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Research Article

Technology Acceptance Model and Teachers' Use of Educational Informatics Network (EBA): A Structural Equation Modeling Analysis[1]

Teknoloji Kabul Modeli ve Öğretmenlerin Eğitim Bilişim Ağı (EBA) Kullanımı: Yapısal Eşitlik Modellemesi ile Bir Analiz

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Abstract

This study aims to examine the teachers' behavior in using the Educational Informatics Network (EBA) within the Technology Acceptance Model (TAM) framework. A total of 326 secondary school teachers from Bilecik, Türkiye, participated in an online survey. The findings from the structural equation modeling analysis are highly consistent with the existing literature and with results from a decade-old study on elementary school teachers using the same scale. The findings indicate that teachers' perception of EBA as an easy-to-use platform positively impacts their evaluation of its usefulness. Teachers' attitudes toward EBA are significantly shaped by perceptions of its usefulness and ease of use, which in turn drive their intention to use the platform. Notably, actual usage behavior is directly influenced by these intentions. Consequently, it is imperative to develop design and training strategies that prioritize usability to encourage teachers' engagement with digital platforms.

Keywords: *Structural Equation Model, Educational Informatics Network, EBA, Technology Acceptance Model.*

Öz

Bu çalışma, öğretmenlerin Eğitim Bilişim Ağı (EBA) kullanımına yönelik davranışlarını Teknoloji Kabul Modeli (TKM) çerçevesinde incelemeyi amaçlamaktadır. Veri toplama sürecinde Türkiye'nin Bilecik ilinde görev yapan toplam 326 ortaokul öğretmeni çevrimiçi bir ankete katılmıştır. Yapısal eşitlik modellemesi analizi sonucunda elde edilen bulgular, mevcut literatür ile yüksek düzeyde tutarlılık göstermekte olup, aynı zamanda on yıl önce aynı

[1] This article is based on Elif Okat's MSc thesis titled: "Distance Education Programs Perception by Teachers' Investigation in The Context of Technology Acceptance Model."

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ölçek kullanılarak ilkokul öğretmenleri üzerinde gerçekleştirilen araştırmanın bulgularıyla da örtüşmektedir. Bulgular, öğretmenlerin EBA'yı kolay kullanımlı bir platform olarak algılamalarının, platformun faydalılığına yönelik değerlendirmelerini olumlu yönde etkilediğini göstermektedir. Öğretmenlerin EBA'ya yönelik tutumları, büyük ölçüde platformun faydası ve kullanım kolaylığı algıları tarafından şekillenmekte ve bu algılar da öğretmenlerin platformu kullanma niyetlerini doğrudan etkilemektedir. Dikkat çekici bir şekilde, gerçek kullanım davranışı bu niyetlerden doğrudan etkilenmektedir. Sonuç olarak, öğretmenlerin dijital platformlarla etkileşimini teşvik etmek amacıyla, kullanılabilirliği önceliklendiren tasarım ve eğitim stratejilerinin geliştirilmesi tavsiye edilmektedir.

Anahtar Kelimeler: *Yapısal Eşitlik Modeli, Eğitim Bilişim Ağı, EBA, Teknoloji Kabul Modeli.*

1. Introduction

The integration of technology into education has progressed at a slow pace and has not been associated with intensive technology use to the same extent as fields such as engineering or banking (Pathiranage & Karunaratne, 2023; Turan & Haşit, 2014) The COVID-19 pandemic, which originated in Wuhan, China, in late 2019 and escalated into a global crisis by early 2020, significantly disrupted various aspects of human life, with school closures being one of its most profound consequences. As a result, the vast majority of countries worldwide were compelled to transition education entirely to an online format, regardless of students' and teachers' levels of technology adoption (Chun & Yunus, 2023).

Teachers' technological competence is not, by itself, enough to maintain uninterrupted learning during large-scale crises such as the COVID-19 pandemic. To ensure the continuity of education, students must have access to educational materials such as books, videos, audio, and visual content, and they should be able to participate in online classroom environments with their teachers. Hence, the presence of platforms that offer the essential infrastructure for the educational process is highly significant. One such platform is the Educational Informatics Network (EBA), which has been in use in Turkey since 2012 and has continuously evolved in terms of functionality and available modules.

The Technology Acceptance Model (TAM), originally proposed by Davis (1989), has been widely applied to understand individuals' adoption of technological systems. In the Turkish context, several studies have tested TAM in educational settings. Notably, Turan and Haşit (2014) examined teachers' technology acceptance behaviors in pre-pandemic conditions and confirmed the structural relationships between perceived ease of use, perceived usefulness, attitude, and behavioral intention.

Accordingly, the primary research problem of this study is to examine whether the structural relationships proposed by the original Technology Acceptance Model remain stable in the post-pandemic EBA context and to evaluate potential changes in their magnitudes relative to pre-pandemic findings. By directly comparing the results of Turan and Haşit (2014) with those of the present study, using the same theoretical model, this research empirically tests the temporal robustness of TAM in the Turkish educational setting.

In this respect, the study contributes to the literature in three ways. First, it makes a theoretical contribution by looking at how stable the original TAM framework was over time, both before and after the pandemic. Second, it provides real-world evidence from a national digital education platform that became crucial for keeping education going during a global crisis. Third, it contributes methodologically by enabling direct comparability with prior findings through the use of the same conceptual model and measurement structure.

2. Theoretical Background

2.1. Distance Education

As a result of rapid technological advancements, changes have occurred across every domain, including education. Distance education has been introduced as a solution to existing problems in the education system, offering individuals alternative learning opportunities, and is an instructional model in which students and teachers are not required to be physically present in the same location (İşman, 2011).

In distance education, students and teachers maintain spatial distance, while learners, instructors, and resources are effectively mediated by interactive communication technologies. Distance education has four key characteristics. First, institutions conduct the study, not individuals. The second is that students

and teachers are geographically separated. Third, telecommunication systems that facilitate interaction help connect teachers and students. Finally, distance education consists of teachers, students, and educational resources (Simonson et al., 2011).

Distance education is conducted synchronously or asynchronously using one or more technologies to support interaction between students and teachers, who are located in different places. The technologies used in distance education include the internet, wired or wireless communication systems, satellite systems, teleconferencing systems, and various multimedia formats such as DVDs, CDs, and videotapes (Allen & Seaman, 2017).

Simonson et al. (2011) identified several barriers to its implementation, including financial constraints, organizational resistance to change, lack of vision, absence of strategic planning, shortage of support personnel, slow implementation processes, inadequate infrastructure, and difficulties in adapting to technological advancements.

Distance education, which initially began in the 18th century with letter correspondence, evolved in the 20th century with the introduction of audiovisual tools and further developed into an information-based model with the advent of the internet in the 1990s. As it is observed, technology plays a pivotal role in the evolution of distance education. In Turkey, the concept of distance education remained in the discussion phase until 1955, following the proclamation of the Republic. Distance education began through correspondence between 1956 and 1975, and it continued with radio and television until 1995. After 1996, it transitioned to an Internet-based system (Bozkurt, 2017). This historical progression indicates that, although Turkey adopted distance education nearly two centuries later than Western countries, it managed to utilize the same technological tools as the rest of the world by the mid-1990s.

2.2. History of EBA

In Turkey, the Instructor Films Center was established in 1952 to integrate communication technologies into various levels of education, with its first production being slide-based content. Over time, with the establishment of a radio education unit, the center was renamed Film-Radio Graphics Center (FRGM), and the prepared broadcasts were aired by the TRT (Turkish Radio and Television Corporation). As the center evolved into a directorate, it was merged with the General Directorate of Computer Services and Education in 1998 and renamed the "General Directorate of Educational Technologies" (EĞİTEK). In 2011, it was renamed once again as the YEĞİTEK ("General Directorate of Innovation and Educational Technologies") (YEĞİTEK, 2022).

On November 22, 2010, the FATİH Project ("Movement for Enhancing Opportunities and Improving Technology") was launched under EĞİTEK to ensure equal educational opportunities. The project aimed to transform 600,000 classrooms in approximately 40,000 schools into smart classrooms by equipping them with broadband internet access, computers, projectors, multifunctional printers, and smartboards (Dursun et al., 2015; YEĞİTEK, 2022). As part of the FATİH Project, a web-based educational and e-learning network called the Educational Informatics Network (EBA) was designed to provide the required e-content. EBA was officially launched on February 6, 2012. In 2015, an e-learning management system feature was added to EBA, followed by a mobile application in 2016. A major update in 2019 made EBA accessible to 18 million students and 1 million teachers. During the COVID-19 pandemic, starting from March 23, 2020, three HD and three SD television channels (EBA TV— a collaboration with the TRT) were launched to meet the educational needs of all school levels from kindergarten to 12th grade. On April 13, 2020, synchronous lessons were introduced, allowing teachers and students to interact in real time (YEĞİTEK, 2022).

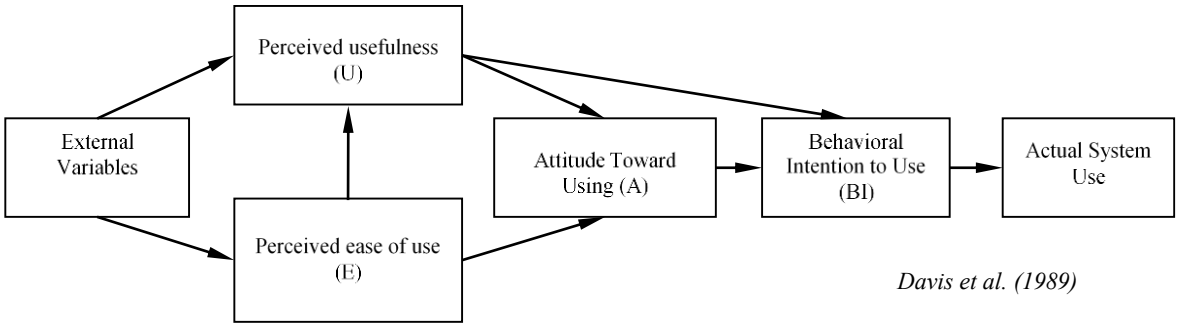
2.3. Technology Acceptance Model (TAM)

Individuals may develop various reactions and resistance to rapid technological developments and changes (Çelik & Bindak, 2005). The reluctance of individuals to adopt these innovations can hinder the success of new systems designed primarily to enhance performance. The Technology Acceptance Model (TAM) is theoretically based on Ajzen and Fishbein's work on attitudes toward behavior and the Theory of Reasoned Action (Davis, 1993; Davis et al., 1989). According to Davis et al. (1989), this model helps researchers identify why users accept or reject a particular system and develop corrective measures.

As shown in Figure 1, *perceived usefulness (PU)* and *perceived ease of use (PEOU)* together explain attitude, while behavioral intention precedes actual system use. PU refers to an individual's belief that using a system will enhance their job performance (Davis, 1989; Kalyoncuoğlu, 2018). PEOU is defined as an individual's perception that a system requires minimal effort for its use. The concept of ease in this context refers to avoiding difficulties and reducing the amount of effort required. (Davis, 1989) and PEOU also significantly influences PU (Davis, 1993).

Attitude toward use is a function of both PU and PEOU (Davis, 1993) and represents an individual's positive or negative feelings toward a technological system. Behavior is not directly determined by attitude but by intention. Attitude influences behavioral intention, which in turn affects actual behavior (Kağıtçıbaşı & Cemalcılar, 2014). Intention is determined by an individual's attitude toward a behavior and the perceived usefulness of that behavior (Özer et al., 2010). Over time, new models of technology acceptance have been proposed: TAM2 by Venkatesh and Davis (2000), Unified Theory of Acceptance and Use of Technology (UTAUT) (2003), and TAM3 by Venkatesh and Bala (2008).

Figure 1: Research Model



Davis et al. (1989)

In this study, the original Technology Acceptance Model (TAM) was chosen over extended models such as TAM2, TAM3, and UTAUT. This decision was made to facilitate a methodological comparison with the study by Turan and Haşit (2014), which used the original TAM model, and to test the stability of the relationships between the model's core variables across the pre- and post-pandemic periods. The original TAM's structural paths were retained without modification to ensure direct comparability.

2.4. Hypotheses

Although these structural paths were confirmed in pre-pandemic conditions (Turan & Haşit, 2014), the near-mandatory use of technology during the pandemic may have altered the strength of these relationships. Therefore, testing of these hypotheses in the pandemic/post-pandemic context provides evidence on TAM's stability.

TAM proposes that PEOU shapes PU, because a system that requires less effort is more likely to be perceived as useful (Davis, 1989) (H_1). Both PU and PEOU are expected to positively influence attitude toward use — teachers who perceive EBA as useful and easy to use are more likely to develop a favorable attitude (Davis et al., 1989; Teo, 2009)(H_2, H_3). A positive attitude toward use naturally leads to a stronger behavioral intention (Ajzen & Fishbein, 1980) (H_4). Behavioral intention is the most direct predictor of actual system use (Davis et al., 1989) (H_5). Finally, PU is also expected to directly affect behavioral intention, as teachers who perceive EBA as useful are more likely to intend to use it, independent of their attitude (Hu et al., 2003; Teo, 2009) (H_6).

3. Methods

3.1. Research Method

This study is quantitative research examining teachers' attitudes, intentions, and perceptions regarding the usefulness and ease of use of the Educational Informatics Network (EBA).

3.2. Data and Sample

The research population consists of middle school teachers working in Bilecik province. The research group consisted of 326 teachers working in secondary schools in the Bilecik province of Turkey.

Participants were selected using convenience sampling. Data was collected between October and December 2021.

3.3. Data Collection Instrument

The data collection instrument consisted of 36 items across two sections: (1) demographic information (11 questions covering gender, marital status, education level, workplace location, EBA usage history, etc.), and (2) the Technology Acceptance Model scale (25 items). The TAM scale developed by Turan (2011) based on the previous studies of Davis (1989), Heinssen et al. (1987), and Hu et al. (2003) and adapted for EBA usage. The scale has 25 items, and five sub-dimensions: PU (6 items), PEOU (5 items), attitude towards use (6 items), behavioral intention (4 items), and actual system usage (4 items). Participants responded to each TAM item using a five-point Likert scale ranging from 1 *(Strongly Disagree)* to 5 *(Strongly Agree)*.

3.4. Ethical Approval

This study was carried out in compliance with the *"Directive of the Scientific Research and Publication Ethics Committee of Bilecik Şeyh Edebali University"*. Ethical approval was obtained before data collection, and an online survey was conducted among teachers. The ethical approval for this study was granted by the *"Scientific Research and Publication Ethics Committee of Bilecik Şeyh Edebali University"* with decision # 6 taken at meeting 8, dated 08/26/2021.

3.5. Data Analysis Procedures

IBM SPSS 25.0 and IBM SPSS AMOS 24.0 statistical software were used to analyze the collected data. Descriptive statistics were calculated, and then the scale's reliability and validity were evaluated using Cronbach's alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). We used structural equation modeling (SEM) to test the research model and determine the causal relationships between variables.

Covariance-Based Structural Equation Modeling (CB-SEM) was used with IBM SPSS AMOS 24.0. CB-SEM was preferred because the study aimed to test and confirm an established theoretical framework (Hair et al., 2014; Kline, 2015). Recommendations regarding sample adequacy in the SEM literature generally indicate that sample sizes above 200 are sufficient for models (Kline, 2015). The sample size of 326 used in this study is consistent with this suggestion. Model evaluation followed a two-step approach:

- Measurement model validation (CFA)
- Structural model testing

In the SEM analysis, the model's goodness of fit was evaluated using various fit indices (χ^2/df, CFI, RMSEA, SRMR).

4. Results

4.1. Descriptive statistics

Table 1 presents the descriptive data of the teachers who completed the survey. Among the participants, 61% are female, and 39% are male. Among the participants, 79.4% are married, and 20.6% are single. Regarding educational background, 90.2% hold an undergraduate degree, while 9.8% hold a graduate degree. Regarding their workplace, 50.3% work in the provincial center, 33.1% in district centers, and 16.6% in towns or villages. The highest proportion of respondents (64.1%) has been using EBA for 5-8 years. Before the pandemic, 68.4% of the teachers had already used EBA. Additionally, 85.6% of the teachers prefer using computers for EBA, while 12.3% use smartphones, and 2.1% use tablets.

Table 1: Descriptive Statistics

Descriptive Data		f	%	Descriptive Data		f	%
Gender	Female	199	61	Marital Status	Married	259	79.4
	Male	127	39		Single	67	20.6
Education	Undergraduate	294	90.2	Pre-pandemic EBA Usage	Yes	223	68.4
	Graduate	32	9.8		No	103	31.6
Workplace Location	Provincial Center	164	50.3	Device	Computer	279	85.6
	District Center	108	33.1		Tablet	7	2.1
	Town/Village	54	16.6		Smartphone	40	12.3
EBA Usage in Lessons	Does not use	14	4.3	School Ownership	Public	302	92.6
	1-4 years	19	5.8		Private	24	7.4
	5-8 years	209	64.1				
	9-12 years	75	23.0				
	More than 12 years	9	2.8				

4.2. Measurement Model Validation (CFA)

Covariance-Based Structural Equation Modeling (CB-SEM), used to confirm or refute theories, was preferred for this purpose in this research. Prior to structural analysis, Confirmatory Factor Analysis (CFA) was performed. As shown in Table 2, all standardized factor loadings were statistically significant ($p < .001$) and ranged from .651 to .973, except for one question from the actual system usage. Actual System Use item #2 was excluded from the measurement model based on multiple diagnostic criteria. This reverse-coded item's standardized factor loading was negative and non-significant ($\lambda_{ASU2} = -.095$). It suggests that respondents may have misinterpreted the item. This decision aligns with Hair et al.'s (2019) recommendation that indicator elimination should be based on multiple diagnostics rather than loading values alone. After this question was excluded, structural analysis was performed.

We calculated Cronbach's alpha coefficients to assess internal consistency, and they were higher than .90 for all constructs except actual usage behavior ($\alpha = .82$). Alpha values above .70 are considered acceptable, and those above .90 indicate that the scales are reliable (Kılıç, 2016). Composite Reliability (CR) and Average Variance Extracted (AVE) were computed to assess construct reliability and convergent validity within the SEM framework. All CR values exceeded the recommended threshold of .70, and all AVE values were above .50. This indicates adequate composite reliability and convergent validity (Hair et al., 2014). Although the reliability coefficients are relatively high, this pattern is common in confirmatory testing of established TAM constructs and reflects strong internal consistency rather than item redundancy.

Table 2. Construct Reliability, Validity

Construct	Item	Std. Ld.	Cr α	CR	AVE
PU	PU1	.924	.98	.98	.89
	PU2	.947			
	PU3	.949			
	PU4	.963			
	PU5	.946			
	PU6	.928			
PEOU	PEOU1	.893	.97	.97	.86
	PEOU2	.908			
	PEOU3	.943			
	PEOU4	.933			
	PEOU5	.961			
Attitude	A1	.914	.98	.98	.88
	A2	.939			
	A3	.967			
	A4	.964			
	A5	.943			
	A6	.903			

Variable	Item	Std. Ld.	Cr α	CR	AVE
Behavioral Intention	BI1	.935	.98	.98	.92
	BI2	.965			
	BI3	.971			
	BI4	.963			
Actual System Usage	ASU1	.793	.82	.83	.62
	ASU2	*-0.095*			
	ASU3	.695			
	ASU4	.861			

Discriminant validity was assessed using the Fornell–Larcker criterion. Comparing the square roots of AVE values (√AVE) with inter-construct correlations, as presented in Table 3. All √AVE values exceeded the corresponding inter-construct correlations, confirming discriminant validity.

Table 3. Discriminant Validity

Variable	PU	PEOU	Attitude	BI	ASU
PU	*.943****				
PEOU	.712	*.928****			
Attitude	.739	.613	*.939****		
Behavioral Intention	.697	.586	.816	*.958****	
Actual System Usage	.642	.552	.748	.751	*.783****

Note: Cr α = Cronbach's Alpha; CR = Composite Reliability; AVE = Average Variance Extracted. ***Diagonal values (italic) represent the square root of AVE (√AVE). The other values in the validity columns are inter-construct correlations.

A single-factor CFA model was used to assess common method bias and compare it with the proposed measurement model (Podsakoff et al., 2003). Compared to the hypothesized model (χ^2 = 658.658, df = 246, RMSEA = .073, CFI = .965, NFI = .946), the single-factor model did not fit well (χ^2 = 4952.831, df = 275, RMSEA = .229, CFI = .614, NFI = .602). The chi-square difference test showed that the model fit worsened substantially ($\Delta\chi^2$ = 4294.173, Δdf = 29), indicating that a single latent factor doesn't explain the covariance structure among the variables.

4.3. Structural Model

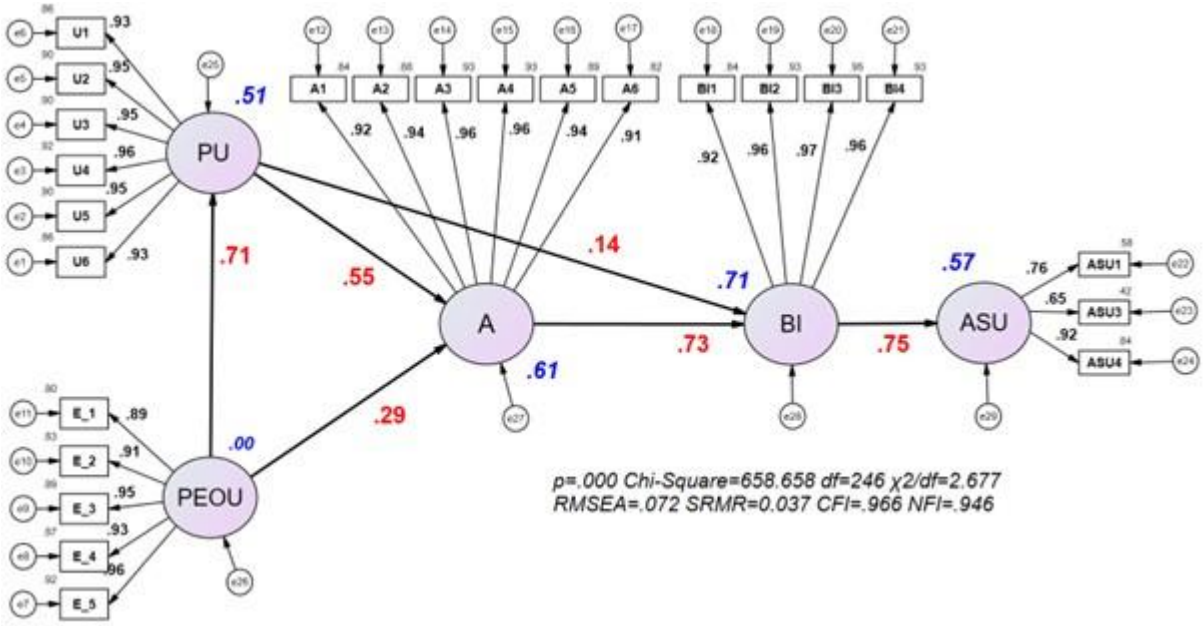
Structural Equation Modeling (SEM) allows simultaneous testing of relationships among both observed and latent variables within a unified framework (Dursun and Kocagöz, 2010). In SEM, the path coefficients, which indicate the estimated path relationships, correspond to the standardized Beta coefficients in regression analysis (Hair et al., 2014; Kline, 2015) and elucidate the change in the standard deviation of the dependent variable resulting from a one-standard-deviation increment in the independent variable (Kline, 2015).

Using IBM SPSS AMOS, an SEM including all variables related to the TAM used in this research was developed, as shown in Figure 2. Since the model fit indices were acceptable, no further modifications were made.

In the figure, path coefficients are shown in red, and R^2 values are displayed in blue in italics. When examining the model, the effect of PEOU on PU is statistically significant, and the path coefficient is calculated as .71. This indicates that a one standard deviation increase in PEOU results in a 0.71 standard deviation increase in PU. The R^2 value for PU is .51, meaning that 51% of PU's variance is explained by PEOU.

It was found that both PU and PEOU have a significant positive effect on user attitude. The path coefficients are .55 for PU and .29 for PEOU, indicating that a one-unit standard deviation change in attitude is composed of .55 from PU and .29 from PEOU. The R^2 value for attitude is .61, suggesting that 61% of its variance is explained by PU and PEOU, together. The effect of PU on intention is weak but statistically significant. The path coefficient for attitude's effect on intention is .73, with an adjusted determination coefficient of .71, indicating that 71% of the variance in intention is explained by attitude and PU. Lastly, the path coefficient for the relationship between intention and actual system usage behavior was found to be .75, with an adjusted determination coefficient of .57. This means that 57% of the variance in actual usage behavior is explained by intention, and a one-unit increase in intention results in a .75 standard deviation increase in usage behavior.

Figure 2. Structural Model



Rather than reporting every available fit index, a focused set of indices is sufficient for model evaluation (Hooper et al., 2008). Following Kline (2015), chi-square with degrees of freedom and p-value, RMSEA, CFI, and SRMR were reported. The fit indices for the model are presented in Table 4, and according to these values, the model shows a good fit.

Table 4: Model Fit Data

	Chi-Square	df	χ^2/df	RMSEA	SRMR	CFI	NFI
Model Data	658.658	246	2.68	.072	.037	0.97	.95
Acceptable Fit (Hooper et al., 2008)				<.08	<.08	>.95	>.95

4.4. Hypothesis Testing Results

The structural model results are presented in Table 5. All hypothesized paths were statistically significant and supported. The strongest relationship was observed between Behavioral Intention and Actual System Use (β = .751, p < .001).

Table 5: Structural Model Results

Hypothesis	Path	β	SE	Critical Ratio	p	Result
H_1	PEOU → PU	.712	.047	15.917	<.001	Supported
H_2	PU → A	.547	.050	9.880	<.001	Supported
H_3	PEOU → A	.291	.051	5.453	<.001	Supported
H_4	A → BI	.732	.056	13.323	<.001	Supported
H_5	BI → ASU	.754	.047	12.650	<.001	Supported
H_6	PU → BI	.142	.045	2.865	.004	Supported

5. Discussion

The results of this study validate that the essential structural relationships posited by the original Technology Acceptance Model (Davis, 1989) remain statistically significant in the post-pandemic context of EBA usage. All hypotheses are supported, demonstrating that the TAM's core elements work

as an explanatory framework. These findings are mainly consistent with previous TAM-based studies in educational contexts, such as Hu et al. (2003), Teo (2009), and Turan and Haşit (2014).

Consistent with prior research (Hu et al., 2003; Teo, 2009; Yorulmaz & Alnıpak, 2020), both perceived ease of use and perceived usefulness significantly affect teachers' attitudes toward use.

Perceived usefulness demonstrates a positive and significant impact on attitude (Schepers & Wetzels, 2007; Songkram & Osuwan, 2022; Teo, 2009) and behavioral intention (Han & Sa, 2022; Hong et al., 2021; Hu et al., 2003; Schepers & Wetzels, 2007; Teo, 2009). However, some researchers have not found this significant effect of perceived usefulness on behavioral intention such as (Avcı & Yıldız, 2021; Bekar & Çam, 2021; Songkram & Osuwan, 2022).

Specifically, when compared to the pre-pandemic findings of Turan and Haşit (2014), a significant structural change emerges. In the previous study, the relationship between perceived usefulness and behavioral intention was not statistically significant. In contrast, the current findings indicate that perceived usefulness significantly affects behavioral intention. This difference indicates that the evaluative role of perceived usefulness has become more pronounced in the post-pandemic period.

This structural shift warrants closer theoretical attention. During the pandemic, teachers relied on EBA as their primary instructional tool, allowing them to develop clearer perceptions of its usefulness through sustained experience. This is consistent with Davis et al. (1989), who found that perceived usefulness strengthened significantly over time with increased system use. When teachers are pushed to use a platform intensively, usefulness shifts from an assumption to an empirical fact. At the same time, the strong and stable relationship between behavioral intention and actual system usage aligns with Davis et al. (1989)'s proposition that intention is the immediate determinant of behavior.

These findings make a clear theoretical contribution. TAM has been tested extensively, but evidence regarding whether its relationships hold over time — and particularly during a crisis such as a pandemic — has been limited. This study shows that the model's core structure is robust, while also revealing that a specific pathway, perceived usefulness to behavioral intention, can strengthen under conditions of intensive, mandatory use. This is not just a replication; it is evidence that crisis-driven digitalization, such as mandatory use of EBA, can reshape how teachers evaluate and adopt technology.

The findings also carry practical implications for education policymakers and school administrators. Since perceived usefulness proved to be a stronger driver of behavioral intention in the post-pandemic period, training programs should go beyond basic platform literacy and focus on demonstrating how EBA concretely supports everyday teaching. Given that most teachers in this study had been using EBA for five or more years, the priority should be on deepening its use for lesson planning, content integration, and student engagement rather than introducing the platform.

6. Conclusion

This study examined the post-pandemic validity of the original Technology Acceptance Model (TAM) in the context of EBA usage and compared the findings with those of pre-pandemic studies. The model's basic structure remained stable. However, the perceived usefulness–behavioral intention relationship became significant in the post-pandemic period, unlike in Turan and Haşit (2014). This shift likely reflects teachers' intensive use of EBA during the pandemic, which strengthened their perceptions of its usefulness in teaching.

From an educational policy perspective, digital infrastructures deployed during crises should be integrated into long-term education planning, rather than treated as temporary solutions.

5.1. Limitations and Future Research

This study has a few limitations worth noting. The data were collected at a single point in time from teachers in one province, which makes it difficult to generalize the findings or track how attitudes change over time. Since all data were self-reported, some response bias cannot be ruled out. The original TAM was deliberately used to enable comparison with Turan and Haşit (2014), but this meant that external factors that may shape technology acceptance were left out of the picture.

These limitations also suggest directions for future research. Following the same teachers over time — before, during, and after a crisis such as a pandemic— would give a much clearer picture of how technology acceptance evolves. Broader samples, including teachers from different provinces and school types, especially those in hybrid settings, would help test whether the findings hold more widely. Researchers might also consider incorporating TAM2, TAM3, or UTAUT to include variables such as institutional support and social influence, which likely played a role during the pandemic but were not investigated here.

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Appendix: Scale Items

Item	English	Turkish
Perceived Usefulness (PU)		
PU1	Using EBA helps me accomplish tasks more quickly.	EBA kullanmak işlerimi daha çabuk yapmamı sağlar.
PU2	Using EBA improves my job performance.	EBA kullanmak iş performansımı artırır.
PU3	Using EBA increases my productivity at work.	EBA kullanmak işteki üretkenliğimi artırır.
PU4	Using EBA increases my effectiveness at work.	EBA kullanmak işteki etkinliğimi artırır.
PU5	Using EBA makes my work easier.	EBA kullanmak işlerimi daha kolay yapmamı sağlar.
PU6	I find EBA useful in my lessons.	Derslerimde EBA kullanmayı yararlı buluyorum.
Perceived Ease of Use (PEOU)		
PEOU1	Learning to use EBA is easy for me.	EBA'nın kullanımını öğrenmek benim için kolaydır.
PEOU2	It is easy for me to make EBA tools do what I want in my lessons.	Derslerimde kullandığım EBA'nın araçlarına istediğim şeyleri yaptırmak benim için kolaydır.
PEOU3	I find EBA tools clear and easy to understand.	EBA araçlarının kullanımını açık ve anlaşılır buluyorum.
PEOU4	It is easy for me to become skillful at using EBA during lessons.	Ders esnasında kullandığım EBA kullanımında ustalaşmak benim için kolaydır.
PEOU5	Overall, EBA tools are easy to use.	Genel olarak EBA araçlarının kullanımı kolaydır.
Attitude Toward Use (A)		
A1	Using EBA in my lessons is a good idea.	Derslerimde EBA'yı kullanmak oldukça iyi bir fikir.
A2	Using EBA features in my lessons makes the class more fun and interesting.	Derslerimde EBA'nın olanaklarını kullanmak dersi eğlenceli ve ilginç yapıyor.
A3	I enjoy teaching with EBA.	EBA'yı kullanarak ders yapmak hoşuma gidiyor.
A4	Using EBA features in my profession makes me happy.	Mesleğimde EBA'nın olanaklarını kullanmak beni mutlu ediyor.
A5	I am enthusiastic about using EBA at work.	İşimde EBA kullanmaya hevesliyim.
A6	Learning to use EBA tools is like gaining new skills — the more you practice, the better you get.	EBA araçlarını kullanmayı öğrenmek yeni beceriler kazanmak gibidir, ne kadar çok pratik yapılırsa o kadar mükemmel olunur.
Behavioral Intention (BI)		
BI1	I plan to use EBA in my lessons in the future.	Gelecekte derslerimde EBA kullanmayı düşünüyorum.
BI2	I intend to use EBA more frequently in my lessons.	Derslerimde EBA'yı daha sık kullanmayı düşünüyorum.
BI3	I intend to continue using EBA in my lessons in the future.	Gelecekte derslerimde EBA'yı devam ettirmeye niyetim var.
BI4	I know I will continue using EBA in my lessons in the future.	Gelecekte derslerimde EBA'yı kullanmaya devam edeceğimi biliyorum.
Actual System Use (ASU)		
ASU1	I spend a lot of time using EBA content.	EBA'nın içeriklerinin kullanımına çok zaman ayırıyorum.
ASU2	I rarely use EBA content. (R)	EBA'nın içeriklerini seyrek kullanırım.
ASU3	I cannot work efficiently without EBA content.	EBA'nın içerikleri olmadan verimli çalışamam.
ASU4	I use EBA content very frequently.	EBA'nın içeriklerini çok sık kullanırım.

Araştırma Makalesi

Technology Acceptance Model and Teachers' Use of Educational Informatics Network (EBA): A Structural Equation Modeling Analysis

Teknoloji Kabul Modeli ve Öğretmenlerin Eğitim Bilişim Ağı (EBA) Kullanımı: Yapısal Eşitlik Modellemesi ile Bir Analiz

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Genişletilmiş Özet

1. Giriş

Eğitimin teknoloji ile entegrasyonu düşük bir hızla ilerlemiş, mühendislik ya da bankacılık kadar yoğun teknoloji kullanımı ile ilişkilendirilmemiştir (Pathiranage & Karunaratne, 2023; Turan & Haşit, 2014). Fakat 2019 yılının son aylarında Çin'in Wuhan bölgesinde ortaya çıkan ve 2020 yılının başında küresel bir pandemiye dönüşen COVID-19 salgını, insan hayatını pek çok yönden etkilediği gibi okulların da kapatılmasına neden olmuştur. Dünyadaki ülkelerin büyük çoğunluğu, hem öğrencilerin hem de öğretmenlerin teknolojiyi benimseme durumlarına bakmaksızın eğitimi tamamen çevrimiçi bir biçime dönüştürmek zorunda kalmıştır (Chun & Yunus, 2023). Her ne kadar öğretmen adaylarının teknolojik bilgi ve becerilerini artırmaya yönelik dersler öğretmen yetiştirme programlarının ders planlarında yer alsa da (Uslu & Güner, 2022), COVID-19 pandemisi sırasında öğretmenler geleneksel yüz yüze eğitimle kıyaslandığında teknoloji kullanımı, dijital okur-yazarlık açısından oldukça zorlanmıştır (Li & Yu, 2022).

Öğretmenlerin teknolojik olarak yeterli olması, COVID-19 pandemisi gibi geniş kapsamlı krizler sırasında öğretimin sürdürülebilmesi için tek başına yeterli değildir. Eğitimin devamlılığını sağlamak için öğrencilerin kitap, video, ses ve görsel içerik gibi eğitim materyallerine erişebilmesi ve öğretmenleriyle çevrim içi sınıf ortamlarında bulunabilmesi gerekmektedir. Bu nedenle, eğitim sürecinin ihtiyaç duyduğu altyapıyı sunan platformların varlığı büyük önem taşımaktadır. Türkiye'de 2012 yılından bu yana kullanımda olan ve zaman içerisinde işlevi ve modülleri gelişen Eğitim Bilişim Ağı (EBA) da bu platformlara bir örnektir.

Araştırmanın temel problemi, pandemi öncesinde incelenen TKM değişkenleri arasındaki ilişkilerin zorunlu ve yoğun dijital kullanımın yaşandığı pandemi/pandemi sonrası dönemde de geçerliliğini koruyup korumadığının incelenmesidir. Turan ve Haşit (2014) bu ilişkileri pandemi öncesinde TKM ölçeğiyle test etmişlerdir. Aradan geçen sürede sınıflarda teknolojik araçların kullanımı yaygınlaşmış hem öğretmenlerin teknoloji kullanımları hem de EBA'nın işlevi değişmiştir. Bu değişimin TKM unsurları arasındaki ilişkilere yansıyıp yansımadığı ise yanıt bekleyen bir sorudur.

2. Yöntem

Bu araştırma öğretmenlerin Eğitim Bilişim Ağı'na (EBA) yönelik tutum, niyetleri ve EBA'yı faydalı ve kullanımını kolay bulmaları ve nihayetinde EBA'da gerçekleşen EBA kullanımlarını inceleyen nicel bir araştırmadır.

Veri toplama aracı olarak kullanılan anket formu; Turan (2011)'ın Davis (1989), Heinssen vd. (1987) ve Hu vd. (2003)'nin çalışmalarından oluşturmuş olduğu sorular ile tanımlayıcı verilerin yer aldığı iki bölüm ve toplam otuz altı sorudan oluşmaktadır. TKM değişkenleri ait olan bölümdeki soruların değerlendirilmesinde "*1=Kesinlikle Katılmıyorum, … ve 5=Kesinlikle Katılıyorum*" aralığında 5'li Likert tipi derecelendirmeye sahip ölçek kullanılmıştır.

Veri toplama öncesinde etik onay alınmış ve öğretmenler arasında çevrimiçi bir anket yapılmıştır. Bu çalışmaya ait etik onay, Bilecik Şeyh Edebali Üniversitesi Bilimsel Araştırma ve Yayın Etiği Komitesi tarafından, 26/08/2021 tarihli 8. toplantısında alınan #6 numaralı karar ile verilmiştir.

Toplanan verilerin analizi için IBM SPSS 25.0 ve IBM SPSS AMOS 24.0 istatistiksel yazılımları kullanılmıştır. İlk olarak betimsel istatistikler hesaplanmış, sonrasında ölçeğin güvenilirliği, Cronbach alfa katsayısı kullanılarak değerlendirilmiştir. Araştırma modelini test etmek ve değişkenler arasındaki nedensel ilişkileri belirlemek için yapısal eşitlik modellemesi (YEM) kullanılmıştır. YEM analizinde, modelin uyum iyiliği çeşitli uyum indeksleri (χ^2, CFI, RMSEA ve SRMR) ile değerlendirilmiştir.

3. Bulgular ve Sonuç

Covid-19 pandemisi günlük yaşantımızı birçok yönden etkilemiş ve eğitim sistemlerinde köklü değişimlere neden olmuştur. Pandeminin etkisi sonucunda yüz yüze eğitim yerini çevrimiçi platformlar aracılığıyla uzaktan eğitime bırakmış ve hem öğrenciler hem de eğiticiler bu süreçte Bilgi ve İletişim Teknoloji (BİT) araçlarını yoğun olarak kullanmak zorunda kalmıştır. Kullanıcıların teknoloji kullanımını açıklamaya yönelik literatürdeki en önemli çalışmalardan birisi de Davis'in (1989) geliştirmiş olduğu Teknoloji Kabul Modeli'dir. Modelde algılanan fayda, algılanan kullanım kolaylığı, kullanıma yönelik tutum ve niyet ile gerçekleşen davranış değişkenler bulunmaktadır. Literatüre göre bireylerin teknolojiye yönelik olumlu tutumları, ondan faydalanma düzeyleri, kullanım niyetlerini ve nihayetinde de gerçekleşen kullanım davranışlarını etkileyen faktörlerdir.

Bu araştırmada branş öğretmenlerinin Eğitim Bilişim Ağı (EBA) kullanımından sağlayacaklarını düşündükleri fayda, onun kullanımını kolay bulma algıları, kullanıma yönelik tutum ve niyetleri ile EBA kullanma davranışları Teknoloji Kabul Modeli (TKM) çerçevesinde ve bir yapısal eşitlik modeli kullanılarak incelenmiştir.

Hazırlanan modelden elde edilen sonuca göre; öğretmenlerin EBA'nın kullanımını kolay bulmaları ve EBA kullanımından elde edeceklerini düşündükleri fayda, EBA'nın kullanımına yönelik tutumları üzerinde istatistiki olarak olumlu ve anlamlı bir etkiye sahiptir. Bu bulgu, daha önce yapılan birçok çalışmayla tutarlılık göstermektedir (Hu et al., 2003; Teo, 2009; Turan & Haşit, 2014; Yorulmaz & Alnıpak, 2020).

Bu araştırmada algılanan faydanın hem kullanıma yönelik tutum hem de niyet üzerinde olumlu ve anlamlı bir etkiye sahip olduğu bulunmuştur. Hu (2003), Ma vd. (2005) ve Teo (2009) da algılanan faydanın niyet üzerindeki anlamlı etkisini bildirmişken, Turan ve Haşit (2014) ve Avcı ve Yıldız'ın (2021) ise yaptıkları araştırmalarda bunun zıttı bir bulguya ulaşmış ve araştırmalarında algılanan faydanın niyet üzerinde anlamlı bir etkisi bulunamamıştır. Kullanıma yönelik tutum ve algılanan faydanın niyet üzerindeki etkileri olumlu ve istatistiki olarak anlamlıdır, tutumun etkisi ise daha fazladır. Kullanıma yönelik tutumun niyet üzerindeki anlamlı etkisi Çubukçu vd. (2017), Hu (2003), Ma vd. (2005), Teo (2009) ve Turan ve Haşit (2014) tarafından da bulunmuştur. Niyet de gerçekleşen kullanma davranışını daha önceki araştırmalarda Turan ve Haşit (2014), Bekar ve Çam (2021) ve Baraz vd. (2021)'nin de bildirdiği şekilde olumlu ve anlamlı olarak etkilemektedir. Araştırmada elde edilen veriler öğretmenlerin EBA kullanım geçmişleri ile ilgili bilgiler de sağlamaktadır. Branş öğretmenlerinin %68,4'ünün EBA'yı pandemiden önce de kullandıkları belirlenmiştir. Bu oran, EBA'nın pandemi öncesinde de öğretmenler arasında yaygın bir kullanım alanı bulduğunu göstermektedir. Ancak, araştırma sonuçlarına göre pandeminin bu kullanımı daha da yaygınlaştırdığı söylenebilir. Ayrıca, öğretmenlerin büyük bir çoğunluğu (%85,6), EBA'yı kullanırken bilgisayarı tercih etmektedir. Bu

durum, öğretmenlerin masaüstü veya dizüstü bilgisayarları, mobil cihazlara kıyasla daha işlevsel bulduğunu göstermektedir. Bunlara ilave olarak, öğretmenlerin büyük çoğunluğu EBA'yı 5-8 yıl arasında kullanmaktadır (%64,1). Araştırmadaki amaçlardan birisi olan on sene sınıf öğretmenleri ile gerçekleştirilen araştırma ile karşılaştırma yapıldığında bulunan en belirgin iki bulgudan birincisi; daha önce algılanan faydanın niyet üzerinde istatistiki olarak anlamlı bir etkisi bulunmamışken, bu araştırmada zayıf da olsa anlamlı bir etki bulunmuştur. Diğer belirgin bulgu ise faktör yüklerindeki yüksek düzeydir. Her iki araştırmadaki yol katsayıları görece yakın değerlerde olmakla birlikte; ilk araştırmadaki davranışa yönelik niyetin gerçekleşen davranış üzerindeki etkisine ait yol katsayısı 0,48 iken, bu araştırmada bu değer 0,75 gibi ilk değere göre oldukça yüksek bir değer olarak hesaplanmıştır.

Sonuç olarak, bu araştırma, öğretmenlerin EBA kullanımını etkileyen faktörleri TKM çerçevesinde değerlendirmiş ve modelin temel öngörülerini büyük ölçüde doğrulamıştır. Algılanan kullanım kolaylığı, algılanan fayda, kullanıma yönelik tutum ve niyetin teknoloji kullanımında kritik değişkenler olduğu bir kez daha gösterilmiştir.