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ORIGINAL ARTICLE

Mixed-Meta Method for Comprehensive Assessment of Educational Information Network (EBA) Activities

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ABSTRACT

In this study, quantitative (meta-analysis) and qualitative (meta-thematic analysis) studies were selected and examined to analyse the effects of Educational Information Network (EBA) activities with the mixed-meta method. Quantitative studies were analysed using MetaWin and CMA 2.0 programs, and moderator analyses such as interdisciplinary, education level, and implementation period were conducted. The effect size value (g=.42) obtained from quantitative studies shows that EBA activities have a moderate effect on academic achievement. Qualitative studies were evaluated with a meta-thematic analysis in which the following themes emerged: the efficiency of EBA activities on curriculum elements, negative aspects, and suggestions. Qualitative findings also revealed that many aspects of EBA activities needed to be improved. The results of the study showed that the findings obtained from the meta-analysis and meta-thematic analysis were consistent with each other. The effect of EBA activities on academic achievement has been evaluated with many studies at both national and international levels. Many of these studies revealed that EBA activities improved academic achievement on a small and medium scale. However, it has been emphasized that EBA activities also have difficulties and deficiencies. It has been stated that factors such as the technical infrastructure of EBA activities, internet connection, motivation and participation of students, education, and the competence of teachers affect the effectiveness of EBA activities.

Keywords: Academic success, EBA activities, effect size, meta-analysis, meta-thematic analysis, mixed-meta method.

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INTRODUCTION

The quality, scope, and accessibility of information are changing in the current era, and there are new opportunities and methods to access information (Brabazon, 2016). In this context, today's schools and teachers are responsible for raising individuals who have developed the ability to obtain knowledge and use it effectively and are knowledgeable about technology (Akkoyunlu & Kurbanoğlu, 2003; Popa & Topală, 2018). In this process, teachers will be learning partners with their students, and schools will become environments where students participate in learning and experience learning (Şenel & Gençoğlu, 2003). The use of technology in education is an essential issue in terms of including activities suitable for multiple intelligences and incorporating various affective characteristics into learning-teaching activities (Kuyubaşıoğlu & Kılıç, 2019). Applications, activities, or experiments that are not possible to do in learning environments for some reasons become easily accessible thanks to technology (Saklan & Ünal, 2018).

Since technology creates changes in education systems, integrating technology into education has been attempted to be realized through various projects in Türkiye. These projects include Support for Computerized Education, One Computer for Every Class, 100% Support for Education, and the FATIH (Movement to Increase Opportunities and Improve Technology) Project. The FATIH Project is an information technology (IT) project prepared in cooperation with the Ministry of National Education and the Ministry of Transportation, aiming to increase the use of technology in schools (Cuya & Kayış, 2018; Demir et al., 2018). The FATIH Project, an important project that combines technology and education, consists of five sections: to improve software and hardware of schools, to use e-content effectively, to make curricula effective and up-to-date on the use of information technologies, to improve and encourage teachers who will use the project through in-service trainings, and to ensure that information and communication technologies are used consciously, safely and critically. The anticipated period for these five main sections to be ready nationwide has been determined as five years. It was aimed to make high schools, middle schools, primary schools and pre-schools suitable for the project in the first, second and third years respectively (Kana & Aydın, 2017).

Educational Information Network (EBA) is defined as one of the most important components of the FATIH Project (Kana & Saygılı 2016). EBA is defined as an online social learning environment that can be accessed anywhere and anytime, regardless of time and environment, and it is offered free of charge to all learners (Durmuşçelebi & Temircan, 2017). The FATIH Project was initiated to popularize the use of technology in education and ensure equal opportunities. Within the scope of this project, the General Directorate of Innovation and Educational Technologies established EBA to increase students' and teachers' access to information and interaction. EBA has also become a necessary resource for face-to-face education not to be interrupted. While students and teachers were not initially required to use EBA, the use of EBA increased when the risks that face-to-face education could be disrupted emerged (Doğan & Koçak, 2020). EBA, which was implemented to benefit from technological opportunities, has begun to be implemented in the schools in Türkiye to remove boundaries in education and increase quality and qualification. Furthermore, people's desire for self-development and lifelong learning is no longer limited to schools (Alabay & Taşdelen, 2017). EBA takes on the role of a digital roof and bridge that prepares and presents content that can have a positive impact on education on the internet. EBA keeps an important position in Türkiye's education system by providing the e-content needed in the education system by offering activities developed for educational purposes both in Türkiye and abroad to its users (Çakmak & Taşkıran, 2017). E-contents in EBA can be listed as teaching materials in formats such as e-books, videos, audio, visual materials, interactive applications, e-tests, etc. (Erensayın & Güler, 2017).

Although some teachers cannot use the EBA system due to some problems, some use EBA in their lessons for some purposes such as lesson reinforcement, visualization, and evaluation (Türker & Güven, 2016). In a study conducted by Tüysüz and Çümen (2016), it was found that although the EBA system helps students' education, it also creates some problems. Students like the features of EBA such as reinforcing the subjects, explaining the subjects, educational games/activities, informative tests, and videos. However, due to the technical problems of EBA, insufficient educational content, and lack of motivation, they do not find EBA sufficient enough and do not use it frequently.

Furthermore, students reported that uploading content to EBA was difficult and that it was ineffective in attracting their attention. These factors meant that they did not visit EBA frequently. While the EBA system has become a distance education platform serving a larger number of students during the pandemic, most studies in the literature were carried out before its widespread use. Teachers have developed different skills and knowledge relating to EBA during the pandemic. Thus, their experiences are valuable for the development and progress of the EBA system and distance education (Doğan & Koçak, 2020).

Purpose and Importance of the Study

A review of the literature reveals that teachers have some problems in using EBA and do not have sufficient knowledge about EBA. For these reasons, teachers can use EBA less in their classes. The use of the EBA system, its features and contents are examined for the development and progress of the EBA system and distance education. This study aims to reveal the benefits of EBA for students and teachers, how it is used, which features are preferred more, which problems are encountered, and how solutions are found. The study will be beneficial for evaluating the effectiveness of the EBA system, determining its strengths and weaknesses, offering improvement suggestions, and measuring the extent to which the EBA system contributes to the quality of education.

For the aforementioned reasons, it was decided to examine the national and international studies conducted in this field to conclude the effectiveness of EBA activities. The results of the related studies that are subject to meta-analysis and meta-thematic analysis are expected to answer the following questions:

In the meta-analysis part of the study;

- What is the general effect size of EBA activities on students' academic success?

In the meta-thematic analysis part of the study;

- In line with the themes and codes determined within the framework of meta-thematic analysis based on document analysis, it is aimed to determine the effectiveness of EBA activities by examining the studies based on research participants' opinions.

METHOD

Mixed methods research represents a research approach whereby a researcher or research team integrates aspects of both qualitative and quantitative methods. This may entail the utilization of both qualitative and quantitative perspectives, data gathering techniques, analytical approaches and inference techniques, with the objective of achieving a comprehensive understanding and validation (Johnson et al., 2007). Mixed studies, in which the researcher uses these two different methods in the data collection and data analysis stages (Creswell, 1999), are frequently preferred, especially in social sciences, as they provide a multiple perspective and a better understanding of the

phenomena by using an eclectic method against complex phenomena (Rossman & Wilson, 1994).

In the current study, the mixed-meta method, in which meta-analysis and meta-thematic analysis are used together, was preferred in order to determine the effectiveness of EBA activities. The mixed-meta method, based on document analysis, is a method that analyzes quantitative data (meta-analysis) with programs such as CMA/MetaWin and qualitative data (meta-thematic) with programs such as NVivo/MAXQDA and facilitates the utilization of comprehensive and detailed content (Batdı, 2020). When conducting mixed-meta methods studies, the analyzed studies must be either published or accepted for publication and must be of high scientific quality (Batdı, 2023). In this respect, it is aimed to present more detailed findings. The analysis processes used in the mixed-meta method are explained in detail below.

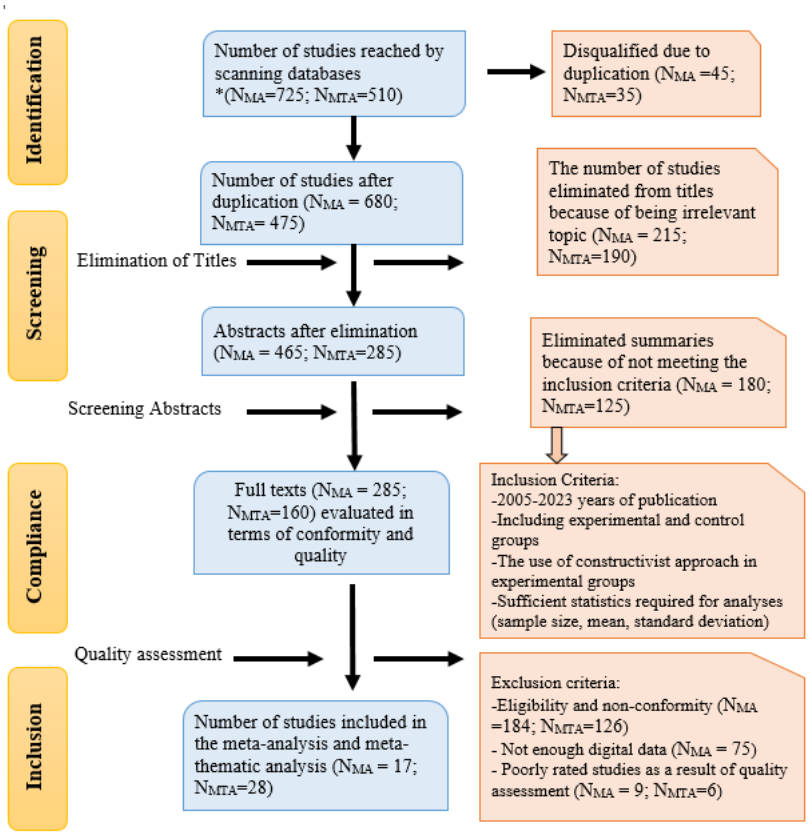
Meta-analysis Process

To examine the effectiveness of EBA activities in the quantitative dimension of the study, the researchers used the meta-analysis method. Meta-analysis is a literature review method used to combine and interpret the results of individual studies on a subject by reusing them, thus it is a synthesis of experimental studies (Cohen et al., 2002). The aim of meta-analysis is not to obtain new data but to make a general interpretation by combining the results of studies on the same subject (McDermottet al., 2004). Bringing together the studies in a meta-analysis and combining the results provides great statistical power (L'Abbe et al., 1987).

Data collection

In the study, the keywords "EBA, EBA activities" were searched in the literature. In this line, the Council of Higher Education (CoHE), Google Scholar, Web of Science, Taylor & Francis Online, Science Direct, ProQuest Dissertations & Theses Global databases were chosen. It was considered significant that the impact of EBA activities was examined, the studies were published in English and Turkish, and the studies were both national and international publications. It was ensured that these studies included data suitable for meta-analysis. Those that met the aforementioned criteria were included in the meta-analysis, and those that did not were excluded from the analysis. The inclusion and exclusion criteria and assigned numbers of these studies are presented in the PRISMA flow diagram in Figure 1.

Figure 1. Selection of the Studies Included in the Analysis



*NMA; Number of studies included in the Meta-Analysis, NMTA; Number of studies included in the Meta-Thematic Analysis

A large number of studies were reached on the evaluation of EBA activities by scanning different databases. In this context, 725 studies were reached within the scope of meta-analysis and 510 studies were reached within the scope of meta-thematic analysis. Of these studies, 45 meta-analysis and 35 meta-thematic analysis studies were not included in the study due to duplication. The remaining studies were included in the study after passing the elimination stages in Figure 1. After the filtering process, 17 meta-analyses and 28 meta-thematic studies were included in the analysis.

Data analysis

The processes conducted within the meta-analysis were analyzed using MetaWin and CMA 2.0 programs. In a meta-analysis, the value that reflects the strength of the relationship between two variables is called effect size, which shows the direction and magnitude of the relationship between the variables (Borenstein et al., 2009). The effect size (Hedges g) value obtained as a result of the analyses was interpreted taking into account the effect level classification of Thalheimer and Cook (2002) The ranges of values for each effect level classification are: - 0.15 ≤ Cohen d < 0.15 at negligible level; 0.15 ≤ Cohen d < 0.40 at small level; 0.40 ≤ Cohen d < 0.75 at moderate level; 0.75 ≤ Cohen d < 1.10 at large level; 1.10 ≤ Cohen d < 1.45 at extensive level; 1.45 ≤ Cohen d as excellent level. Additionally, the random effects

(REM) model was used to assess and interpret the data acquired throughout the analyses. Schmidt et al. (2009) stated that REM was more appropriate since the conditions under which the fixed effects model (SEM) could be used were limited. Therefore, REM was used in the current study.

Effect size

In order to statistically combine independent studies and reach a common conclusion, the data must be converted to a common unit of measurement. This unit of measurement is called effect size (Thalheimer & Cook, 2002). The concept of effect size is the basis of meta-analysis and was introduced by Cohen in 1988 and explained as the frequency of occurrence of a phenomenon in society. Standard effect size is used to correct the bias that may be caused by effect size (Hedges, 1989). When Cohen's d coefficient is calculated, some deviations are seen due to the sample. When these deviations are corrected, the corrected deviation is called Hedges g coefficient (Borenstein et al., 2009).

Publication bias

While a meta-analysis offers a mathematically accurate synthesis of the included studies, if the analysis presents a biased representation of these studies, the resulting average effect size will also reflect that bias. Many studies have shown that research with large effect sizes is more likely to be published than studies with small effect sizes. Since published studies are more commonly included in meta-analyses, any biases present in these studies are also reflected in the overall analysis (Taşdemir, 2022). This problem is generally called “publication bias” (Rothstein, 2008). Publication bias, which arises from the greater likelihood of publishing studies with large samples or statistically significant results, can contribute to an overestimation of the average effect size (Borenstein et al., 2009). Hence it is of importance to test for publication bias in meta-analysis studies.

Model selection in meta-analysis

After determining the studies to be included in the analysis, the meta-analysis determines the appropriate model and statistical methods for these studies and moves on to the stage of combining the results, and the statistical model is selected at this stage. Statistical models are divided into two parts as Fixed Effect Model (FEM) and Random Effect Model (REM) (Decoster & Claypool, 2004). The meaning of the FEM is based on the assumption that all studies in the meta-analysis have a single effect size. In this model, the observed differences arise from sampling error (Borenstein et al., 2009; Rosenberg et al., 2000). The measurements of the studies to give the same result are somewhat difficult. The accuracy of this measurement is provided with the homogeneity test. If homogeneity is not achieved among the studies according to the test, the REM that considers the variance is preferred (Akçil, 1995; Camnalbur, 2008). When the fixed effect model is not provided, the REM is used. The REM assumes that the effect size may vary across studies not only due to sampling error but also due to intervening variables such as education level, age of participants, and class variables (Borenstein et al., 2009; Sutton et al., 2000). The variance across studies may be large or small. If the variance is small, the expected result in both models will be almost the same. Furthermore, the REM assumes that the effects are distributed normally (Borenstein, 2009).

Moderator analysis

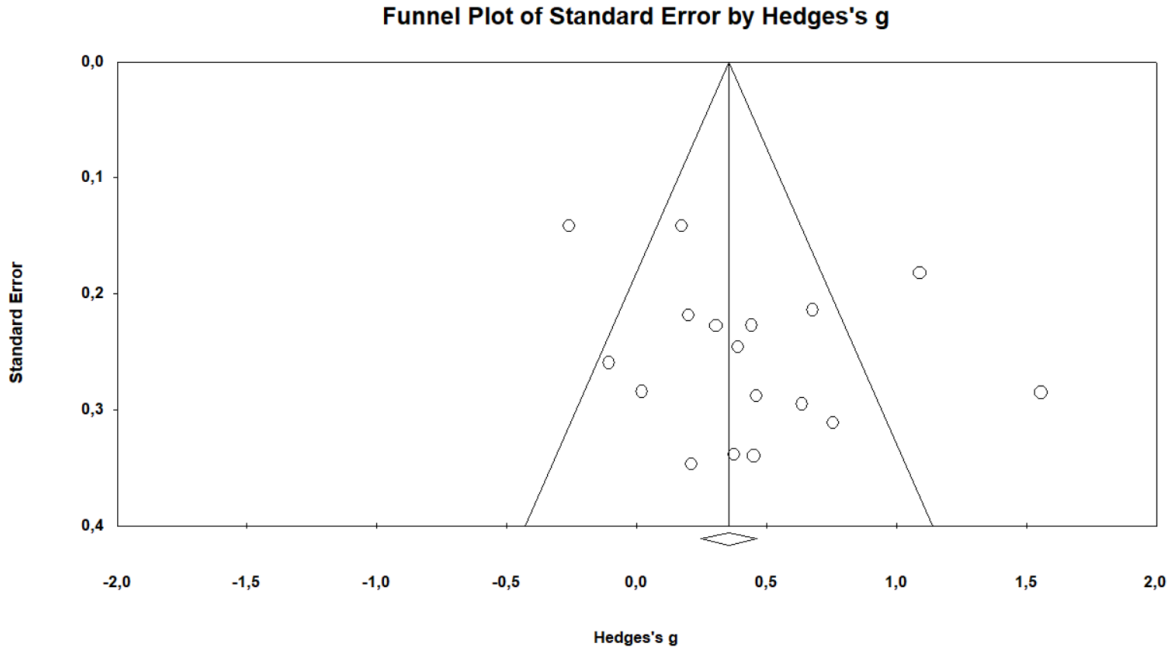
Calculations for the heterogeneity test using the meta-analysis of research on EBA activities, the I2 value was found to

be 75.47. Beyond merely examining the overall effect size of academic achievement, this value implies that the current study can be investigated in the context of other variables. According to Cooper et al. (2009), high heterogeneity can be observed at values of 75% or higher. It was therefore investigated at which levels and courses, for how many groups of people, and for how long the application of EBA activities would lead to more successful results in order to detail the relevant meta- analysis in the study, which required a moderator analysis.

Reliability

In the literature review process, selecting studies for the meta-analysis should be carried out carefully (Çarkungöz & Bülent 2009). Reaching at least 30 relational studies on the subject studied in the meta-analysis study ensures that the research is reliable and valid (DeCoster & Claypool 2004). To ensure the reliability of the meta-analysis study, the effect sizes of the studies should be calculated separately and these values should be given in the content section of the study (Wolf, 1986). In meta-analysis studies which figures out the effect size, the use of published studies and/or studies with significant differences in meaning, publication bias becomes important (Batdı, 2023). Publication bias in meta-analysis studies is a term used for the situation where the studies published in the literature do not systematically represent the universe of the completed research (Simske, 2019). Therefore, some calculations are performed to answer the question of whether there is publication bias in meta-analysis studies.

Figure 2. Funnel plot of the studies included in the meta-analysis



In order to evaluate publication bias, the funnel plot obtained through the CMA data analysis program and shown in Figure 2 was examined. The symmetric distribution of the funnel plot indicates that there is no publication bias (Sedgwick & Marston 2015; Şen & Yıldırım, 2020). Accordingly, the funnel plot in Figure 2 shows that there is no publication bias in the studies included in the analysis. The Egger test examines the possible asymmetry in the funnel

plot and reveals whether it exists. If the p value is not statistically significant, it is interpreted as the absence of asymmetry, i.e. publication bias (Card, 2012). As a result of the Egger test, p = 0.08 was calculated. This is another evidence that there is no publication bias. In addition, the Fail Safe N (FSN) value was also examined to evaluate publication bias. As the FSN value increases, publication bias decreases (Şen & Yıldırım, 2020). As a result of the analysis, the FSN value of the studies included in the meta-analysis was found to be 198. With this value, it can be said that the current study is reliable.

Meta-thematic analysis

In the second stage of the mixed-meta method, meta-thematic analysis was conducted. Meta-thematic analysis is a type of technique based on the analysis of raw data from the findings of qualitative studies and the creation of new codes and themes (Batdı & Talan, 2019). Meta-thematic analysis works with the inductive method. First, many small data are obtained, and these data are brought together to form general expressions and general definitions (Batdı, 2020). By comparing the results of the meta-thematic analysis with the results of the meta-analysis, comprehensive and valuable results can be reached by considering similar and different aspects (Batdı, 2023).

Data collection

In the meta-thematic analysis phase of the current study, relevant data were collected based on document review. The qualitative data of this study conducted through document review were analyzed using the content analysis method. Document review involves analyzing written materials that contain information about the phenomenon or phenomena intended to be investigated (Yıldırım & Şimşek, 2018). Content analysis is a systematic, variable technique in which coding based on certain rules and some words in the text are summarized as small expressions divided into parts (Krippendorff, 1989). The existence, meaning and relationships of words or concepts in the text or texts are determined and analyzed, and inferences are made about the message in the text (Büyüköztürk et al., 2020). The data obtained for meta-thematic analysis consist of articles and theses obtained from national and international sources. The views of the participants in the studies were created by re-analyzing them with different themes and codes.

Coding

Coding is the process of defining meaningful sections in the data as a result of content analysis (Williams & Moser, 2019). At this stage, the data should first be divided into meaningful parts and a semantic equivalent should be found for each section. If these sections form a meaningful whole within themselves, they are coded by giving a name. The important thing is that the assigned names can define these sections. According to Corbin and Strauss (1990), there are three types of coding (open, associative and selective) in the coding process, and these types can be changed and developed during the data collection process. In the coding process, sometimes the previously determined codes may not work and can be removed from the coding list. In this study, coding was done based on open coding. Accordingly, three themes were determined and codes suitable for these themes were created in the studies included in the qualitative analysis. These themes were determined as; contributions on the program elements, limitations, and suggestions.

Reliability

In meta-thematic analysis, reliability methods were applied to ensure the trustworthiness of qualitative studies. While creating themes and codes in meta-thematic analysis, direct quotation expressions were included to be presented in the findings section. Relevant quotations are presented in the findings section by specifying the codes affecting the study and the page number from which the quotation was made. Where direct quotations were given, the sources from which the codes and themes were extracted were indicated by a code that included the page number from which the code and theme were cited. The letters "M," "TFO," and "PQDTG" in the study stand for articles, Taylor & Francis Online studies, and ProQuest Dissertations and Theses Global database studies, respectively. (For instance, a quote from page 75 of study number 10 in ProQuest Dissertations and Theses Global is included on page 75 of PQDTG-10-p. 75). Furthermore, codes obtained from the CoHE National Thesis Center were abbreviated by providing thesis numbers.

FINDINGS

The findings obtained in quantitative (meta-analytical) and qualitative (meta-thematic) analyses are presented under subheadings. In this section, the interpretation of the meta-analysis findings of the studies on the effect of EBA activities on academic achievement is presented. Then, the findings and comments obtained through meta-thematic analysis of the studies are discussed.

Findings Regarding Meta-Analysis

17 data were obtained from 17 studies included in the meta-analysis. The average effect sizes (Hedges' g), 95% confidence intervals (Lower-Upper), and heterogeneity values (Q, p, I2) of the effect sizes of EBA activities on academic achievement according to SEM and REM are presented in Table 1. Table 1 shows the effect size value according to REM moderate with g=0.42. This finding can be interpreted as EBA activities having a moderate effect on academic achievement scores.

Table 1. *Meta-Analysis Data*

Test Type	Model	n	*g*	%95 Confidence Interval		Heterogeneity		
				Lower	Upper	Q	*p*	I^2
AA	SEM	17	0.35	0.25	0.46	65.23	0.00	75.47
	REM	17	0.42	0.20	0.65			

Table 2. *Overall Effect Sizes of Studies Included in the Analysis by Moderator Analysis*

Md.	Groups	Effect Size and %95 Confidence Interval				Test of Null		Heterogeneity		
		n	g	Lower	Upper	Z-value	P-value	Q-value	df	P-value
Teaching Levels of	Primary	2	0.28	-0.09	0.65	1.46	0.14			
	Middle	11	0.37	0.10	0.64	2.71	0.00			
	High School	3	0.70	-0.17	1.57	1.56	0.11			
	Tot. Betw. Overall	16	0.36	0.15	0.57	3.34	0.00	0.79	2	0.67
Durations Applications	1-4	7	0.58	0.23	0.92	3.33	0.00			
	5-6	3	0.39	0.09	0.70	2.57	0.01			
	7-8	5	0.03	-0.23	0.29	0.23	0.82			
	9-+	2	0.62	0.21	1.43	2.65	0.01			
	Tot. Betw. Overall	17	0.32	0.16	0.48	3.85	0.00	9.97	3	0.02
Course Areas	Science	2	0.19	-0.15	0.54	1.10	0.27			
	Social Sciences	4	0.57	-0.07	1.21	1.75	0.08			
	Maths	7	0.63	0.39	0.87	5.18	0.00			
	English	4	0.09	-0.23	0.41	0.54	0.58			
	Tot. Betw. Overall	17	0.39	0.23	0.56	4.75	0.00	8.83	3	0.03

When the heterogeneity test presented in Table 1 is examined, it is seen that the effect sizes of attitude (Q=65.23; p<.05) are distributed heterogeneously. The I2 value (75.47%) in Table 1 shows that the observed variance is due to the true variance between the studies. Cooper et al. (2009) states that an I2 value of 25% indicates low heterogeneity, 50% medium, and 75% and above high heterogeneity. Since the I2 value calculated as 75.47 in the current study is at a high level (Higgins et al., 2003), it can be stated that there are moderator variables affecting the total effect size. In other words, a high I2 value indicates heterogeneity, and heterogeneity indicates moderator analysis (Borenstein et al., 2009). In this context, moderator analyses were conducted regarding the teaching stage, application process, and interdisciplinary and presented in Table 2. In the moderator analyses, the largest effect size was seen in the high school level in the education level (g=0.70); in the 9-+ week group in the application period (g=0.62); and in Mathematics among disciplines (g=0.63). When these values are examined, it can be stated that EBA activities have a higher level in the groups where the effect size is the largest. On the other hand, in the significance test, no significant difference was found in terms of education level (QB=0.79; p>.05). However, it was seen that there was a meaningful difference in terms of application period (QB=9.97; p<.05) and between disciplines (QB=8.83; p<.05). When the analysis results were

evaluated in general, EBA-based applications had small-level and medium-level effects in all groups.

Findings Regarding Meta-Thematic Analysis

In the meta-thematic analysis part of the study, qualitative studies including the evaluation of EBA activities were analyzed and the themes and codes obtained were modeled. As a result of the study, three themes were created: "contributions to curriculum components", "limitations of EBA" and "suggestions". These themes and the codes under these themes are outlined in this section. Table 3 shows the codes under the first theme "contributions to curriculum components".

Table 3. Theme 1: Contributions to curriculum components

Theme 1: Contributions to Curriculum Components	
Objectives	Being compatible with the outcomes
	Organizing content that is appropriate for the goals
	Expressing the goals and gains clearly
	Having plenty of animations and activities regarding the realization of the gains
	Ensuring the realization of the gains by appealing to more than one sense
Content	Presenting entertaining content
	Offering different alternative opportunities for content
	Having a complementary content layout
	Having attention-grabbing, repeatable content
	Providing rich content (video, animation, simulation, etc.)
Teaching methods and techniques	Attachment of playful activities
	Providing happy and comfortable environments
	Having a wide activity area
	Offering the opportunity to do homework without assistance
	Offering music and sports activity opportunities
	Offering interesting environments based on multiple intelligences
	Ensuring that technology is included in education
	Developing questioning skills with different alternatives
	Sharing of work, activities, homework, and questions
	Making learning permanent by providing active participation

	Providing ease in summarizing the subject, watching experiments, and repeating
	Providing better learning of the subjects with different methods and techniques
	Contains applications that provide teacher-student-parent interaction
	Providing the processes of learning, repeating, testing, and reinforcing the subject
Assessment/ Evaluation	Achieving the standards of measurement and evaluation
	Providing the opportunity for assessment by reinforcing the subject
	Providing the opportunity for summarizing and repeating the subject
	Providing self-study and evaluation opportunities
	Offering feedback and self-evaluation opportunities regarding the shares
	Providing the ability to report and analyze the evaluation results

The following codes can be presented as examples regarding their contributions to curriculum components: Being compatible with the outcomes, providing entertaining content, offering the opportunity to do homework without assistance, providing the ability to report and analyze evaluation results, and having eye-catching, repeatable content. The sentences referenced for these codes are as follows: "The audiovisual materials in EBA are compatible with the textbooks given to us by the Ministry of National Education. The units are exactly the same as the books we study." (664538-p.108); "If she can connect it to something fun, it was exciting to her and then she remembered it." (PQDT6-p.89); "The EBA TV lessons looked the same as my lessons at school. They were just explanations on screen [rather than in class]. It helped me improve me a lot in the beginning. I even noticed a change in myself, I started doing my homework without consulting my mother and father." (TFO1-p.83); "I think the content section and reporting feature are quite good. Providing analytical results in evaluating the student is positive in terms of evaluation." (M3-p.330); "I think I am successful. Because there are all kinds of activities, these activities are quite remarkable." (565487-p.80). Furthermore, the content has contributions such as offering different alternative opportunities for content, having a complementary content layout, summarizing the subject, facilitating experiment monitoring and repetition, and allowing the subject to be summarized and repeated.

The codes under the theme of negative aspects are given in Table 4.

Table 4. Theme 2: Limitations of EBA

Theme 2: Limitations of EBA	
Technology and Infrastructure	Internet connection and infrastructure problems
	Hardware deficiencies
	Problem of not being able to log into the EBA system
	Lack of promotional and training videos related to the system
	Low resolution of visuals

Content and Pedagogy	Insufficient amount of branch-specific content Inability to find e-content on every subject Content not suitable for the gain Incomprehensible subject explanations Insufficient videos and tests with subject explanations Weak structuring of the content Insufficient connection of the content to real life Low feasibility level of the activities Including only general subjects
Interaction and Teaching Process	Inadequate feedback Experiencing interaction problems Inability to use body language Inability to experience socially focused vital activities Communicative inadequacies causing low motivation Inability to complete social and emotional development Inadequacy in expressing the affective dimension Inadequacy in teaching practical courses Difficulty in conducting experiments and observations
Teachers and Students	Teachers' inadequacy in using EBA Not suitable for students who need special education Inadequacy of in-service training Creating technology addiction Inability to complete social and emotional development
Measurement and Evaluation	Inadequate measurement and evaluation Limited tests and activities Causing inequality of opportunity

There are 5 sub-themes regarding the negative aspects of EBA application: technology and infrastructure, content and pedagogy, interaction and teaching process, teachers and students, and measurement and evaluation. Some of the codes that emerged regarding these themes and sub-themes are as follows: Inadequacy in expressing the affective dimension, incomprehensible subject explanations, not suitable for students who need special education, and low resolution of visuals. The sentences that were taken as references for these codes can be listed as follows: “Children having difficulty expressing themselves and their feelings, teachers’ observation of children, sense of ownership, inability to see individual differences, learning difficulties not being resolved immediately are the shortcomings of distance education compared to traditional methods.” (M5-p.65); “I could not understand most of the explanations, so I had a hard time.” (565487-p.78); “Since it is a special education branch, it is difficult to keep our students glued to the screen and they cannot enter on their own. However, with parental support.” (M3-p.332); “The resolution of the visuals is low.” (563258-p.58). In addition, the contents have negative effects such as not being suitable for the gain, weak structuring of the contents, lack of promotional and training videos related to the system, and inadequate measurement and evaluation.

Table 5 shows the third theme “the suggestions for development of EBA” and the codes under it.

Table 5. Theme 3: Suggestions for development of EBA

Theme 3: Suggestions for Development of EBA	
Hardware and	Hardware of EBA should be improved.

Infrastructure	The performance of the internet and servers should be enhanced. Teachers need support for the use of smart boards. Infrastructure problems should be solved.
Development of the Content and Editing	The number of educational materials should be increased. There should be more interesting content. Content should be constantly updated. Insufficient/unnecessary content should be removed from the system. Content should be organized according to units and subjects. Content should be more reinforcing and encouraging. Content and documents should be separated according to different types of schools. E-content should be prepared with support from real-life materials. Changes should be made in accordance with the curriculum of the courses. The number of the experiments, animations, and videos should be increased. Activities should be prepared in accordance with Bloom Taxonomy.
Application and Technical Support	There is a need for activities using different techniques. Rich educational environments such as designing experiments should be offered. Different activities and material application opportunities should be offered. Applications should be aimed at high-level skills.
User Awareness and Motivation	Students and teachers should be aware of the EBA system. There should be rewards for motivation after completing the activities. The learner should be given the responsibility of learning. A positive attitude towards distance education should be developed. Educators should have basic computer and internet usage skills.
Visual and Audio Materials	The number of visual and audio materials should be increased. Contents of the learning materials should be carefully selected by experts. The process should be supported with interaction-oriented materials.

When the codes related to the suggestions are examined, it is seen that the process should be supported with interaction-oriented materials, equipment should be improved, contents should be constantly updated, and applications for different methods and techniques should be added. When the codes forming the theme are examined, some sentences referring to the codes under this theme can be listed as follows: "I believe that it cannot be applied effectively as in the school environment. However, applications in teacher activity should be transferred to students and evaluated in a more flexible structure, supported by various visuals, videos, and interactive materials." (M5-p.67); "For this technology to be used effectively, first of all, teacher training should be planned in more detail, face-to-face, and long-term. In addition, I believe it is necessary to employ technical personnel who intervene in classroom environments where technology is used in our schools. Within the scope of the programs for students, small-scale information training should be organized about EBA, V-Class, technology use-necessity, and conscious internet and technology use. (K-1)" (M7-p.28); "…if the contents are developed and are at a sufficient level, and if the information is provided to teachers and students in other fields about content management regarding EBA, I believe that efficiency will increase even more…" (480725-p.40); "Let me say that it was not given in our videos, it should be given. Multiple teaching methods, such as the six thinking hats, can be used. Different methods and techniques can be used." (505816-p.84). In addition, we can say that there are many positive effects. The number of materials should be increased, insufficient/unnecessary content should be removed, interesting content should be increased, and changes should be made to the curriculum.

DISCUSSION AND CONCLUSION

The current study, conducted in mixed-meta (meta-analysis and meta-thematic analysis), is based on document review. In this context, it was carried out with the data obtained from studies accessed from the databases to examine the effects of EBA activities from various perspectives. In the meta-analysis part of the study, the effect size of EBA activities on students' academic achievement was examined. In the meta-thematic part of the study, the codes obtained from the raw data were collected under three themes. As a result of the meta-analysis conducted with 17 data, it was concluded that the effect of EBA activities on academic achievement was significant and positive (g=0.42). This value is a medium-level effect according to the level classification of Thalheimer and Cook (2002).

When the moderator analyses were evaluated, in the meta-analysis conducted according to the education levels, the highest effect size was seen at the high school level (g=0.70), and the lowest effect size was seen at the primary school level (g=0.28). This finding is understood as EBA activities are more effective at the high school level than other groups. In the moderator analysis, the highest effect size in the application period was seen in the 9-+ week group (g=0.62), while the lowest effect was seen in the 7-8 weeks (g=0.03). This finding can be interpreted as meaning that short-term applications are less effective. When it was examined whether the effect size of EBA activities changed according to the application periods of the studies, it was found that there was a significant difference between the application periods (QB=9.97; p<.05), indicating that the effectiveness of the relevant applications changed according to the application periods. It was determined that the largest effect size among the disciplines was in the Mathematics course (g=0.63). There is a significant difference between the courses (QB=8.83; p<.05), which shows that the effectiveness of EBA activities varies according to the courses.

When the results of the moderator analysis are summarized in general, it can be stated that EBA activities have similar small and medium-level effects in the groups. Therefore, it can be concluded that the relevant activities are effective and the effect size is generally positive and medium-level in terms of the variables determined by the moderator. Within the scope of the meta-analysis, the data obtained with the moderator analyses revealed that the least studies on EBA activities were conducted at primary school levels. In this respect, it was determined that more studies were needed at the relevant levels that the least studies were conducted in science, and that more studies should be conducted in these areas.

In the meta-thematic analysis section, some codes were extracted from 28 qualitative studies conducted on EBA and taken from the determined databases. Through open coding, these codes were gathered under three themes. The three determined themes were determined as follows: "Contributions to curriculum components", "limitations of EBA", and "suggestions for the development of EBA". The codes in the first "Contributions to curriculum components" theme were categorized into four sub-themes: “objectives”, “content”, “teaching methods and techniques”, and “assessment/evaluation”.

Under the theme “Contributions to curriculum components”, codes such as organizing content appropriate to the objectives, providing rich content (video, animation, simulation, etc.), providing better learning of subjects with

different methods and techniques, and providing self-study and evaluation opportunities were obtained. The results of a study suggesting that applications that include digital learning materials should be considered within the scope of the curriculum (Berg et al., 2004) show that information and communication technologies now affect curriculum elements. In the study of Çevik and Duman (2018), it was concluded that Morpa Campus, an application very similar to EBA, provides similar contributions in terms of gains. In the study of Erman (2021), it was seen that the EBA application supports activities, facilitates learning, reinforces subjects, and provides students with the opportunity to participate. In the study conducted by Tüysüz and Çümen (2016), it was found that EBA contributes to student success and plays an active role in learning subjects. The results of another study (Tan et al., 2021) show that digital learning environments contribute to students' creativity and innovative thinking skills by providing rich content. In this context, it can be concluded that the results are consistent with those of the current study.

In the meta-thematic analysis of the current study, the second theme, “Limitations of EBA”, was divided into 5 subthemes: “Technology and infrastructure”, “content and pedagogy”, “interaction and teaching process”, “teachers and students”, and “measurement and evaluation”. In a study conducted in Malaysia (Wong, 2007), the limitations encountered in e-learning environments were discussed. The results show that due to limited internet access and infrastructural deficiencies, e-learning environments are not as efficient as expected. For instance, due to low internet speed, students are unable to watch course videos related to subject explanations or have difficulty participating in video conferences. The results of this study confirm the inferences regarding “technology and infrastructure”, which is one of the limitations encountered in the current study regarding EBA. In the study titled “Science Teachers' Views on the Place of EBA Among Digital Education Platforms” conducted by Saklan and Ünal (2019, p. 30) regarding the sub-theme of “Content and pedagogy”, teachers stated that there were not enough digital materials for science courses for EBA. In the study of Erman (2021, p. 127), it was seen that among the suggestions and criticisms of students and teachers regarding EBA, suggestions, and criticisms such as revising the EBA design, having differently organized lesson explanations, increasing the quality of video shooting, and enriching the infrastructure and content were presented. Wong's (2007) study results show that individual differences in the learning process can cause various limitations in using e-learning content. For this reason, situations where e-content is not prepared according to the student are among the limitations of digital learning environments. This situation, which coincides with the results of the current study, shows that learning strategies, motivation, and learning styles are features that should be considered when preparing e-content.

The results of a study on the inclusion of digital elements in the curriculum (Berg et al., 2004) show that being open to educational innovations and integrating digital materials into teaching processes supports the phenomenon of learning outside of school. The fact that students have become acquainted with blended education, which includes distance education, especially after the pandemic, has shown them that learning will not only happen at school. It can be suggested that the importance of digital learning environments has increased even more today. Therefore, designing digital materials in a way that attracts students' attention will be effective in meeting expectations for their potential. It is seen in the theme of the current study regarding suggestions that the research participants think that interesting materials that take individual differences into account should be included in EBA. Considering the importance of digital materials in shaping contemporary learning environments, it is supported by various sources that their design should be created according to students and that this is a motivation-enhancing element (Berthelsen & Tannert, 2020; Chiu et al., 2021). Erensayın (2018, p.95) study results show that materials suitable for different levels should be created, individual differences should be taken into account, and expression should be enriched by various methods and techniques. The current study results show that a student-centered approach should be adopted when designing digital content in EBA.

Under the theme of suggestions for EBA activities, it has also been revealed that infrastructure problems should be solved, the number of materials should be increased, the content should be made according to the curriculum, teachers should receive training on EBA use, and the content should be selected by experts. The results of Hacıoğlu (2019, p.91) study show that smart boards and internet infrastructure should be created in schools, EBA should be introduced to teachers, and different experimental studies should be included for EBA to be more efficient and functional. The study (Tursunalievich & Rahmat, 2021) conducted on creating and developing digital learning environments shows that the most important component in education is the teacher, the primary education stakeholder in the learning environment. Therefore, teachers with high levels of competence have a great impact on the teaching process in both face-to-face and digital learning environments. Among the study results, there is a need for teachers to master interactive technologies and develop the necessary skills for the new learning environments offered by the age. In this context, as the results of the current study show, teachers need to take training and courses on EBA to ensure their individual and professional development, master the subtleties of the relevant digital learning environments, and develop effective teaching.

When the results of the current study are considered in general, it is seen that the effect size of EBA activities on the academic success of the students is at a medium level. There are some suggestions to increase this level in the meta-thematic analysis. It is thought that considering the suggestions can be effective in increasing academic success. Moreover, the fact that there are few studies at the primary school level and the effect level is low, more studies should be conducted, the fact that the effect level is medium due to the few studies lasting 9 weeks and above, the number of studies should be increased, the fact that the least studies have been done on a course that requires experimental and technology such as science, again shows that more studies should be done in this field, and the lack of studies on different disciplines shows that the variety of courses should be increased. It can be suggested that studies should be initiated to increase the knowledge of teachers about EBA in the 21st century and that the deficiencies related to EBA should be quickly restructured and developed and made more useful. It has been seen that more studies should be done on EBA activities and that there are many negative aspects, and accordingly, there are many suggestions in this context. It is thought that considering the suggestions will contribute to the literature, researchers, and curriculum developers.

REFERENCES

Note: The studies included in the meta-analysis and meta-thematic analysis are shown with one asterisk (*).

*Açıkgöz, G. (2018). *Eğitim Bilişim Ağı (EBA) destekli matematik öğretiminin 7. Sınıf öğrencilerinin akademik başarısına etkisi* [Unpublished master's thesis, Kastamonu University]. Council of Higher Education National Thesis Center.

*Akbaş, E. E. (2019). The impact of EBA (Educational Informatics Network) assisted mathematics teaching in 5th grade fractions on students' achievements. *Journal of Computer and Education Research Year*, *7*(13), 120-145. https://doi.org/10.18009/jcer.531953

Akkoyunlu, B., & Kurbanoğlu, S. (2003). Öğretmen adaylarının bilgi okuryazarlığı ve bilgisayar öz-yeterlik algıları üzerine bir çalışma. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *24*(24), 1-10.

*Aksoy, N. (2017). *EBA (Eğitim Bilişim Ağı)nın kullanım amacı, karşılaşılan sorunlar ve çözüm önerileri.* [Unpublished master's thesis, Kahramanmaraş Sütçü İmam University]. Council of Higher Education National Thesis Center.

Alabay, A., & Taşdelen, V. (2017). Ortaöğretim öğretmenlerinin ve öğrencilerinin EBA (Eğitimde Bilişim Ağı) kullanımına ilişkin görüşleri üzerine bir araştırma. *İstanbul Aydın Üniversitesi Eğitim Fakültesi Dergisi*, *Özel Sayı*, 27-29.

*Ankay, E. (2019). *5e öğretim modeline dayalı Eğitim Bilişim Ağı (EBA) kullanımının 5. sınıf öğrencilerinin kesirlerle toplama ve çıkarma işlemleri konusundaki başarısına, tutumuna ve bilgilerinin kalıcılığına etkisi.* [Unpublished master's thesis, Gazi University]. Council of Higher Education National Thesis Center.

*Arslan, H., & Kuzu, A. (2019). Eba ders modülünün ve vsınıf yazılımının ters yüz sınıf modelinde uygulanabilirliğine yönelik öğretmen görüşleri. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*, *19*(1), 20-36. https://doi.org/10.17240/aibuefd.2019.19.43815-538301

*Aslan, A. (2020). *Eğitim Bilişim Ağı (EBA) destekli ters yüz edilmiş sınıf (tys) modelinin 9. sınıf coğrafya dersi beşeri sistemler ünitesinin öğretim sürecine etkileri.* [Unpublished doctoral dissertation, Atatürk University]. Council of Higher Education National Thesis Center.

*Atalay, M. (2019). *Ortaokullarda Eğitim Bilişim Ağının (EBA) incelenmesi.* [Unpublished master's thesis, Necmettin Erbakan University]. Council of Higher Education National Thesis Center.

*Aydoğan, Ş. (2016). *EBA destekli öğretimin 4. sınıf öğrencilerinin ısı-sıcaklık ve erime-çözünme konularında kavram yanılgılarına ve tutumlarına etkisi.* [Unpublished master's thesis, Ömer Halisdemir University]. Council of Higher Education National Thesis Center.

Bal, H., & Boz, M. S., (2017). EBA'nın kullanılabilirlik düzeyinin ölçülmesi. Received from: https://yegitek.meb.gov.tr/meb_iys_dosyalar/2018_11/06103543_SERPYLhYLYA_HOCA.pdf

*Balaman, F., & Tiryaki, S. H. (2021). Corona virüs (Covid-19) nedeniyle mecburi yürütülen uzaktan eğitim hakkında öğretmen görüşleri. *İnsan ve Toplum Bilimleri Araştırmaları Dergisi*, *10*(1), 52-84. https://doi.org/10.15869/itobiad.769798

Batdı, V. (2020). *Introduction to meta-thematic analysis.* V. Batdı (Ed.), Meta-thematic analysis in research process içinde (s. 1-38). Anı Yayıncılık.

Batdı, V. (2020). İlköğretim ikinci kademede matematik dersinde oyunsal uygulamaların karma-meta ile analizi. In *4th Asia Pacific International Modern Sciences Congress* (pp. 102-115).

Batdı, V. (2023). Yapılandırmacı yaklaşım uygulamalarının karma-meta yöntemiyle incelenmesi. *Eğitim ve Bilim*, *48*(213). http://dx.doi.org/10.15390/EB.2023.11774

Batdı, V., & Talan, T. (2019). Augmented reality applications: A Meta-analysis and thematic analysis. *Turkish Journal of Education*, *8*(4), 276-297. https://doi.org/10.19128/turje.581424

Berg, V. D., Blijleven, P., & Jansen, L. (2004). Digital learning materials: Classification and implications for the curriculum. In J. V. Akker, W. Kuiper, & H. Uwe (Eds.), *Curriculum landscapes and trends* (pp. 237–254). Kluwer Academic.

Berthelsen, U. D., & Tannert, M. (2020). Utilizing the affordances of digital learning materials. *L1-Educational Studies in Language and Literature*, 1-23. https://doi.org/10.17239/L1ESLL-2020.20.02.03

Borenstein, M., Hedges, L. V., Higgins, J. P. T. ve Rothstein, H. R. (2009). *Introduction to meta-analysis*. John Wiley & Sons Ltd.

Brabazon, T. (2016). *The University of Google: Education in the (post) information age*. Routledge.

Büyüköztürk, Ş., Çakmak, E. K., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2020). *Bilimsel araştırma yöntemleri.* Pegem Akademi.

Camnalbur, M. (2008). *Bilgisayar destekli öğretimin etkililiği üzerine bir meta analiz çalışması* [Unpublished doctoral dissertation, Marmara University]. Council of Higher Education National Thesis Center.

Card, N. A. (2012). *Applied meta-analysis for social science research*. The Guilford Press.

Chiu, T. K., Lin, T. J., & Lonka, K. (2021). Motivating online learning: The challenges of COVID-19 and beyond. *The Asia-Pacific Education Researcher*, *30*(3), 187-190. https://doi.org/10.1007/s40299-021-00566-w

Cohen, L., Manion, L. ve Morrison, K. (2002). *Research methods in education*. Routledge.

Cooper, H., Hedges, L. V. ve Valentine, J. C. (2009). *The handbook of research synthesis and meta-analysis* (2nd Ed.). Russell Sage Publication.

Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative Sociology*, *13*(1), 3-21. https://doi.org/10.1007/BF00988593

Creswell, J. W. (1999). *Mixed-method research: Introduction and application*. In Handbook of Educational Policy (pp. 455-472). Academic press.

Cuya, B., & Kayış, E. (2018). Öğrencilere göre EBA Portalı'nın kullanım düzeyi. *MEB Eğitim Teknolojileri Geliştirme ve Projeler Daire Başkanlığı*, *1*, 1-40.

*Çakmak, Z., & Taşkıran, C. (2017). Sosyal bilgiler öğretmenlerinin perspektifinden Eğitim Bilişim Ağı (EBA) platformu. *Uluslararası Türk Eğitim Bilimleri Dergisi*, *2017*(9), 284-295.

Çarkungöz, E., & Ediz, B. (2009). Meta Analizi. *Uludağ Üniversitesi Veteriner Fakültesi Dergisi*, *28*(1), 33-37.

*Çetin, E. (2020). *EBA ders ile coğrafya öğretiminin öğrencilerin akademik başarısına etkisi.* [Unpublished master's thesis, Dokuz Eylül University]. Council of Higher Education National Thesis Center.

Çevik, H. & Duman, T. (2018). Analyzing the effects of e-learning on science education. *International Journal of Instruction*, *11*(1), 345-362. https://doi.org/10.30964/auebfd.1022054

DeCoster, J., & Claypool, H. M. (2004). A meta-analysis of priming effects on impression formation supporting a general model of informational biases. *Personality and Social Psychology Review*, *8*(1), 2-27.

Demir, D., Özdinç, F., & Ünal, E. (2018). An examination of participation to the education information network (EBA) portal. *Erzincan Üniversitesi Eğitim Fakültesi Dergisi*, *20*(2), 407-422. https://doi.org/10.17556/erziefd.402125

*Doğan, S., & Koçak, E. (2020). EBA sistemi bağlamında uzaktan eğitim faaliyetleri üzerine bir inceleme. *Ekonomi ve Sosyal Araştırmalar Dergisi*, *7*(14), 111-124.

Durmuşçelebi, M., & Temircan, S. (2017). Eğitim Bilişim Ağı'ndaki eğitim materyallerinin öğrenci görüşlerine göre değerlendirilmesi. *Uluslararası Toplum Araştırmaları Dergisi*, *7*(13), 632-652. https://doi.org/10.26466/OPUS.357033

Erensayın, E., & Güler, Ç. (2017). Eba platformundaki ders materyallerinin eğitsel yazılım değerlendirme ölçütlerine göre değerlendirilmesi. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, *18*(1), 657-678.

*Erensayın, E. (2018). *Çevrimiçi ders materyallerinin değerlendirilmesi: EBA ders örneği.* [Unpublished master's thesis, Van Yüzüncü Yıl University]. Council of Higher Education National Thesis Center.

*Erman, E. (2021). *Uzaktan eğitim kapsamında hazırlanan tarih dersi elektronik ders içeriklerinin tarih öğretmenleri ve ortaöğretim öğrencileri açısından değerlendirilmesi: EBA örneği.* [Unpublished doctoral dissertation, Gazi University]. Council of Higher Education National Thesis Center.

*Fiş Erümit, S. (2021). The distance education process in K–12 schools during the pandemic period: evaluation of implementations in Turkey from the student perspective. *Technology, Pedagogy and Education*, *30*(1), 75-94. https://doi.org/10.1080/1475939X.2020.1856178

*Gowon, R. P. (2009). Effects of television and radio on speaking and writing skills of senior secondary school students in Jos metropolis. *African Research Review*, *3*(2). https://doi.org/10.4314/afrrev.v3i2.43609

*Göksu, M. (2020). *5. sınıf geometri öğretiminde EBA destekli matematik eğitiminin öğrenci başarısına ve görüşlerine etkisi.* [Unpublished master's thesis, Giresun University]. Council of Higher Education National Thesis Center.

Göktaş, E. (2017). Bir eğitim politikası belirleme yöntemi: meta analiz. *Medeniyet Eğitim Araştırmaları Dergisi*, *1*(2), 35-54.

*Gül Şahutoğlu, N. (2018). *Eba kodlama modülü kullanımının ortaokul öğrencilerinin programlamaya ilişkin öz yeterlik inançlarına etkisi ve modüle ilişkin öğrenci görüşleri.* [Unpublished master's thesis, Gaziantep University]. Council of Higher Education National Thesis Center.

*Hacioğlu, A. (2019). *10. sınıf coğrafya dersi topoğrafya ve kayaçlar konusunun öğretiminde EBA (Eğitim Bilişim Ağı) destekli öğretimin öğrencilerin akademik başarısına etkisi* [Unpublished master's thesis, Gazi University]. Council of Higher Education National Thesis Center.

Hedges, L. V. (1989). *A practical guide to modern methods of meta-analysis*. National Science Teachers Association, 1742 Connecticut Avenue, NW, Washington, DC 20009.

Higgins, J. P., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *BMJ*, *327*(7414), 557-560.

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, *1*(2), 112-133.

*Kana, F. & Aydın, V. (2017). Ortaokul öğretmenleri ve öğrencilerinin Eğitim Bilişim Ağı hakkında görüşleri. *International Journal of Social and Humanities Sciences Research (JSHSR)*, *4*(13), 1494-1504.

Kana, F., & Saygılı, D. (2016). Ortaöğretim Türk dili ve edebiyatı dersinde Eğitim Bilişim Ağının kullanımına yönelik öğrenci görüşlerine yönelik bir durum çalışması. *Akdeniz Eğitim Araştırmaları Dergisi*, *20*, 11-23.

*Kelismail, E. (2019). *Eğitim Bilişim Ağı (EBA) destekli öğretimin 6. sınıf öğrencilerinin cebirsel ifadeler alt öğrenme alanında matematik başarılarına ve tutumlarına etkisi.* [Unpublished master's thesis, Gazi University]. Council of Higher Education National Thesis Center.

*Kelly, P. A. (2003). *The effects of ongoing parent involvement using television on the reading readiness of kindergarten students*. Boston College.

Krippendorff, K. (1989). *Content Analysis*. In E. Barnouw, G. Gerbner, W. Schramm, T. L. Worth, & L. Gross (Eds.), International Encyclopedia of Communication (Vol. 1, pp. 403-407). Oxford University Press.

*Kurnaz, A. (2020). Using educational informatics network (EBA) as an educational learning platform in EFL courses in Türkiye. [Unpublished master's thesis, Çukurova University]. Council of Higher Education National Thesis Center.

*Kurtdede Fidan, N., Erbasan, Ö., & Kolsuz, S. (2016). Sınıf öğretmenlerinin Eğitim Bilişim Ağı'ndan (EBA) yararlanmaya ilişkin görüşleri. *Journal of ınternational social research*, *9*(45). https://doi.org/10.17719/jisr.20164520642

Kuyubaşıoğlu, R. M., & Kılıç, F. (2019). Ortaokul öğretmenlerinin görüşlerine göre EBA (eğitimde bilişim ağı) kullanim düzeylerinin incelenmesi. *Journal of Advanced Education Studies*, *1*(1), 32-52.

L'Abbe, K. A., Detsky, A. S. ve O'Rourke, K. (1987). Meta-analysis in clinical research. *Annals of Internal Medicine*, 107, 224-233. https://doi.org/10.7326/0003-4819-107-2-224

*Lengerlioğlu, Y. (2019). *The effects of TV series as curricular activities on speaking skills of English language learners.* [Unpublished master's thesis, Hacettepe University]. Council of Higher Education National Thesis Center.

McDermott, E., Graham, H., , Hamilton, V. (2004). *Experiences of being a teenage mother in the UK: a report of a systematic review of qualitative studies*. Lancaster University, 39-42.

*Özbey, A. (2019). *EBA destekli öğrenme ortamının ortaokul öğrencilerinin eşitlik ve denklem konusundaki başarı, tutum ve motivasyonlarına etkisi*. [Unpublished master's thesis, Zonguldak Bülent Ecevit University]. Council of Higher Education National Thesis Center.

*Pehlivan, D. S. (2020). *The use of EBA (education information network) in teaching vocabulary and grammar to EFL young learners.* [Unpublished master's thesis, Muğla Sıtkı Koçman University]. Council of Higher Education National Thesis Center.

*Pekdemir Gerede, M. (2019). *Eğitim Bilişim Ağı (EBA) 4. sınıf ders içeriklerine yönelik videoların çoklu ortam tasarım ilkelerine göre incelenmesi.* [Unpublished master's thesis, Gazi University]. Council of Higher Education National Thesis Center.

Popa, D. & Topală, I. R. (2018). Students' digital competencies, related attitudes and self directed learning. *eLearning & Software for Education*, *3*. https://doi.org/10.12753/2066-026X-18-154

Rosenberg, M. S., Adams, D. C., & Gurevitch, J. (2000). *MetaWin: statistical software for meta-analysis.* Sinauer Associates.

Rossman, G. B., & Wilson, B. L. (1994). Numbers and words revisited: Being "shamelessly eclectic". *Quality and Quantity*, *28*(3), 315-327.

Rothstein, H. R. (2008). Publication bias as a threat to the validity of meta-analytic results. *Journal of Experimental Criminology*, *4*, 61-81. https://doi.org/10.1007/s11292-007-9046-9

Saklan, H. & Ünal, C.(2019). Dijital eğitim platformları arasında EBA'nın yeri ile ilgili fen bilimleri öğretmenlerinin görüşleri. *Ondokuz Mayıs Üniversitesi Eğitim Fakültesi Dergisi. 38*(1), 19-34. https://dergipark.org.tr/tr/download/articlefile/740273

Saklan, H., & Ünal, C. (2018). Technology friendly science teachers' views of educational information network (EBA). *Necatibey Faculty of Education Electronic Journal of Science & Mathematics Education*, *12*(1).

*Sarıkaya, D.(2020). *Eğitim bilişim ağı (EBA) ve deney destekli etkinliklerin 7. sınıf elektrik devreleri ünitesinin öğretimine etkisinin incelenmesi ve öğrenci görüşleri.* [Unpublished master's thesis, Kastamonu University]. Council of Higher Education National Thesis Center.

Schmidt, F. L., Oh, I., & Hayes, T. L. (2009). Fixed- versus random-effects models in meta-analysis: Model properties and an empirical comparison of differences in results. *British Journal of Mathematical and Statistical Psychology*, *62*(1), 97-128. https://doi.org/10.1348/000711007x255327

Simske, S. (2019). *Meta-analytics consensus approaches and system patterns for data analysis*. Elsevier.

Sedgwick, P., & Marston, L. (2015). How to read a funnel plot in a meta-analysis. *BMJ*, 351. https://doi.org/10.1136/bmj.h4718

Sutton, A. J., Abrams, K. R., Jones, D. R., Sheldon, T. A., & Song, F. (2000). *Random effects methods for combining study estimates*. In: Methods for meta-analysis in medical research. Chichester: John Wiley, 73-86.

Şen, S., & Yıldırım, İ. (2020). *CMA ile meta-analiz uygulamaları*. Anı Yayıncılık.

Şenel, A., & Gençoğlu, S. (2003). Küreselleşen dünyada teknoloji eğitimi. *Gazi Üniversitesi Endüstriyel Sanatlar Eğitim Fakültesi Dergisi*, *11*(12), 45-65.

Taşdemir, F. (2022). Examination of the effect of STEM education on academic achievement: A Meta-analysis study. *Education Quarterly Reviews*, *5*(2).

*Tekin, M. (2019). *EBA destekli oran-orantı öğretiminin ders başarılarına ve üstbilişsel davranış algılarına etkisi.* [Unpublished master's thesis, Zonguldak Bülent Ecevit University]. Council of Higher Education National Thesis Center.

Thalheimer, W., & Cook, S. (2002). How to calculate effect sizes from published research: A simplified methodology. *Work-Learning Research*, *1*(9), 1-9.

*Türker, A. G. A., & Güven, Ö. G. C. (2016). Lise öğretmenlerinin Eğitim Bilişim Ağı (EBA) projesinden yararlanma düzeyleri ve proje ile ilgili görüşleri. *Eğitim ve Öğretim Araştırmaları Dergisi/Journal of Research in Education and Teaching*, *5*(1).

*Türker, A., & Dündar, E. (2020). COVID-19 pandemi sürecinde Eğitim Bilişim Ağı (EBA) üzerinden yürütülen uzaktan eğitimlerle ilgili lise öğretmenlerinin görüşleri. *Milli Eğitim Dergisi*, *49*(1), 323-342.

Tüysüz, C., & Çümen, V. (2016). EBA ders web sitesine ilişkin ortaokul öğrencilerinin görüşleri. *Uşak Üniversitesi Sosyal Bilimler Dergisi*, *9*(27/3), 278-296.

*Umino, T. (2002). *Foreign language learning with self-instructional television materials: An exploratory study*. University of London (United Kingdom).

*Vahit, H. R. (2019). *EBA etkinlikleriyle yapılan matematik öğretiminin başarıya ve tutuma etkisi*. [Unpublished master's thesis,

Kastamonu University]. Council of Higher Education National Thesis Center.

*Wainwright, D. K. (2010). *Television as parenting tool: The role of parental efficacy, attitude, and television use in parenting in children's television exposure* (Doctoral dissertation, University of Pennsylvania).

*Wellington, E. (2016). *Television's Effects on the Future Aspirations of African American Middle School Females: A Phenomenological Study* [Unpublished doctoral dissertation, Drexel University).

Williams, M., & Moser, T. (2019). The art of coding and thematic exploration in qualitative research. *International Management Review*, *15*(1), 45-55.

Wolf, F. M. (1986). *Meta-analysis: Quantitative methods for research synthesis* (Vol. 59). Sage Publications.

Wong, D. (2007). A critical literature review on e-learning limitations. *Journal for the Advancement of Science and Arts*, *2*(1), 55-62.

*Yerli, M. S. (2018). *Sosyal bilgiler öğretiminde Eğitim Bilişim Ağı (EBA) uygulamasının öğrencilerin akademik başarısına etkisi.* [Unpublished master's thesis, Adıyaman University]. Council of Higher Education National Thesis Center.

Yıldırım, A., & Şimşek, H. (2018). *Sosyal bilimlerde nitel araştırma yöntemleri*. Seçkin Yayıncılık.