital semantic mapping created through Freemind

Previous Studies on Semantic Mapping

The value of vocabulary in language learning, especially for its connection to background knowledge, is becoming more widely acknowledged. The necessity of vocabulary acquisition in this context has led to research into the efficacy of semantic mapping, which is a technique based on using semantic networks, in a variety of fields. Thus, many studies have been conducted on semantic mapping.

The impact of semantic mapping techniques on language learners' reading comprehension was extensively examined by Taghavi and Sadeghi (2008) and El Koumy (1999). While Taghavi and Sadeghi (2008) examined gender-related differences in strategy efficacy and concluded that semantic mapping considerably improved reading comprehension regardless of gender, El-Koumy (1999) examined several teaching strategies and concluded that the teacher-student interactive approach is preferable. A common topic in the studies of Thuy (2013) and Altay (2017) is the positive impact of semantic mapping on vocabulary learning. In addition to Altay's research, which highlights its significant impact on growing vocabulary quantity, Thuy's study shows how semantic mapping helps students remember word meanings more successfully. Studies by Karamifard and Minaeifar (2016) and Al-Otaibi (2011) both focus on technology-assisted learning. Al-Otaibi is interested in computer-assisted semantic mapping and how it affects vocabulary and reading comprehension in a variety of ways. The perception scores of students using digital and traditional mind-mapping methodologies are compared in Karamifard and Minaeifar's study, which reveals that the digital group received higher results. Keles (2012) and Kılıçkaya (2020) also emphasize the use of mind maps as a teaching tool. The study by Keles (2012) highlights the advantages of mind maps for planning,

assessment, and student participation in the classroom. Similarly, Kılıçkaya (2020) examines cooperative digital graphic writing using semantic mapping, highlighting its potential to improve student engagement and memory.

Some researchers investigated how technology might improve educational outcomes. The systematic review by Rosário (2021) supports the idea that vocabulary learning can be enhanced by computer-assisted semantic mapping. In addition, it was found that digital mind mapping software can simplify knowledge and encourage active student participation, according to Bhattacharya and Mohalik (2020).

In conclusion, these studies show how semantic mapping affects language learning in a variety of ways, including vocabulary development, reading comprehension, technology integration, and instructional strategies.

Research Questions

This study aims to find out the effects of semantic mapping strategy on learning through digital or paper-based means. With this objective in mind, the study seeks out answers to the following research questions:

1. Is there a significant difference between the pre-test and post-test scores of the digital semantic mapping group?
2. Is there a significant difference between the pre-test and post-test scores of the paper-based semantic mapping group?
3. Is there a significant difference between the post-test scores of the digital semantic mapping group and the paper-based semantic mapping group in terms of their improvement?
4. Is the semantic mapping strategy an effective way to learn new words for both the digital semantic mapping group and the paper-based semantic mapping group?

Methodology

Research Design

This study employed a mixed-method research design. According to Johnson et al. (2007, p. 123) mixed method research means that a researcher or group of researchers combines aspects of both quantitative and qualitative methods (e.g., employing qualitative and quantitative views, data collection, analysis, and inference processes) for the broader objectives of both breadth and depth of comprehension and verification. The biggest advantage of the mixed method is to obtain results with high reliability by using both quantitative and qualitative methods (Kıymet & Çakır, 2021). As there are two experimental groups to be tested, a quasi-experimental design seemed appropriate and was employed within the study. Aspects that distinguish the quasi-experimental

design apart from the experimental design are not requiring a control group, random assignment or selection of participants and being less rigorous (Loewen&Plonsky, 2017).

Participants

This quasi-experimental study was carried out in the 2022-2023 Academic Year at the School of Foreign Languages, Dokuz Eylül University with the participation of 42 intermediate-level EFL learners between the ages of 18 and 20. The demographic information about the participants of the study is presented below (See Table 1). Two groups consisting of 21 students were randomly assigned as the "digital semantic mapping group" and the "paper-based semantic mapping group" as there was no significant difference found between the pre-test scores (See Table 2). They were randomly selected from intact classes for the quantitative part of the study. As for the qualitative part of the study, the researcher herself conducted the interview questions with 10 participants (See Table 1) on a voluntary basis. The process stopped when data saturation was reached with repeated replies.

Table 1.

The Number and the Gender Information of the Participants

	Quantitative part of the study		
	Female	Male	Total
Digital Semantic Mapping Group	9	12	21
Paper-based Semantic Mapping Group	11	10	21
Total	20	22	42
	Qualitative part of the study		
	Female	Male	Total
Digital Semantic Mapping Group	2	3	5
Paper-based Semantic Mapping Group	2	3	5
Total	4	6	10

Table 2.

The Results of Independent T-Test for Pre-Test Scores

Groups	N	Mean	SD	t	P
Group 1	21	8.52	3.20	.056	.956
Group 2	21	8.57	2.27		

N: the number of participants / Mean: the average determined by dividing the total test scores belongs to a particular group / SD: a measurement of the data's degree of dispersion with respect to the mean / t: the size of the difference in relation to the variation in the sample data / P: significant differences

In order to compare the means of the groups, a T-test was carried out on the pre-test findings. The outcomes of the analysis show that the mean scores of the Group 2 were M: 8.57, SD: 2.27, while mean scores of the Group 1 were M: 8.52, SD: 3.20. The t value at the significance level of .956 for the analysis of the table was. 056. P value being > 0.05. No significant difference was found between the two groups.

Instruments

The quantitaive data was collected by a test which was used both as a pre-test and a post-test. A vocabulary test was in use which was finalised under the guidance of field and scale development experts at the end of the pilot study. The pilot study was conducted on 120 prep students in order to verify the reliability and validity of the test. Found to be reliable (Cr. 0.89), the test was ready to be used as the pre-test and post-test within the implementation process. The test included 30 satisfactory, valid, and reliable multiple-choice questions with 30 different target words in accordance with the reading texts the participants would be required to read (See Figure 3). Also, reading texts with the topics of adjectives, technology, films, crime, art and nature, and maps (for both digital and paper-based) were employed to provide content for the data collection procedures. Reading topics may be seen in Table 3.

Choose the correct one.

1- The ---------- was sentenced to twenty years after he killed his partner.

a) witness b) murderer c) victim d) evidence

2- She's the ---------- of my favourite children's books.

a) author b) copy c) novel d) series

3- We were all impressed by the ---------- of the film. It was composed by a famous singer.

a) soundtrack b) plot c) action d) special effect

4- Do you know that fish can change the colour of their ---------- instantly?

a) paws b) scales c) branches d) tails

5- Hans and I ---------- after we graduated from university so I don't know whether he works or not.

a) stayed in touch b) invented c) shared d) lost touch

Figure 3.

Sample Questions for the Achievement Test

Table 3.
Topics for the Reading Texts

WEEK	*TOPIC*	*READING TEXT*	*TARGET WORDS*
1	*Adjectives*	*No Laughing Matter*	*Funny, social, honest, embarrassed, friendly, nervous*
2	*Technology*	*Technology and Change*	*Share, invent, social media, power, circle, lose touch, stay in touch, devices*
3	*Crime*	*The Greatest Unsolved Crime*	*Examine, witness, victim, evidence, murder, murder, solve, terrorise*
4	*Art*	*Six of the Best, Biggest, and Most Popular*	*TV series, copy, novel, author, copy, award, download*
5	*Films*	*Classic Films You Must See*	*Plot, direct, special effects, soundtrack, film, star, nominate, action*
6	*Natural Environment*	*Animals Have Adapted to Survive Everywhere*	*Fur, skin, paw, feather, scale, petal*

To collect further data, structured interviews were employed as the chosen method for data collection following a six-week implementation period. The interview questions were thoughtfully developed and organized by the researcher under the guidance of field experts and the consultancy of a qualitative educational research expert, aligning with the research objectives and focusing on aspects such as students' preferences, perceptions, and concerns regarding the utilization of the semantic mapping strategy.

Implementation Process

In this mixed-method research design study, quantitative data was collected by utilizing a pre-test and post-test, and then qualitative data was obtained by conducting structured interviews by the researcher to get further information and verify the results gathered through the quantitative data.
Using semantic mapping strategy, the digital semantic mapping group studied target vocabulary through digital means while the paper-based semantic mapping group used non-digital means during the implementation process (six weeks), where the researcher acted as the instructor for both groups.

In the first week, both groups took the pre-test which took about 30 minutes on the same day. Throughout the process, the digital semantic mapping group was asked to create semantic maps using digital means (using the software FreeMind, which appears to be the most widely used mind

mapping program for the education, business, and government sectors according to Armstrong, Tucker and Massad (2009)). FreeMind provides the core building blocks for map generation by giving users a variety of options for linking additional information to maps. Users can develop connections to online sites, local files, exe files, and any type of file. On the other hand, the paper-based semantic mapping group developed the maps using paper and pens. The procedure went on the same way for six weeks, with different topics and different reading texts. At the final stage of the study, the post-test was conducted on both groups in the following week to examine the effects of the implementation. Some selected products are presented below:

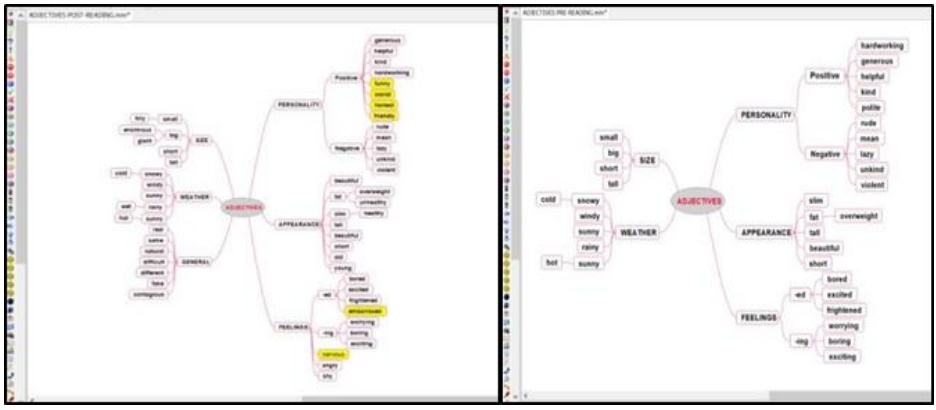

Figure 4.

Examples of a digital semantic map for "Adjectives" before and after reading created by the participants in the Digital semantic mapping group (for further information please check the original study- MA thesis)

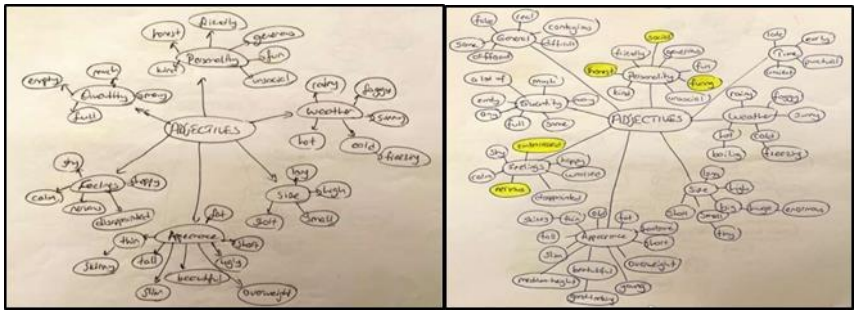

Figure 5.

Examples of a paper-based semantic map for "Adjectives" before and after reading created by the participants in the Paper-based semantic mapping group

Data Collection and Data Analysis

The purpose of this study was to compare the digital semantic mapping group, in which the strategy was implemented digitally, and the paper-based semantic mapping group, in which the strategy was employed non-digitally. The results were examined using the SPSS 21.0 version. Prior to the main analysis, a normality test was carried out, and then the T-test was determined. The quantitative results were obtained using a dependent T-test for repeated measures and a T-test for independent groups.

The researcher also conducted face-to-face, structured interviews with the participants in order to analyse their views and ideas concerning the application of the semantic mapping strategy. More information and better comprehension of the quantitative findings were given to the researcher by the responses to these interview questions. One week after the implementation, voluntary interviews were held with the 10 randomly chosen students. The participants were divided equally between the paper-based and digital semantic mapping groups. They also received detailed explanations of the interview procedure. To make participants feel comfortable discussing their ideas, feelings, and experiences related to the themes discussed during the interview, the researcher also provided them with an ideal setting. Turkish, the participants' mother tongue, was used throughout the interviews to help them be more open with their feelings. Following the interviews, content analysis was employed following the steps in Creswell and Creswell (2018). Recordings were transcribed and then translated. Repeating patterns were categorised, and overlapping codes were found. Under the consultancy of a qualitative educational research expert, validity and reliability were checked. Two outside researchers were asked to classify the themes according to the Miles and Huberman (1994) formula for the inter-rater reliability, and the final reliability was calculated as 0.90.

Findings

Normality Test

Table 4.

Normality Test Results

	Kolmogorov-Smirnov		Shapiro-Wilk	
	df	p	Df	p
	42	0.68	42	0.53

P< 0.05

It was determined from the results of the normality test that both variables had a normal distribution (p-value > 0.05). Parametric statistical techniques were used for the study as a result of the normal distribution of the data. A T-test was used in order to find out whether there were any differences between the two variables.

Findings Related to the Pre-test and Post-test of the Digital Semantic Mapping Group Students

Table 5.

The Results of Paired Samples T-Test for the Pre-Test and Post-Test Scores of the Digital Semantic Mapping Group

Tests	N	Mean	SD	t	P
Pre-test	21	8.52	3.20	21.73	.000
Post-Test	21	26.52	2.96		

The findings revealed that the average scores for the digital semantic mapping group's pre-test and post-test assessments of academic achievement were X=8.52 and X=26.52. When the table was analysed, it was seen that there was a significant difference between the pre-test and post-test averages of the students in the group who participated in the digital semantic mapping (t= 21.73; p. 000) in favour of the post-test group with a high effect size (Cohen's d=4.73).

Findings Related to the Pre-Test and Post-Test of the Paper-based Semantic Mapping Group Students

Table 6.

The Results of Paired Samples T-Test for the Pre-Test and Post-Test Scores of the Paper-based Semantic Mapping Group

Tests	N	Mean	SD	t	P
Pre-test	21	8.57	2.27	20.03	.000
Post-Test	21	26.14	3.52		

The results revealed that the pre-test and post-test averages for academic achievement of the paper-based semantic mapping group were X=8.57 (pre-test) and X=26.14 (post-test). When the table was analysed, it turned out that there was a significant difference between the pre-test and post-test scores of the paper-based semantic mapping group (t=20.03; p. 000) in favour of the post-test group with a high effect size (Cohen's d=4.35).

Findings Related to the Post-test of the Digital Semantic Mapping Group and Paper-based Semantic Mapping Group Students

Table 7.

The Results of Independent T-Test for Post-Test Scores of the Digital Semantic Mapping Group and the Paper-based Semantic Mapping Group

Groups	N	Mean	SD	t	P
Digital Semantic Mapping Group	21	26.52	2.96	.379	.707
Paper-based Semantic Mapping Group	21	26.14	3.52		

When the table was analysed, it was clear that there was no statistically significant difference between the post-test achievement averages of the digital semantic mapping group and the paper-based semantic mapping group (t=.379; p>.05). According to the results, the post-test mean scores for academic achievement were found to be 26.52 for the group using digital semantic mapping and 26.14 for the group using paper-based semantic mapping.

Findings of the Interview

The interview questions given below were addressed to the participants of both experimental groups- Digital semantic mapping and Paper-based semantic mapping-. Following the content analysis, a table classifying themes providing relevant statements was created and displayed (See Table 8).

Q1. "How was the process of learning vocabulary with semantic mapping strategy, what did you like and what did not you like in this process?
Q2. "What are your views on the semantic mapping strategy, do you think you will use this strategy to learn new words in the future?"

Table 8.

Main themes on perceptions about Semantic Mapping Strategy (Digital & Paper-based) (*PD: Participant of the *Digital* Semantic Mapping Group/PP: Participant of the *Paper-based* Semantic Mapping Group)

Themes	**Sub-themes**	
T1.Positive	T1.1 Effectiveness& motivation	*"I liked realising that I actually knew a lot of words when I was using this strategy. It motivated me." (PD1)* *"It was a method that I normally never knew and one of the most important issues in learning English is to learn vocabulary. In this way, it made me realise my own learning style by using a different strategy. It was a very good experience for me…Using new methods instead of traditional ways can make the lesson more engaging, and participating so actively in it can make it more interesting and fruitful. (PD5)*
	T1.2 Permanence	*"… learning vocabulary in this way was more enjoyable, efficient and permanent." (PD4)* *"It was an active study that enabled me to learn efficiently in the lessons. I believe that the words learnt in this way are more permanent than other methods." (PD3)* *"…As a result, knowledge gained through research becomes more permanent….since it forces you to do research, it is a bit far from memorisation and you need to know the words you don't know or another word while looking at a word. While learning a word, the vocabulary expands more because you learn two or three extra words. At the same time, it is more permanent as it is not memorised." (PP2)*
	T1.3 Fun element	*"…it was quite enjoyable for me…it will definitely be easier to memorise with this semantic mapping strategy." (PtHEP4)*
Themes	**Sub-themes**	
T2. Negative	T2.1 Time-management	*"…it took a lot of time to think about the words I knew while creating the maps and not remembering the English equivalents of the words I knew caused me to panic. A process that can be very productive for students with extensive vocabulary knowledge was challenging for students like me who have vocabulary difficulties." (PD2)* *"Making maps is quite challenging. That can take some time, as well." (PD3)* *"It is a little difficult and, as I mentioned, only applicable to people with more time. You might find it challenging to categorise if you are working alone." (PP1)* *"If I need to make a negative comment on this subject, I don't like that it takes a long time…. (PP5)*

	T2.2 Background need &appropriateness	*"This method needs a strong background to be effective." (PD3)* *I think that the semantic mapping strategy is more useful for children and therefore, it may be boring for an individual with a background. I think it will be very effective only when used by children." (PP5)*
	T2.3 Practical difficulties	*"First of all, to mention them, many papers will be needed. And after a certain period of time, those papers will be lost. Finding them will be difficult for me." (PP4)*

Themes	**Sub-themes**	
T3.Potentials for future use	T3.1 More likely	*"In general, it is an effective and motivating method. I want to use it as much as possible. I believe that it will become more practical as I use it and I will learn the words more permanently because I make an effort." (PD5)* *"I plan to use it as much as possible from now on." (PD1)* *"I have used the semantic mapping strategy for different purposes before. Now I am thinking of using it for learning vocabulary." (PD2)*
	T3.2 Hesitant or Unlikely	*"I do not think I will use this method from now on because I think the negative aspects outweigh the advantages. I am more familiar with traditional vocabulary learning techniques; I think I would prefer them." (PP4)* *"I usually use it for things like what I did in a day, what I need to do, but I don't think I will use it for acquiring new words." (PP1)*

All the students that participated in the digital semantic mapping group considered the vocabulary acquisition process to be beneficial and reported that it improved their engagement, motivation, and self-awareness. Two participants added that using a digital platform for studying helped them acquire vocabulary and give their learning more permanence. Some participants, however, spent a lot of time making the maps (PD1, PD2, PD3, PD4), or needed a strong background (PD3). Regarding the advantages of the paper-based semantic mapping strategy, three participants stated that this strategy is entertaining (PP4), might speed up the process of learning new words (PP1), and might contribute to long-term memory (PP5). On the other hand, participants have provided a variety of comments on the negative aspects of the semantic mapping strategy. The disadvantages mainly relate to the amount of time needed (PP1, PP2, PP3, PP5), age appropriateness (PP4, PP5), and practical difficulties in organizing maps (PP4).

The semantic mapping strategy is regarded as an efficient, long-lasting,

and motivating strategy by each participant of the digital group, and every participant said that they intended to use it in some way. However, based on the responses of the participants to this question, it seems that many of the participants in the group who used the paper-based semantic mapping strategy were uncertain and hesitant (PP1, PP3, PP4, PP5) due to time-related concerns or a preference for traditional techniques.

Discussion

The results of the study will be analysed in relation to the research questions.

RQ1: Is there a significant difference between the pre-test and post-test scores of the digital semantic mapping group?

The mean levels of academic achievement for the digital semantic mapping group were significantly different between the pre-test and post-test. The findings indicated that the digital semantic mapping group's average academic achievement pre-test was X=8.52 and post-test was X=26.52 (p=.707>.05) (See Table 4). These findings could very well imply that the digital semantic mapping group's application of the strategy was successful and that applying the semantic mapping procedure digitally could be an effective strategy for learning new words in a second or foreign language. The significant difference between the pre- and post-test findings suggests that the digital semantic mapping strategy greatly contributed to language learning. Therefore, using the digital semantic mapping strategy to learn new words in a second or foreign language could be considered as an effective strategy. Teachers and language learning experts can use this strategy to improve their students' language proficiency. In other words, the results of the pre- and post-tests showed a significant difference, showing that the digital semantic mapping strategy had a significant effect on the students' language development similar to some studies in the literature (Al-Otaibi, 2011; Bhattacharya&Mohalik, 2020; Kılıçkaya, 2020, Rosário, 2021). This result highlights the need to use interactive, advanced technology in language education.

RQ2: Is there a significant difference between the pre-test and post-test scores of the paper-based semantic mapping group?

The findings showed that the paper-based semantic mapping group's pre-test and post-test averages for academic achievement were X=8.57 (pre-test) and X=26.14 (post-test). At p=.000>.05, a significant difference was found (see Table 5). These findings indicate that paper-based semantic mapping is an effective strategy for increasing vocabulary knowledge and that the use of non-digital semantic mapping strategies improves academic achievement. With the findings of the post-test and pre-test showing a significant difference, paper-based semantic mapping may be suggested as a useful technique for learning new words. Similarly, at Urmia University, one of the objectives of Taghavi and

Sadeghi's (2008) study was to examine the effectiveness of teaching the semantic mapping approach and its effects on related context, reading comprehension. The results demonstrated that teaching semantic mapping to students had a significant impact on their reading comprehension and that students' reading comprehension significantly improved after receiving this training.

RQ3: Is there a significant difference between the post-test scores of the digital semantic mapping group and the paper-based semantic mapping group in terms of their improvement?

There was not a significant difference in the pre-test averages of academic achievement between the groups using the digital semantic mapping strategy and the paper-based semantic mapping strategy at the start of the study. In this context, this may be stated as equality. Similar findings were made regarding the results of the post-test scores for the two groups (see Table 6). Between the pre-test and post-test results within each group, both groups displayed a significant difference (See Tables 4 and 5). These results show that after the implementation, the achievement scores of the groups developed at the same level. It is therefore possible to draw the conclusion that the semantic mapping strategy itself has a significant impact on vocabulary learning, whether it is carried out digitally or non-digitally. In the literature, some studies comparing the digital semantic mapping strategy with traditional semantic mapping can be found. As a contradictory finding to this study, Karamifard and Minaefier (2020) reported that students' performance increased substantially in both groups, with a significant difference in favour of the digital group.

RQ4: Is the semantic mapping strategy an effective way to learn new words for both the digital semantic mapping group and the paper-based semantic mapping group?

The statistical findings revealed a substantial difference between the pre- and post-test scores for both the digital semantic mapping strategy group and the paper-based semantic mapping strategy group. This showed the effectiveness of the semantic mapping strategy as a technique for vocabulary learning. The researcher also interviewed ten participants in structured face-to-face interviews to get their viewpoints in order to obtain more data.

In light of participant comments, it was determined that the digital semantic mapping group was more motivated. They underlined that the digital semantic mapping strategy improved their motivation and boosted self-awareness, particularly in the context of online education. Participants remarked that their motivation to keep learning came from realising that they noticed more words than they knew at first. Additionally, some participants, who were digital natives, thought it was advantageous to learn a language on a digital platform. The participants in the paper-based semantic mapping group asserted that this strategy could speed up the process of memorisation of new words and

enhance learning. Moreover, it was considered that adding visuals would help with word recall. However, it was noted that such a strategy might not be as effective for fewer experienced language users and that it would be more effective for young language learners. Also, both groups discussed various difficulties they had during this procedure. For instance, several participants reported having issues remembering words they already knew or finding it time-consuming to create the maps, which made it more challenging for learners with less language proficiency to overcome these challenges. Despite these difficulties, all participants in the digital semantic group stated that they would use this strategy in the future, but the students in the paper-based group were hesitant or resistant about this issue.

In a nutshell, the digital semantic mapping strategy group may be seen as more motivated based on the interviews, considering their tendency to have a more positive perspective toward the semantic mapping strategy. The participants in this group agreed that this strategy made learning more enjoyable, effective, and permanent. This result is consistent with that of Chalak and Rastgoo's (2021) research. According to the findings of the analysis, the participants had positive feelings about mind mapping, particularly the digital technique.

To overall discuss both the quantitative and qualitative findings of the study, some inferences could be made. First, considering the quantitative part of the study, the positive results of the digital semantic mapping group and the paper-based semantic group have suggested that semantic mapping is an effective strategy for learning new vocabulary no matter how it is applied, with digital means or paper-based. This might be implicated as positive reflections of the strategy on the vocabulary learning experiences of both groups. Additionally, however, the interview results showed that students who used the semantic mapping strategy with digital means were found to be comparatively more eager and motivated to utilize the semantic mapping strategy for vocabulary learning after the implementation and hold potential for future use of the strategy. This might well be explained with the digital tendencies of the age group and their being digital natives. Studies conducted on semantic mapping revealed enhancement in vocabulary acquisition (Al-Khasawneh& Alhawamdeh, 2023; Feng, Alsager, Azizi & Sarabani, 2023; Palma, 2023) in line with the findings of the present study. Also, motivational inclinations given by the qualitative findings of the present research are also supported by the studies (Abbasioğlu Ünalır, 2019; Feng, Alsager, Azizi & Sarabani, 2023; Wahab & Astri, 2022) reviewing the literature. The factor revealing the significance of the study is that both digital and paper-based means were applied within, also highlighting students' insights.

Conclusion

Many students struggle with effective vocabulary learning strategies and

mostly rely on traditional methods like making lists or looking into dictionaries. These methods might allow for instant comprehension, but they usually hinder the long-term retention of the target vocabulary.

While long-term memory has a large capacity and keeps knowledge permanently, short-term memory normally has a maximum capacity of seven pieces of information and diminishes after 24 hours. The ability to effectively use long-term memory is essential for language learning, especially when acquiring new words. Combining prior knowledge with new information is an essential component of language comprehension and vocabulary development. It can be difficult to learn and remember new words when learning a language. As a result, to make the process effective, learners need to employ a variety of vocabulary learning strategies, such as the semantic mapping strategy. By placing words in contexts, the semantic mapping strategy speeds up this procedure and helps words be understood, retained, and applied. By facilitating connections to the existing knowledge networks, this strategy improves language and vocabulary learning and, consequently, increases comprehension and retention of the vocabulary.

With the advancements in technology, learners' strategies for learning vocabulary have also changed in favour of using digital resources for language acquisition. A growing number of individuals, especially digital natives, have shown interest in making semantic maps using digital tools. These applications offer new ways of expanding one's vocabulary and give learners the chance to integrate technology into their learning. Thus, implementing and varying language learning settings would not only improve vocabulary learning using strategies like semantic mapping but also generate better results, including enhanced interest and motivation among learners in the learning process.

Implications and Suggestions for Further Research

This study aims to identify whether different vocabulary learning techniques, such as the semantic mapping strategy, may help learners effectively acquire languages. However, as the study has some limitations such as time, and number of the participants, more research is needed to make more general inferences about this issue.

The present study was conducted on 42 students at a prep school in Turkiye, with an implementation which lasted for six weeks. Thus, further studies might be conducted with a larger sample size at different levels or age groups, in private institutions to obtain further and more varied data. A free version of digital semantic mapping was employed in the present study. Different applications that can be utilized on computers, laptops or mobile phones might also be tools for further research. Also as the participation of the researcher may be regarded as a limitation, further studies might be conducted under the instruction of another teacher to check for the difference with the results.

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