A Systematic Compilation Study on Digitalization in Language Education[*]

Dil Eğitiminde Dijitalleşme Yönelik Sistematik Bir Derleme Çalışması

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ABSTRACT

In this study, research on the use of digital tools in language education was classified according to the determined categories (method, purpose of the study, research group, sample size, data collection tool, data analysis method) and it was aimed to determine the effect of digital tools on students' acquisition of language skills. In the study, in which the systematic compilation method was used, a literature review was made first, and a total of 146 studies, 64 of which were articles and 82 theses, were reached. 146 studies; method, purpose, research group, sample size, data collection tool and data analysis method. In the review, a significant part of the studies examining the effect of digital tools on language acquisition were carried out in foreign language education (81.63%), the most quantitative research method (60.95%) was used, the majority of the studies aimed to provide information about the integration of digital tools into language education (18.24%). It is seen that the sample is between 50-100 people (53.53%), the sample is mostly selected from university students (64.64%), the most tests (53.90%) are used as the data collection tool, and the t-test (65.04%) is used the most as the data analysis method. In order to determine the effect of digital tools on individuals' acquisition of language skills, a meta-analysis was conducted with 26 data in mother tongue education, 52 data in foreign language education, and 74 data in language education. The effect of digitalization on foreign language education is large (0.80), its effect on mother tongue education is moderate (0.46), and its effect on language education is moderate (0.63). According to the subgroup analyzes, while digitalization in language education does not make a statistically significant difference according to school type, it differs significantly according to research type and language skills.

ÖZ

Bu çalışmada, dil eğitiminde dijital araçların kullanımına ilişkin yapılan araştırmalar belirlenen kategorilere göre (yöntem, çalışmanın gerçekleştirilme amacı, araştırma grubu, örneklem büyüklüğü, veri toplama aracı, veri analiz yöntemi) sınıflandırılmış ve öğrencilerin dil becerilerini edinmesinde dijital araçların etkisini tespit etmek amaçlanmıştır. Sistematik derleme yönteminin kullanıldığı araştırmada öncelikle alanyazın taraması yapılmış, 64 makale 82 tez olmak üzere toplam 146 çalışmaya ulaşılmıştır. 146 çalışma; yöntem, amaç, araştırma grubu, örneklem büyüklüğü, veri toplama aracı ve veri analiz yöntemine göre incelenmiştir. Yapılan incelemede dijital araçların dil edinimine etkisinin incelendiği çalışmaların önemli bir kısmının yabancı dil eğitiminde gerçekleştirildiği (%81.63), en çok nicel (%60.95) araştırma yönteminin kullanıldığı, çalışmaların önemli kısmında dijital araçların dil eğitimine entegrasyonuna ilişkin bilgi vermenin (%17.80) amaçlandığı, çoğunlukla 50-100 kişi aralığındaki (% 53.53) örneklemle çalışıldığı, en fazla üniversite (%64.64) öğrencilerinden örneklem seçildiği, veri toplama aracı olarak en fazla test (%53.90), veri analiz yöntemi olarak en fazla t testi (%65.04) kullanıldığı görülmektedir. Dijital araçların, bireylerin dil becerilerini edinmeleri üzerindeki etkisini belirlemek amacıyla ana dili eğitiminde 26, yabancı dil eğitiminde 52, dil eğitiminde ise 74 veri ile meta-analiz yapılmıştır. Dijitalleşmenin yabancı dil eğitimine etkisi geniş (0.80), ana dil eğitimine etkisi orta (0.46), dil eğitimine etkisi orta (0.63) düzeydedir. Yapılan alt grup analizlerine göre, dil eğitiminde dijitalleşme okul türüne göre istatistiksel olarak anlamlı farklılık yaratmazken araştırma türüne ve dil becerilerine göre anlamlı farklılık göstermektedir.

Anahtar Sözcükler: *Ana dil eğitimi, Yabancı dil eğitimi, Sayısallaştırma, Meta-analiz.*

INTRODUCTION

Developments in digital technologies have brought about changes in the lifestyles, habits, leisure activities and especially the learning styles of the generation born in 1980 and after compared to the previous generations. The fact that this new generation, named by Prensky (2001) as digital native, spends too much time with digital tools has changed the way their brains work and it has become necessary to include visual stimuli in the learning process for success. The digital tools that have emerged and developed rapidly in the last two decades have transformed the lesson process where only books and blackboards are used into boring time frames that do not help students learn and pass exams. In the rapidly changing technological environment, the ability of the schools to attract students and provide learning will only be possible by filling the gap

between the lives inside and outside the school using digital tools (Baniabdelrahman, 2013). Digital tools enable that students learn at their own pace during the education process, that distracted students to focus on, and that dangerous tasks are easily fulfilled easily in a virtual environment (Ateş & Sur, 2020).

Schools, institutions where formal education is given, are expected to train students in accordance with the requirements and conditions of the day. Communication in native and foreign languages is among the basic needs of individuals in the 21st century when the world turned into a global village. Therefore, raising individuals who can express themselves in writing and verbally, and understand what they read and listen are among the primary goals of education planners, curricula and teachers. It is extremely important for individuals to acquire language skills in the globalizing world, and there are studies showing that digital tools facilitate the acquisition of language skills.

Digital tools used in language education address students individually by interacting with them and take the role of a teacher who evaluates the students' responses, records their performance, points out their mistakes and makes explanations (Naba'h, Hussain, Al Omeri & Shdeifat, 2009). Annamalai (2019) thinks that Web 2.0 tools can add a new dimension to language learning and teaching activities when it is supported by pedagogical applications. Studies show that it is possible to use Web 2.0 tools such as whatsapp, facebook, youtube, twitter, and blogs, which young people show great interest, in a way to improve students' language skills (Hung & Huang, 2015; Parmaxi & Zapharis, 2016).

Acquiring vocabulary, grammar knowledge, reading, listening, speaking and writing skills both in native and in foreign languages by using digital tools is much more motivating and easier than just sticking to books and tutors. Cobb (2009) lists the benefits of computer-assisted language learning to students and teachers as follows: Students can improve their listening and speaking skills through a variety of speaking and listening exercises./ Students can go back to difficult texts and listen often when needed./ It encourages students to focus on all language skills./ It provides the opportunity to practice for students with busy schedules. / It is cheaper than traditional

training method./ Provides personalized application and feedback./ It automatically corrects errors (Topbaş, 2009).

Mayo (2015) states that the applications carried out using digital tools help to reveal the working atmosphere that contributes to acquisition of new information and the development of students' oral skills. Similarly McKeown, Crosson, Moore and Beck (2018) claims that digital tools can make significant contributions to learning new words. Repetitions are extremely necessary in learning new words and constant repetition of words using online tools provide great benefit to their users. Reading and listening activities carried out using digital tools, the fact that computer programs give commands that correct learners' mistakes and that people communicate with each other in the target language by using social media all make it easy to learn a foreign language both inside and outside of the classroom.

The literature review shows that there are studies examining the use of digital tools to improve students' reading, writing (Leis, Cooke and Tohei, 2015; Uslu, 2019;), speaking (Sarıman, 2016; Elenein, 2019), listening (Tahriri, Tous and MovahedFar 2015; Ciğerci, 2015), vocabulary (Ashraf, Motlaghb and Salami 2014; Yılmaz, 2012) and grammar (Naba'h et al., 2009; Bani Hani, 2014; Akyüz, 2018) skills in learning foreign language. Some studies indicate that language education given using digital tools does not make a significant effect on developing students' language skills, while some report they are very effective in developing four basic language skills. Sharifi, Rostami AbuSaeedi, Jafarigohar and Zandi (2018) examined whether computer-assisted language education is more effective than traditional education with a meta-analysis method, however, a systematic review study on digitalization in language education has not been conducted in the literature. Within the scope of this research, studies in which digital tools are used in language education will be examined according to research patterns, purpose of realization, sample sizes, sample type, data collection tools and data analysis methods in order to eliminate a deficiency in the literature. In addition, it will be determined to what extent digitalization affects success in foreign language education, mother tongue education and language education.

This study evaluates the studies that have discussed language education given using digital tools both in Turkey and the world. The study examines 146 studies obtained as a result of the literature review based on their methods, samples, data collection tools, and analysis methods and shows the role of digital tools in acquiring language skills by combining experimental research with meta-analysis method. Based on the main purpose of the research, the following sub-goals were determined:

1. What is the distribution of the studies included in the systematic review according to whether they are related to mother tongue and foreign language education?

2. What is the distribution of the studies included in the systematic review according to the research designs used?

3. What is the distribution of the studies included in the systematic review according to their aims?

4. What is the distribution of the studies included in the systematic review according to sample sizes?

5. What is the distribution of the studies included in the systematic review according to the research group?

6. What is the distribution of the studies included in the systematic review according to the data collection tools used?

7. What is the distribution of the studies included in the systematic review according to the data analysis methods used?

8. According to the studies included in the systematic review, what is the effect of digitalization on success in foreign language education?

9. According to the studies included in the systematic review, what is the effect of digitalization on success in mother tongue education?

10. According to the studies included in the systematic review, what is the effect of digitalization on success in language education?

METHOD

Research Design

In this research, it is aimed to examine the studies on the use of digital tools in language education with a systematic compilation method. systematic compilation; In case of a certain problem, it is the screening of all researches made in that field, inclusion or exclusion from the sample group in accordance with predetermined criteria, and finally synthesizing the studies included in the compilation (as cited in Higgins and Green, 2011; Karaçam, 2013). The following steps were followed in the systematic compilation process. In the next part of the study, the steps to be followed in the systematic compilation process determined by Çalık and Wiyarsi (2021) were followed:

Research scope:

1. Determining the research problem

2. Determining the problem questions

Selection, decision making and classification: deciding which databases to collect data from

3. Determining the keywords to be used in collecting the data and determining the date range to collect the data

4. Determining the criteria to be taken as reference in the creation of the sample group

5. Reaching a total of 146 studies, 64 articles and 82 theses, examining the effect of digital tools on the acquisition of language skills, and classification of these studies

Analyzing, coding, reliability:

6. Classification of the studies under the headings of method, purpose, study group, sample size of the study, data collection tools, data analysis method, the effect of

digitalization on success in mother tongue education, the effect of digitalization on success in foreign language education

7. Generating codes for each title

8. Examining the studies in detail and classifying them according to categories to ensure the validity of the research.

9. Separation of the research into separate categories by two researchers for reliability. Using the reliability formula (Reliability=Consensus/[consensus + disagreement] x 100) developed by Miles and Huberman (1994) to calculate the reliability of the results

10. Calculating the consistency rate of this study as 90% and deciding that it is a valid and reliable study. [According to Baltacı (2017), for a study to be reliable, a consistency of at least .70 should be maintained among the coders.]

11. Analyzing the study data (146 studies) dealing with the use of digital tools in language education in line with the determined categories and tabulating the results as frequency and percentage values

12. Determining the studies that include the sample size (n), arithmetic mean (X) and standard deviation (sd) values of the experimental and control groups to calculate the effect size

13. The effect of digitalization on success in mother tongue education with 26 data obtained from 16 studies, the effect of digitalization on success in foreign language education with 52 data obtained from 47 studies, the effect of digitalization on success in language education with 74 data using meta analysis method

Presentation and synthesis:

11. Presenting the findings and discussing the findings based on the relevant literature.

Compliance with Ethical Rules

In order to reach the data to be used in the study, the keywords "language education", "computer-assisted language education", "digitalization in language education", "digitalization in mother tongue education", "digitalization in foreign language education" and their English equivalents, Google Scholar, ULAKBİM, YÖK National Thesis Center, Proquest databases were searched. Ethics Committee Approval Certificate was not obtained in this study because it was not included in the scope of studies conducted with qualitative or quantitative approaches that required data collection from the participants, where humans and animals (including material/data) were used for experimental or other scientific purposes, clinical studies were conducted on humans, and studies conducted on animals. The data within the scope of the research were collected from studies in which digital tools were used in language education. In the bibliography section, the bibliography of the studies included in the meta-analysis and examined within the scope of systematic research are included in the Annex 1 section. Studies involving sample size (n), arithmetic mean (X) and standard deviation (sd) values of the experimental and control groups that allow to calculate the effect size were included in the analysis. These studies were written in the coding list. The coding list includes data about the author of the study, the number of students in the experimental and control groups, the type of the study, the study sample, language skills tried to be improved, and the use of digital tools in native or foreign language education.

Data Analysis

Publication Bias

One of the greatest concerns in meta-analysis studies is the issue of studies included in meta-analysis being biased. Studies in meta-analysis are mostly selected from published studies. The assumption that published studies are generally those including significant differences leads to the thought that studies that to be included in meta-analysis accumulate in a certain direction (Long, 2001 as cited in Doğan & Baştuğ, 2020). Publication bias of this study was examined using Funnel plot, Rosenthal's Safe N

method, Orwin's Safe N calculation method, Duval and Tweedie's Trim and Fill method, and Egger's regression test (Çolak et al., 2019). Funnel plot graphs showing the publication bias in this study are shown in Figure 1:
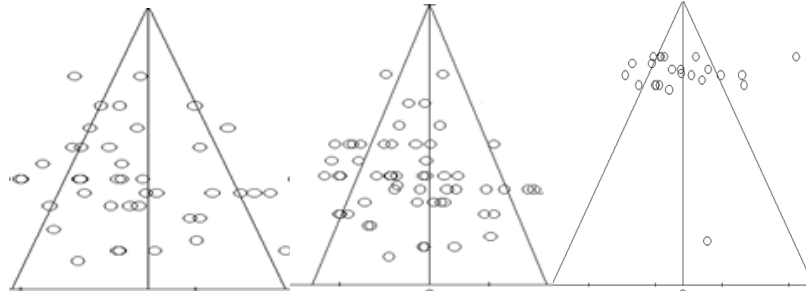

Figure 1. Funnel plot graphics on the effect of digitization on success in language education, foreign language education, native language education

In case of publication bias in the study, the effect sizes in the funnel plot (figures shown with circles) seem asymmetrical. If there is no publication bias, the effect sizes show a symmetrical distribution. Figure 1 shows that the effect sizes of the studies are distributed almost symmetrically in the graphic. To test the publication bias, Orwin's Fail-Safe N calculation, Duval and Tweedie's Trim and Fill method and Egger's test were also used in addition to the funnel plot. Orwin's Fail-Safe N number is a method used to determine the number of studies that may be missing in meta-analysis (Borenstein, Hedges, Higgins & Rothstein, 2009 as cited in Alkan & Bayri, 2017). The analysis showed that the numbers of studies required to reach the .00 level (trivial) of the effect size value for the effect of digitization on language education was 9,820, on foreign language education was 7,865 and on success in native language education was 492. Additionally, the lack of significance of the Egger test result (p>.05) also confirmed that there was no publication bias in the meta-analysis.

The statistical model was selected according to the p and Q values obtained as a result of the heterogeneity test in the meta-analysis study. Therefore, heterogeneity test was performed without calculating the effect value. Q value was found 536.162 (p<.05) for language education, 374.643 (p<.05) for foreign language education, 222.921 (p<.05)

for native language education. The values obtained indicate a high level of heterogeneity for the three variables. Thus, the analysis was decided to make according to the random effects model (Dinçer, 2014).

RESULT

The studies on digitalization in language education were examined according to the purpose, method, research group, sample size, data collection tool and data analysis method in the results section of this research. The results of meta-analysis made to determine the effect of digital tools on individuals' acquisition of language skills are also included in this section.

Table 1. Frequency Analysis of Experimental Studies on Digitalization in Native and Foreign Language Education

Language (Codes 1)	f	%
Foreign Language Education	80	81.63
Native Language Education	18	18.36
Total	98	100

According to Table 1, the significant majority of the studies examining the effect of digital tools on language acquisition were carried out in foreign language education (81.63%), and there were few studies that discussed native language education (18.36%).

Table 2. Frequency Analysis of the Methods Used in Studies on Digitalization in Language Education

Method (Codes 2)	f	%
Quantitative	89	60.95
Unspecified	21	14.38
Qualitative	16	10.95
Mixed	14	9.58
Literature Compilation	4	2.73
Meta-analysis	2	1.36
Total	146	100

Table 2 shows that the methods used in studies were mostly quantitative (60.95%). Of the studies, 14.38% had not specified the method and 9.58% had used mixed methods. Literature review (2.73%) and meta-analysis (1.36%) were the least used methods.

Table 3. Frequency Analysis for the Purpose of Studies on Digitalization in Language Education

Purpose (Codes 3)	f	%
Providing information on the use of digital tools in language education	26	17.80
The effect of digital tools on improving writing skill	22	15.06
The effect of digital tools on improving listening skill	22	15.06
The effect of digital tools on improving reading skills	15	10.27
The effect of digital tools on improving vocabulary	14	9.58
The effect of digital tools on improving speaking skills	11	7.53
The effect of digital tools on language learning skills	9	6.16
The effect of digital tools on language learning attitude and motivation	9	6.16
Getting opinions about the studies carried out using digital tools	8	5.47
The impact of digital tools on improving grammar and punctuation	7	4.79
Determining teachers' perceptions of internet-based language teaching	3	2.05
Total	146	100

Table 3 shows that studies on the effect of digital tools on language acquisition aimed to provide information about the integration of digital tools into language education the most (17.80%). Determining teachers' perceptions about internet-based language education, improving grammar and punctuation marks (4.79%) and getting opinions about applications made with digital tools (2.05%) were among the least-targeted objectives.

Table 4. Frequency Analysis of Sample Sizes of Studies on Digitalization in Language Education

Sample Size (Codes 4)	f	%
Studies with a sample consisted of 50-100 people	53	53.53
Studies with a sample consisted of 1-50 people	30	30.30
Studies with a sample consisted of more than 150 people	9	9.09
Studies with a sample consisted of 100-150 people	7	7.07
Total	99	100

According to Table 4, studies on the effect of digital tools on language acquisition were studied with a maximum sample of 50-100 people (53.53%) and 1-50 (30.30%). The number of the studies conducted with sample groups consisting of 100-150 people was the least (7.07%).

Table 5. Frequency Analysis of the Study Groups of Studies on Digitalization in Language Education

Sample (Codes 5)	f	%
University	64	64.64
Middle School	19	19.19
Primary school	10	10.10
High school	4	4.04
Nursery	2	2.02
Total	99	100

Table 5 shows, that most of the sample had been chosen from university (64.64%) and secondary school (19.19) students in the studies. The least studies had been carried out with sample groups from high schools (4.04%) and nurseries (2.02%) and was the least.

Table 6. Frequency Analysis of Data Collection Tools Used in Studies on Digitalization in Education

Collection Tool (Codes 6)	f	%
Test	69	53.90
Questionnaire	19	14.84
Composition	17	13.28
Interview	17	13.28
Rubric	4	3.12
Video	2	1.56
Total	128	100

According to Table 6, tests (53.90%) and questionnaires (14.84%) were the most commonly used data collection tools in the studies. The least used data collection tools were videos (1.56%) and rubrics (3.12%).

Table 7. Frequency Analysis of Data Analysis Methods Used in Studies on Digitalization in Education

Analysis Method (Codes 6)	f	%
t test	67	65.04
ANCOVA	18	17.47
ANOVA	11	10.67
Content analysis	4	3.88
MANCOVA	3	2.91
Total	103	100

Table 7 shows, that t test (65.04%) and ANCOVA (17.47%) were the data analysis methods that were used the most. The methods used the least were MANCOVA (2.91%) and content analysis (3.88%).

The forest plot regarding the effect of digitalization on success in foreign language education is shown in Figure 2. The data indicating the effect size are presented in Table 8:

Figure 2. Forest Plot for the Effect of Digitalization on Success in Foreign Language Education

Table 8. The Effect of Digitalization on Success in Foreign Language Education

	n	ES_{mean}	z	Q	p	I^2	S_{error}	ES_{min}	ES_{max}
Foreign Language Education	52	0.80	9.52	374.643	0.00	86.387	0.08	0.63	0.97

According to Table 8, as a result of the analysis performed with 52 data, the effect of digitization on success in foreign language education was 0.80. The calculated effect size value was large according to the classification determined by Dinçer (2014).

The forest plot indicating the effect of digitalization on success in native language education is shown in Figure 3. The data for the effect size are presented in Table 9.
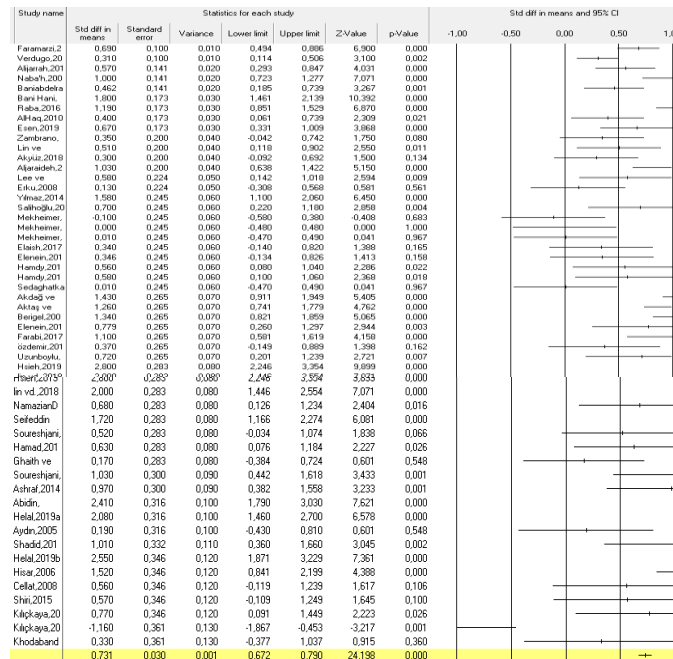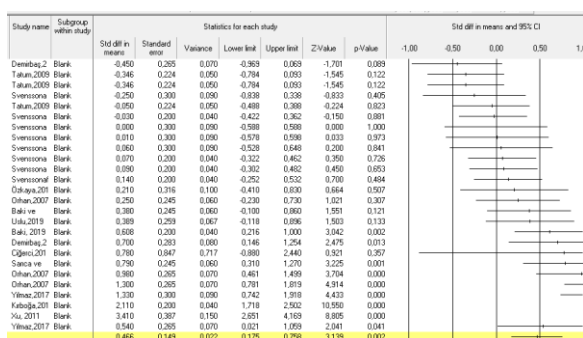
Figure 3. Forest Plot for the Effect of Digitalization on Success in Native Language Education

Table 9. The Effect of Digitalization on Success in Native Language Education

	n	ES$_{mean}$	z	Q	p	I^2	S$_{error}$	ES$_{min}$	ES$_{max}$
Native Language Education	26	0.46	3.13	222,921	0.00	88.78	0.14	0.17	0.75

According to Table 9, as a result of the analysis performed with 26 data, the effect of digitization on success in native language education was found to be 0.46. The calculated effect size value was medium according to the classification determined by Dinçer (2014).

The forest plot regarding the effect of digitalization on success in language education is shown in Figure 4. The data for the effect size are presented in Table 10.

Study name	Statistics for each study						Std diff in means and 95% CI
	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Faramarzi,2	0.690	0.100	0.010	0.494	0.886	6.900	0.000
Verdugo,20	0.310	0.100	0.010	0.114	0.506	3.100	0.002
Alijanah,201	0.570	0.141	0.020	0.293	0.847	4.031	0.000
Nabah,200	1.000	0.141	0.020	0.723	1.277	7.071	0.000
Banishdeku	0.462	0.141	0.020	0.185	0.739	3.267	0.001
Bani Hani,	1.800	0.173	0.030	1.461	2.139	10.392	0.000
Raba,2016	1.190	0.173	0.030	0.851	1.529	6.870	0.000
AlHaq,2010	0.400	0.173	0.030	0.061	0.739	2.309	0.021
Esen,2019	0.670	0.173	0.030	0.331	1.009	3.868	0.000
Zambrano,	0.350	0.200	0.040	-0.042	0.742	1.750	0.080
Lin ve	0.510	0.200	0.040	0.118	0.902	2.550	0.011
Svenssona	-0.030	0.200	0.040	-0.422	0.362	-0.150	0.881
Svenssona	0.140	0.200	0.040	-0.252	0.532	0.700	0.484
Svenssona	0.070	0.200	0.040	-0.322	0.462	0.350	0.726
Svenssona	0.090	0.200	0.040	-0.302	0.482	0.450	0.653
Baki,2019	0.608	0.200	0.040	0.216	1.000	3.042	0.002
Akyüz,2018	0.300	0.200	0.040	-0.092	0.692	1.500	0.134
Alparslah,2	1.030	0.200	0.040	0.638	1.422	5.150	0.000
Tatum,2009	-0.346	0.224	0.050	-0.784	0.093	-1.545	0.122
Tatum,2009	-0.346	0.224	0.050	-0.784	0.093	-1.545	0.122
Tatum,2009	-0.050	0.224	0.050	-0.488	0.388	-0.224	0.823
Lee ve	0.580	0.224	0.050	0.142	1.018	2.594	0.009
Erku,2008	0.130	0.224	0.050	-0.308	0.568	0.581	0.561
Yilmaz,2014	1.500	0.245	0.060	1.100	2.060	6.450	0.000
Salihoğlu,20	0.700	0.245	0.060	0.220	1.190	2.858	0.004
Mekheimer,	-0.100	0.245	0.060	-0.580	0.380	-0.408	0.683
Mekheimer,	0.000	0.245	0.060	-0.480	0.480	0.000	1.000
Mekheimer,	0.010	0.245	0.060	-0.470	0.490	0.041	0.967
Orhan,2007	0.250	0.245	0.060	-0.230	0.730	1.021	0.307
Elaish,2017	0.340	0.245	0.060	-0.140	0.820	1.388	0.165
Elenein,201	0.346	0.245	0.060	-0.134	0.826	1.413	0.158
Baki ve	0.380	0.245	0.060	-0.100	0.860	1.551	0.121
Handy,201	0.560	0.245	0.060	0.080	1.040	2.286	0.022
Handy,201	0.580	0.245	0.060	0.100	1.060	2.368	0.018
Handy,201	0.590	0.245	0.060	0.100	1.060	2.390	0.016
Sedaghatkai	0.010	0.245	0.060	-0.470	0.490	0.041	0.967
Sanca ve	0.790	0.245	0.060	0.310	1.270	3.225	0.001
Uslu,2019	0.389	0.259	0.067	-0.118	0.896	1.503	0.133
Akdağ ve	1.430	0.265	0.070	0.911	1.949	5.405	0.000
Orhan,2007	0.980	0.265	0.070	0.461	1.499	3.704	0.000
Orhan,2007	1.300	0.265	0.070	0.781	1.819	4.914	0.000
Aktaş ve	1.260	0.265	0.070	0.741	1.779	4.762	0.000
Beigel,200	1.340	0.265	0.070	0.821	1.859	5.065	0.000
Elenein,201	0.779	0.265	0.070	0.260	1.297	2.944	0.003
Farabi,2017	1.100	0.265	0.070	0.581	1.619	4.159	0.000
özdemir,201	0.370	0.265	0.070	-0.149	0.889	1.398	0.162
Uzunboylu,	0.720	0.265	0.070	0.201	1.239	2.721	0.007
Demirbaş,2	-0.450	0.265	0.070	-0.969	0.069	-1.701	0.089
Yilmaz,2017	0.540	0.265	0.070	0.021	1.059	2.041	0.041
Hsieh,2019	2.800	0.283	0.080	2.246	3.354	9.899	0.000
Hsieh,2019	2.800	0.283	0.080	2.246	3.354	9.899	0.000
Namazian0	0.680	0.283	0.080	0.126	1.234	2.404	0.016
Seifeddin	1.720	0.283	0.080	1.166	2.274	6.081	0.000
Demirbaş,2	0.700	0.283	0.080	0.146	1.254	2.475	0.013
Soureshjani,	0.520	0.283	0.080	-0.034	1.074	1.838	0.066
Hamad,201	0.630	0.283	0.080	0.076	1.184	2.227	0.026
Ghaith ve	0.170	0.283	0.080	-0.384	0.724	0.601	0.548
Yilmaz,2017	1.330	0.300	0.090	0.742	1.918	4.433	0.000
Soureshjani,	1.030	0.300	0.090	0.442	1.618	3.433	0.001
Svenssona	-0.250	0.300	0.090	-0.838	0.338	-0.833	0.405
Svenssona	0.000	0.300	0.090	-0.588	0.588	0.000	1.000
Ashraf,2014	0.970	0.300	0.090	0.382	1.558	3.233	0.001
Svenssona	0.010	0.300	0.090	-0.578	0.598	0.033	0.973
Svenssona	0.060	0.300	0.090	-0.528	0.648	0.200	0.841
Abidin,	2.410	0.316	0.100	1.790	3.030	7.621	0.000
Özkaya,201	0.210	0.316	0.100	-0.410	0.830	0.664	0.507
Aydin,2005	0.190	0.316	0.100	-0.430	0.810	0.601	0.548
Shadif,201	*1.010*	*0.332*	*0.110*	*0.360*	*1.660*	*3.045*	*0.002*
Helal,2019c	2.950	0.346	0.120	1.871	3.229	7.361	0.000
Hisar,2006	1.520	0.346	0.120	0.841	2.199	4.388	0.000
Cellat,2008	0.560	0.346	0.120	-0.119	1.239	1.617	0.106
Shin,2015	0.570	0.346	0.120	-0.109	1.249	1.645	0.100
Kılçkaya,20	0.770	0.346	0.120	0.091	1.449	2.223	0.026
Kılçkaya,20	-1.160	0.361	0.130	-1.867	-0.453	-3.217	0.001
Khodaband	0.330	0.361	0.130	-0.377	1.037	0.915	0.360
	0.601	0.026	0.001	0.550	0.652	23.057	0.000

Figure 4. Forest Plot for the Effect of Digitalization on Success in Language Education

Table 10. The Effect of Digitalization on Success in Language Education

	n	ES$_{mean}$	z	Q	p	I^2	S$_{error}$	ES$_{min}$	ES$_{max}$
Language Education	74	0.63	8.77	536,162	0.00	86,385	0.07	0.49	0.77

According to Table 10, the effect of digitization on success in language education was 0.63. The calculated effect size value was medium according to the classification determined by Dinçer (2014).

Table 11. The Effect of School and Publication Type on Success in Digitized Language Education

	Variable	n	Effect Size	Standard Error	95% confidence interval Min. Max.		sd	Level χ	Q_B	p
School Type	Nursery	3	0.55	0.21	0.13	0.96				
	Primary	10	0.61	0.17	0.28	0.95				
	Middle	25	0.46	0.11	0.23	0.68	4	9.48	3.72	0.40
	High	3	0.94	0.36	0.22	1.66				
	Unv.	33	0.74	0.12	0.49	0.99				
Study Type	Article	44	0.79	0.10	0.60	0.99				
	Thesis	30	0.40	0.09	0.21	0.58	1	3.84	8.51	0.0

According to Table 11, the effect sizes of school type were found to be 0.55 for nurseries, 0.61 for primary schools, 0.46 for middle schools, 0.94 for high schools, and 0.74 for universities. However, the variance between studies for the school type moderator was not statistically significant (Q= 3.72, p> .05).

Research type moderators were divided into two groups as theses (30) and articles (44). Effect sizes for research type groups were calculated as 0.40 for the these and 0.79 for the articles. The variance for the research type variable between studies was statistically significant (Q=8.51, p<.05). The success levels achieved in articles was higher than those in theses.

Table 12. The Effect of Digitalization in Language Education on Language Skills

	Variable	n	Effect Size	St. Error	Min.	Max.	sd	Lev. χ	Q_B	p
	Comp.	27	0.36	0.07	0.21	0.51				
Language	Narration	24	0.55	0.11	0.32	0.77				
Skills	Vocabulary	15	0.71	0.17	0.36	1.06	3	5.99	26.98	0.00
	, Grammar	8	1.68	0.25	1.19	2.17				
	Success									

Table 12 shows that the effect sizes of language skills groups were calculated for comprehension (0.36), expression (0.55), vocabulary and grammar knowledge (0.71), and for general success (1.68). The variance for the language skills variable between studies was statistically significant (Q=5.99, p<.05). Education carried out using digital tools positively affected students' acquisition of vocabulary and grammar knowledge and their general success level the most. Education provided with using digital tools affected the students' comprehension skills (reading and listening) the least.

CONCLUSION, DISCUSSION and SUGGESTIONS

In this study, studies discussing digitalization in language education were examined in terms of research designs, purposes, sample sizes, sample types, data collection tools, and data analysis methods and the extent to which digitization affected success in foreign language education, native language education and language education was determined through a meta-analysis study.

In the first evaluation, it was found that the number of studies examining the effect of digitalization on success in foreign language education (81.63%) was much higher than those conducted in native language education (18.36%). The fact that children learn their native language in the family where they were born without any need for education and acquire listening and speaking skills when they start school encourages researchers to make research on practices that make education in a foreign language easier and permanent. Quantitative (60.95%) and qualitative (10.95%) research methods are seen to have been used the most in the studies. It is seen that bit tools were integrated into the education process while the studies examined how the use of different digital tools in

language education could affect success, and the effect emerging as a result of the measurements was tried to be determined concretely. The researchers revealed the situation through applications, which increased the frequency of using the quantitative approach. Of the studies on digitalization in language education, 60% aimed to improve writing, reading, vocabulary, listening and speaking skills and to facilitate the language acquisition process with the help of digital tools. According to Selçuk and Palancı (2014), the high number of quantitative studies can be explained by the potential of conducting this type studies quickly, reaching the sampling quickly and more comfortably, and collecting and interpreting data easily and in a shorter time. However, the method was not specified in the 14.38% of the studies. Considering that the studies prepared without specifying the method cannot be reliable, these studies are not likely to contribute to language education.

This study shows that the practices regarding the use of digital tools in language education were performed with samples of at most 50-100 people (53.53%). The small sample size can be attributed to the use of experimental design, a quantitative research method, in studies investigating the effect of digitization on language education. The effect of digital tools on the acquisition of language skills was examined through studies conducted in schools or language learning centers sometimes with one or sometimes two classes. Considering that studies with larger samples yield more comprehensive results, the high number of studies conducted with a small sample size is an important deficiency regarding the studies in this field. Examination of the sample groups that the studies were carried out with indicates that the majority of the studies selected the samples from university students (64.64%), and that the number of the studies selecting their samples from high schools (4.04%) and nurseries (2.02%) was quite low. Considering that a great majority of the people conducting the studies are academicians, university students are an easy-to-reach sample group for them. The low number of studies that selected the sample groups from high school and nursery classes is one of the important deficiencies in the literature.

Test and questionnaire were used the most as data collection tools (53.90% and (14.84%, respectively). Multiple choice question tests are frequently used because they can measure the skills wanted to be evaluated with a large number of questions in a (Özçelik, 1998: 141). Tests and questionnaires are tools that can be used, albeit partially, in taking students' views and evaluating their reading and listening skills; however, in language education, the data collected using compositions, videos and interviews can reflect the real situation much better in assessing the speaking and writing skills of students. Although the evaluation of the data collected using these tools requires more time for the researchers, the complete demonstration of the effectiveness of the applications depends on collecting data through other tools besides tests and questionnaires. The analysis conducted on 146 studies showed that the t test was most commonly used data analysis method in evaluating the collected data (65.04%). The wide use of the t test in a significant majority of the studies may be due to examining the effect of digitization on success in language education through experimental studies conducted with pre- and post-test groups. On the other hand, the use of variance analysis in a small number of studies may be due to the fact that case studies examining the effect of digitalization on students' language acquisition skills are quite few.

The meta-analysis study conducted with 74 data (8 studies have negative effect size, 66 have positive effect size) showed that language education given using digital tools is more effective than traditional teaching. According to the random effects model, the effect size value of 74 studies was 0.63, which is at a medium level according to the Cohen's d coefficient. Similarly, in the literature, meta-analysis studies conducted by Camnalbur (2008) and Sharifi et al. (2018) found that computer-aided education positively affected the academic achievement of students. This result of the study overlaps with the literature. In addition, the effect of digitalization on native language and foreign language learning was examined separately in this study and found that digitalization had a moderate effect (EL=0.46) in learning the native language and a large effect (EL=0.80) in foreign language learning. No study discussing the effect of digitization on success in native language and foreign language education was found in the literature. The fact that individuals receive foreign language education in line with

their own wishes and as a result of a need (settling in a new country, education, job) may be an important factor for the different results of using digital tools in native language education and foreign language education.

In this study, a moderator analysis was also conducted to determine whether the effect sizes differed significantly according to variables such as school type, research type, and language skills. As a result of the homogeneity test conducted to determine whether there was a significant difference between the effect sizes of language education conducted using digital tools according to the type of school, there was no significant difference between the groups (QS=3.72, p>.05). However, the homogeneity test performed according to the type of publication (QS=8.51, p<.05) and language skills (QS=26.98, p <.05), showed a significant difference between the groups. The effect size of articles (0.79) was higher than in the theses (0.40). Effect sizes for language skills were calculated based on comprehension (ES=0.36), narration (ES=0.55), vocabulary and grammar knowledge (ES=0.71), and general success level (ES=1.68). Digitization in language education improved students' overall success levels and vocabulary and grammar knowledge at most. The least effect was seen on students' receptive skills (reading and listening). This result may be related to the fact that acquiring and improving a skill requires a long time and effort and that vocabulary and grammar teaching is based on knowledge transfer and can be learned more easily than acquiring a skill.

Based on the results obtained from the study, the followings are suggested:

1. There are few studies on digitization in native language education; therefore, more studies should be conducted on digitization in native language education.

2. The analysis shows that the studies on the use of digital tools in language education were made with samples including 50-100 people the most and the samples were chosen from university students. Further studies with larger sample groups should be carried out and practices should be made with students from other student groups.

3. The data in the studies were found to have been collected mostly using tests and questionnaires in the studies on digitalization in language education. The data should be collected using more comprehensive measurement tools.

4. The analysis shows that digitization has different effects on the success in native language and foreign language education. Studies examining the reasons why digital tools have different results in native language education and foreign language education should be performed in the future.

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GENİŞ ÖZET

Bilgi ve iletişim teknolojilerinde yaşanan gelişmeler yaşamın diğer alanlarını olduğu gibi eğitim-öğretim sürecini de etkilemiş, dil eğitimi dijital araçlarla gerçekleştirilmeye başlanmıştır. BİT araçlarının dil eğitiminde kullanılması, dijitalleşmenin dil becerilerine etkisini inceleyen bir dizi araştırmanın yapılmasını sağlamıştır ancak alanyazın incelendiğinde bu araştırmaları sistematik bir incelemeye tabi tutan çalışmanın olmadığı görülmektedir. Bu çalışmada alanyazındaki önemli bir eksikliği gidermek adına dil eğitiminde dijital araçların kullanımına ilişkin yapılan araştırmaları sistematik bir derleme ile incelemek amaçlanmıştır. Araştırma kapsamında öncelikle problem ve alt problemler, verilerin toplanacağı veri tabanları, verilerin toplanmasında kullanılacak anahtar kelimeler, örneklem grubunun oluşturulmasına referans alınacak kaynaklar belirlenmiştir. Ardından alanyazın taraması yapılmış, 64 makale 82 tez olmak üzere toplam 146 çalışmaya ulaşılmıştır. Ulaşılan çalışmalar dikkatle incelenmiş ve aşağıda belirtilen kategorilere göre sınıflandırmalar yapılmıştır: Çalışmada kullanılan yöntem/ Çalışmanın gerçekleştirilme amacı/ Çalışmanın gerçekleştirildiği araştırma grubu/ Çalışmanın örneklem büyüklüğü/ Çalışmada kullanılan veri toplama aracı/ Çalışmada kullanılan veri analiz yöntemi. Dijital araçların bireylerin dil becerilerini edinmeleri üzerindeki etkisi meta-analiz yöntemi ile incelenmiştir. Ana dili eğitiminde dijitalleşmenin başarıya etkisi 16 çalışmadan elde edilen 26 veri ile, ikinci dil eğitiminde dijitalleşmenin başarıya etkisi 47 çalışmadan elde edilen 52 veri ile, dil eğitiminde dijitalleşmenin başarıya etkisi 74 veri ile analiz edilmiştir.

Çalışma sonunda yabancı dil eğitiminde dijitalleşmenin başarıya etkisinin incelendiği araştırma sayısının (%81.63) ana dili eğitiminde (%18.36) yapılan araştırmaya göre çok daha fazla olduğu; araştırmalarda en fazla nicel (%60.95) ve nitel (10.95) yöntemlerin kullanıldığı; dil eğitiminde dijitalleşmeye ilişkin hazırlanan çalışmaların %60'ında yazma, okuma, kelime bilgisi, dinleme ve konuşma becerilerini geliştirmek istendiği; dijital araçların dil eğitiminde kullanımına ilişkin gerçekleştirilen uygulamaların en fazla 50-100 kişiden oluşan örneklemlerle (%53.53) yapıldığı; araştırmaların gerçekleştirildiği örneklem grubunun önemli bir kısmının üniversite öğrencilerinden (%64.64) seçildiği, lise (%4.04) ve ana sınıfı (%2.02) öğrencilerinin örneklem alındığı çalışma sayısının oldukça az olduğu; veri toplama aracı olarak en fazla test (%53.90) ve anket (% 14.84) kullanıldığı; 146 araştırma üzerinde yapılan incelemede, toplanan verilerin değerlendirmesinde en fazla kullanılan veri analiz yönteminin t testi (%65.04) olduğu görülmüştür.

74 veri ile yapılan (8 çalışmanın ortalama etki büyüklüğü negatif, 66 çalışmanın etki büyüklüğü pozitif) meta-analiz çalışması, dijital araçlarla gerçekleştirilen dil eğitiminin geleneksel öğretime göre daha etkili olduğunu göstermiştir. Rastgele etkiler modeline göre 74 çalışmanın etki büyüklüğü değeri 0,63'tür ve bu değer Cohen d katsayısına göre orta düzeydedir. Ayrıca yapılan çalışmada dijitalleşmenin ana dili ve yabancı dil öğrenmeye etkisi ayrı ayrı incelenmiş; dijital araçların ana dili öğrenmede orta (ED=0.46), yabancı dil öğrenmede geniş düzeyde (ED=0.80) etkiye sahip olduğu sonucuna ulaşılmıştır. Alanyazın incelendiğinde ise ana dil ve yabancı dil eğitiminde dijitalleşmenin başarıyı ne düzeyde etkilediğini gösteren bir araştırmaya rastlanmamıştır. Dijital araçların ana dil eğitiminde ve yabancı dil eğitiminde farklı sonuçlar

ortaya çıkarmasının, yabancı dil eğitimini bireylerin kendi istekleri doğrultusunda ve bir ihtiyaç sonucunda (yeni bir ülkeye yerleşme, eğitim, iş) almalarının önemli bir etken olduğu düşünülmektedir.

Dijitalleşmenin, dil edinme becerisine etkisinin incelendiği bu çalışmada etki büyüklüklerinin "okul türü, araştırma türü, dil becerileri" gibi değişkenlere göre anlamlı düzeyde farklılaşıp farklılaşmadığını belirlemek üzere ayrıca moderatör analizi yapılmıştır. Dijital araçlarla gerçekleştirilen dil eğitiminin okul türüne göre etki büyüklükleri arasında anlamlı farklılık olup olmadığını belirlemek amacıyla yapılan homojenlik testi sonucunda, gruplar arası anlamlı farklılık olmadığı tespit edilmiştir (QB= 3.72, p>.05). Ancak yayın türü (QB=8.51, p<.05) ve dil becerilerine (QB=26.98, p<.05) göre yapılan homojenlik testinde, gruplar arası anlamlı farklılığa rastlanmıştır. Makale çalışmalarında ulaşılan etki büyüklüğü (0.79), tez çalışmalarında ulaşılan etki büyüklüğünden (0.40) daha yüksektir. Dil becerilerine göre etki büyüklükleri anlama becerisinde 0.36, anlatma becerisinde 0.55, kelime ve gramer bilgisinde 0.71, genel başarı düzeyinde 1.68 olarak hesaplanmıştır. Dil eğitiminde dijitalleşme, öğrencilerin en fazla genel başarı düzeylerini ve kelime, gramer bilgisini geliştirmiştir. En az etki ise öğrencilerin anlama (okuma ve dinleme) becerisi üzerinde görülmüştür. Bir beceriyi edinmenin ve geliştirmenin uzun zaman ve uğraş gerektirmesi; kelime, dil bilgisi öğretiminin bilgi aktarımına dayalı ve beceriye göre daha kolay öğrenilebilir olmasının böyle bir sonucun ortaya çıkmasında etkili olduğu düşünülmektedir. Ulaşılan sonuçlardan hareketle bundan sonraki çalışmalarda ana dili eğitiminde dijitalleşmeye ilişkin daha kapsamlı araştırmaların yapılması, araştırmaların daha büyük örneklemlerle gerçekleştirilmesi ve üniversite dışındaki öğrenciler üzerinde uygulama yapılması, dijital araçların ana dil eğitiminde ve yabancı dil eğitiminde farklı sonuçlar ortaya çıkarmasının nedenlerine yönelik çalışmalar yapılması önerilerinde bulunulmuştur.