

# A Preliminary Investigation of the Technology Acceptance Model (TAM) in Early Childhood Education and Care

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**Abstract:** *The technology acceptance model (TAM) is a well-known postmodern idea that explains how humans adopt and use new technologies. The model focuses on variables that impact behavioral intention to use new technology from the perspective of the end user. The purpose of this study was to construct a viable questionnaire for assessing preschool teachers' technology acceptability in online instruction in ECEC, based on data collected from 182 Romanian preschool instructors, using the theory of planned behavior framework. Our application of theory of planned behavior in technology adoption in ECEC is extraordinarily good, with 66 percent explained variance of actual usage of technology in class. The research literature supports the findings that the intention to use technology and a good attitude toward technology are the most significant determinants of actual technology usage. Although more research is needed in larger and more complex samples to confirm these findings, there is compelling evidence that the prediction methodology can be used to predict preschool teachers' level of technology acceptance and assist educational decision-makers in designing timely interventions that improve the chances of success. The study's major findings point to crucial variables that might help national educational decision-makers improve technology adoption in ECEC.*

**Keywords:** *Technology Acceptance Model, Early Childhood Education and Care, scale reliability.*

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## 1. The Technology Acceptance Model (TAM)

Postmodern psychology is a philosophical position that asks whether an ultimate or solitary interpretation of truth is even conceivable within the area of psychology. It also contradicts the modernist notion of psychology as an individualistic science (Kvale, 1992) in favor of viewing people as a cultural and community product controlled by communication rather than an inward self (Lobman, 2005; Sandu & Nistor, 2020a, Sandu & Nistor, 2020b; Huidu, 2018). To accept the diversity of reality and avoid oversimplification, postmodern psychology employs a variety of approaches rather than a single approach. Postmodernism sees a methodical, analytical approach to understanding the human mind as flawed by the impossibility of assuming a detached, objective perspective (Childers, 1995).

The technology acceptance model (TAM) is a prominent postmodern concept that helps to explain how people come to accept and use new technologies (Clipa, & Greciuc, 2018; Mățã, et al., 2020; Clipa et al., 2014). From the standpoint of the end user, the model focuses on variables that influence behavioral intention to utilize new technology (Davis, 1989; Kalayou et al., 2020). TAM consists of three fundamental user motivation variables: perceived ease of use, perceived utility, and attitudes toward technology. Among these variables, perceived utility (PU) and perceived ease of use (PEU) are regarded as primary determinants that explain the behavioral intention to use or accept new technology directly or indirectly (Kalayou et al., 2020; Sumak et al., 2011). Despite the existence of several TAM variants, some with or without external variables, and others with or without actual technology usage as an end variable, the TAM's key aspects include perceived ease of use, perceived usefulness, attitudes toward technology, and intents to utilize technology (Davis, 1986; Venkatesh & Bala, 2008a; Marangunic & Granic, 2015). The TAM has been researched and developed on a regular basis, with the second TAM (Venkatesh et al., 2000) and the unified theory of acceptance and application of technology (Venkatesh, 2000) being two notable advancements (Venkatesh et al., 2003). A TAM 3 have been established in online commerce, which covers the impact of trust and perceived risk on a specific technology (Venkatesh & Bala, 2008b).

Perceived ease of use relates to how simple an individual perceives it is to use technology without exerting effort, or how easy it is to use (Davis, 1986; Bong et al., 2019; Mostaghel & Oghazi, 2017; Chiu et al., 2017; Dogruel et al., 2015).

The degree to which a person feels that using technology would improve their job performance is referred to as perceived usefulness (Bong et al., 2019; Mostaghel & Oghazi, 2017; Chiu et al., 2017; Dogruel et al., 2015; Lekjaroen et al., 2016; Hsiao, Tang, 2015).

The degree to which the act of using a system is seen to be joyful in and of itself, regardless of any performance results connected with system use, is referred to as perceived enjoyment (Dogruel et al., 2015; Park et al., 2021).

Intention to use denotes a desire to make use of the technology in the future (Hsiao & Tang, 2015; Lekjaroen et al., 2016).

Actual use refers to a person's readiness to utilize technology now (Dogruel et al., 2015).

The degree to which a technology is viewed as being compatible with the current values, needs, and prior experiences of potential adopters is referred to as compatibility (Chiu, et al., 2016; Rogers, 1995).

The psychological inclination of appraising a certain element with some degree of favor or dislike is referred to as attitude (Bong et al., 2019; Chiu et al., 2017; Hsiao & Tang, 2015; Lekjaroen et al., 2016).

People's opinions of their own effectiveness or aptitude to complete a task effectively are referred to as self-efficacy (Bandura, 1986; Bong, et al., 2019; Dogruel, et al., 2015; Palos, & Samfira, 2021; Tulbure et al., 2015).

A broad sensation of tiredness from engaging in video conference calls is known as Zoom fatigue (Fauville, et al., 2021).

The probability that a technology-assisted educational activity may not be as effective as planned is referred to as perceived risk (Li, Huang, 2009).

An individual's overall assessment of technology is a crucial factor in determining their attitudes toward technology (Zhang et al., 2012).

Because of the COVID-19 epidemic, online education has become a popular response, requiring preschool instructors to adapt and use educational technology quickly. Given this critical circumstance, research on preschool teachers' use of technology can provide insight into how to increase preschool teachers' motivation to use educational technology. The Technology Acceptance Model (TAM) was widely used in previous research to analyze the process of humans accepting technology. A recent study looked into the characteristics that affected preschool teachers' use of technology with personalized TAM. Preschool teachers, according to the study, had a moderate to high degree of behavioral intention. The perceived usefulness and ease of use of preschool teachers are strongly linked to their behavioral goals. Perceived usefulness is influenced by perceived ease of use and work

relevance. Computer self-efficacy and perceptions of external control are two positive features of perceived ease of usage (Hong et al., 2021).

In this study, we hypothesized that the constructs and associations described in the modified TAM model (Rad et al., 2022) are valid to measure the behavioral intention to use technology in ECEC by preschool teachers. The proposed research variables, their relationships, the research framework, and our hypotheses presume that actual use is significantly influenced by perceived usefulness, perceived ease of use, perceived enjoyment, intention to use, compatibility, attitude, self-efficacy, emotional consequences of Zoom fatigue, and perceived risk.

### ***1.1. The Present Investigation***

Following a review of the literature, we found that the TAM model is generally applicable, offering a solid theoretical and empirical basis for our current study. Existing research, on the other hand, has the following weaknesses, which have already been identified. Previous study has focused on kids and pre-service teachers rather than preschool instructors. The majority of the research looked at the TAM in non-epidemic situations rather than in the midst of an outbreak. The rapid adoption of online teaching by the COVID-19 needs an understanding of the factors that influence preschool teachers' willingness to use educational technology.

To answer our research question, what is the degree of technology adoption among preschool teachers in the ECEC online educational setting during COVID-19, we developed an online questionnaire called the Technology Acceptance Model in Early Childhood Education and Care (TAM ECEC), conducted a reliability analysis, and then used linear regression analysis to predict preschool teachers' technology acceptance levels, using the theory of planned behavior framework.

## **2. Methodology**

### ***2.1. Participants***

During the COVID-19 epidemic in Romania in the spring of 2021, 182 preschool instructors were randomly recruited from a project-based national training program for preschool teachers called Inclusive and Qualitative Early Education. The Romanian Ministry of Education has introduced a countrywide preschool teacher training program for 2000 preschool teachers. 182 preschool teachers engaged in online education and used educational technology in their classrooms during COVID-19. At the start of our inquiry, we obtained informed consent (Sandu & Frunza, 2019).

The 182 respondents are from Alba, Arad, Bihor, Bistrita-Nasaud, Brasov, Caras-Severin, Cluj-Napoca, Dolj, Gorj, Hunedoara, Mehedinti, Salaj, Satu Mare, Sibiu, and Timis Counties and are all female preschool instructors that work in public preschools in Romania. We got replies ranging in age from 23 to 62 years old, with an average mean age of 42. Our responders had a variety of professional experience in preschool education, ranging from 2 to 43 years, with an average mean of 20 years. In the sector of preschool and elementary education, all of our responders had a government-accredited title and a bachelor's diploma or higher education.

## **2.2. Instrument**

Validated items were utilized to measure the TAM based on previous research (Venkatesh and Bala, 2008a). TAM ECEC is a technique that evaluates the technology acceptance of early childhood education and care professionals in an online learning setting. It has 27 questions on a Likert scale of 1 to 5, with 1 denoting strong disagreement and 5 denoting strong agreement. For items Q22, Q23, Q24, Q25, and Q27, we apply reverse scoring, which means 1 is recorded with 5 and vice versa. The data is interpreted using ten-dimension ratings. Higher scores indicate a greater willingness to adopt technology.

TAM ECEC measurement consists of ten dimensions and 27 items: D1. Perceived utility (e.g., "By adopting digital technologies, I can have stronger socio-educational relationships with my parents and kids," 3 items), D2. Perceived ease of use (e.g., "Digital technology interaction is straightforward and quick to master," 4 items), D3. Perceived pleasure (e.g., "I love using digital tools in my class," 4 items), D4. Intention to use (e.g., "I would utilize digital tools in my class," single item), D5. Actual use (for example, "I frequently utilize digital tools in my class," a single item), D6. Compatibility (example: "Most aspects of my professional life are compatible with the usage of digital tools," 3 items), D7. Attitude (e.g., "Using digital tools in my class is a wonderful concept," 2 items), D8. Self-efficacy (3 items) (e.g., "I am confident in my capacity to learn to use digital technology," D9. Emotional effects of Zoom fatigue (e.g., "I experience emotional tiredness after my lessons," 3 items with reversed scores), and D10. Perceived risk (e.g., "I'm fearful of being mocked in front of my children and parents," 3 questions with reversed scores). In the present research sample, Cronbach's alpha of the dimensions for D1, D2, D3, D6, D7, D8, D9, D10 were 0.91, 0.83, 0.91, 0.91, 0.95, 0.83, 0.80 respectively 0.80, except for D4 and D5 that are represented by single items, reflecting the behavioral intent to use and actual use of technology.

The online questionnaire TAM ECEC demonstrated good reliability coefficients with a calculated Cronbach's alpha of 88%. The calculated item means is  $m=3.14$  and the scale mean is  $m=85.03$ , with a variance of 189.593 and a standard deviation of 13.769.

The ANOVA with Tukey's Test for Nonadditivity yelled a between items coefficient of  $F=182.596$  significant at a  $p<0.01$  and a Hotelling's T-Squared coefficient of  $F=4.536$  significant at a  $p<0.02$ .

### ***2.3. Procedure***

To begin, we developed a Romanian version of an online questionnaire and altered items to match the needs of preschool teachers at COVID-19. Second, a pilot test was conducted with ten experienced specialists from Arad's Aurel Vlaicu University to get input. The online questionnaire was revised and revamped based on these first findings. Furthermore, studies show that the average time it takes to complete an online survey is roughly 10 minutes. Finally, a randomized convenience sample strategy was applied using the project's professional online platform <https://etic.cf/>, which contained the national online training program for nearly 2000 Romanian preschool educators.

Teachers from Romania's national training program for Inclusive and Qualitative Early Education were chosen at random. After learning about the study's goals, all preschool teachers agreed to take part. After receiving the online questionnaire links, preschool instructors had one week to complete the questionnaires by phone or computer at any time that was convenient for them.

## **3. Results and discussion**

### ***3.1. Preliminary Analyses***

All factors are evaluated using a 5-point Likert scale, with 3 serving as the theoretical midpoint. On four variables, preschool teachers offer ratings ranging from 3.17 to 3.87 for reported enjoyment, intention to utilize, self-efficacy, and perceived risk.

When the ten factors were considered, we discovered that preschool instructors had the lowest view of educational technology's usefulness ( $m=2.56$ ), followed by actual usage ( $m=2.92$ ), and self-efficacy ( $m=3.87$ ). The variables' standard deviation spread is between 0.86 and 1.17, indicating a small variability range. Skewness and kurtosis range from -0.95 to 0.42 and -0.68 to 1.15, respectively. The current study's skewness and Kurtosis values

both suggest that the examined constructs are within the normalcy range, according to the literature's stated standards (Ori et al., 2009).

With a significant threshold of 0.05, the correlation values vary from 0.15 to 0.79. The attitude and perceived enjoyment had the strongest correlation coefficient ( $r = 0.79, p < 0.001$ ). Perceived risk and perceived usefulness have a significant negative correlation ( $r = -0.15, p < 0.05$ ), while perceived risk has a positive correlation ( $r = 0.41, p < 0.001$ ) with emotional consequences of Zoom fatigue.

### 3.2. Multiple Regression analysis

Regression analysis helps us to analyze and, more importantly, model the connection between variables, allowing us to make predictions about what the actual usage of technology variable will do based on the scores of the other dimensions: perceived usefulness, perceived ease of use, perceived enjoyment, intention to use, compatibility, attitude, self-efficacy, emotional consequences of Zoom fatigue, and perceived risk.

A multiple regression was carried out to investigate whether perceived usefulness, perceived ease of use, perceived enjoyment, intention to use, compatibility, attitude, self-efficacy, emotional consequences of Zoom fatigue, and perceived risk could significantly predict actual use of technology in ECEC. The results of the regression indicated that the model explained 66.3% of the variance and that the model is significant  $F(9.172) = 40.603, p < .001$ . While intention to use contributed significantly to the model ( $B = .466, p < .01$ ), and also attitude ( $B = .197, p < .05$ ), the rest of our variables did not bring a significant contribution to our model, as seen in Table 1.

**Table 1** – Multiple regression analysis coefficients  
Source: Authors' own conception

Model Summary <sup>b</sup>										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				Sig. F Change	Durbin - Watson
					R Square Change	F Change	df1	df2		
1	.825 <sup>a</sup>	.680	.663	.67114	.680	40.603	9	17	.000	1.938

a. Predictors: (Constant), D10. Perceived risk, D2. Perceived ease of use, D9. Emotional consequences of Zoom fatigue, D1. Perceived usefulness, D8. Self-efficacy, D4. Intention to use, D6. Compatibility, D7. Attitude, D3. Perceived enjoyment

b. Dependent Variable: D5. Actual use

Source: Authors' own conception

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	164.598	9	18.289	40.603	.000 <sup>b</sup>
	Residual	77.474	172	.450		
	Total	242.071	181			

a. Dependent Variable: D5. Actual use

b. Predictors: (Constant), D10. Perceived risk, D2. Perceived ease of use, D9. Emotional consequences of Zoom fatigue, D1. Perceived usefulness, D8. Self-efficacy, D4. Intention to use, D6. Compatibility, D7. Attitude, D3. Perceived enjoyment

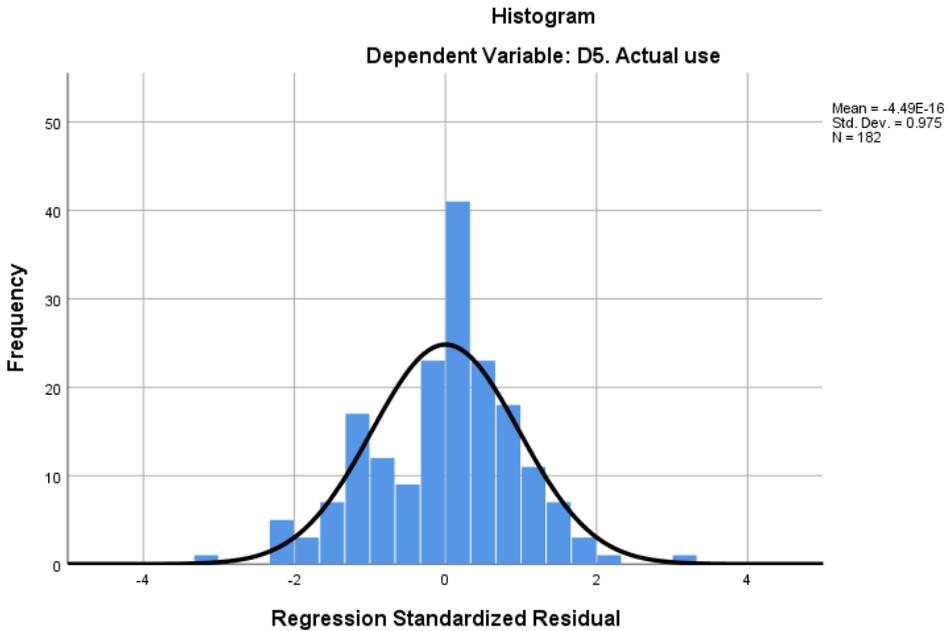
Source: Authors' own conception

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.122	.304		.403	.687
	D1. Perceived usefulness	-.024	.060	-.024	-4.08	.684
	D2. Perceived ease of use	.074	.081	.059	.924	.357
	D3. Perceived enjoyment	.111	.108	.100	1.035	.302
	D4. Intention to use	.466	.081	.476	5.747	.000
	D6. Compatibility	.115	.085	.104	1.355	.177
	D7. Attitude	.197	.095	.191	2.074	.040
	D8. Self-efficacy	.011	.082	.008	.138	.891
	D9. Emotional consequences of Zoom fatigue	-.102	.059	-.087	-1.726	.086
	D10. Perceived risk	.040	.055	.036	.722	.471

a. Dependent Variable: D5. Actual use

Source: Authors' own conception



Source: Authors' own conception

**Figure 1** – Regression Standardized residual

The scatterplot of standardized predicted values vs standardized residuals demonstrated that the data matched the requirements of variance homogeneity and linearity, and that the residuals were roughly normally distributed (Figure 1).

#### 4. Discussion

As a result of the coronavirus, Romanian preschools were closed for three months in the spring of 2020, leading in a significant shift from offline to online learning. Online education, of course, needs preschool instructors' grasp of information technology. However, it is still unclear if preschool teachers will utilize instructional technology. This study employed a customized TAM to measure Romanian preschool educators' technology adoption during COVID-19. Our findings support the premise that a tailored TAM may be valuable in an emergency online education situation.

Actual use behavior among preschool instructors ranged from moderate to high, with reported utility, perceived ease of use, perceived enjoyment, intention to use, compatibility, attitude, self-efficacy, emotional

consequences of Zoom fatigue, and perceived risk all contributing. The most immediate and crucial factors in preschool educators' real use behavior are their behavioral intention to use and attitude. Perceived utility, perceived ease of use, perceived enjoyment, intention to use, compatibility, attitude, and self-efficacy all have a positive relationship with actual usage.

Our findings contribute to a deeper understanding of preschool instructors' usage of educational technology during the COVID-19 outbreak, as well as teacher training throughout the world. According to this study, most preschool teachers accepted instructional technology throughout the epidemic since their behavioral intention score was over 3, indicating moderate or greater levels of agreement. The intense pushing for behavioral objectives by the Romanian Ministry of Education might explain the high behavioral goals. Teachers who have access to educational technology may obtain online resources and professional training from the Ministry of Education, which may have increased their motivation to use it.

Furthermore, among these qualities, preschool instructors had the lowest perceived usefulness score, indicating that preschool teachers have difficulty appreciating the utility of using technology in an ECEC environment. In support of these findings, in the final question of the online questionnaire, we asked respondents to describe their overall experience with online education in ECEC. According to over 80% of responses, the use of technology in ECEC education is both interesting and provocative, but without parental assistance in supporting their toddlers in connecting and participating in online activities, all efforts are fruitless.

The findings demonstrated that the goal of use and attitude toward technology had a significant and positive impact on the actual technology use behavior of Romanian preschool teachers. According to earlier research on the TAM, perceived utility and perceived ease of use are two essential components that have a strong impact on the adoption process of a system (Liu et al., 2019; Marangunic and Granic, 2015; Okumus et al., 2016; Scherer et al., 2019). Furthermore, preschool teachers who have a positive attitude toward educational technology are more likely to use it, whereas those who have a negative attitude toward it are more likely to reject it. A behavioral intention to use instructional technology, in addition to having a positive attitude toward technology, would boost their preparedness to use it. As a result, the keener preschool teachers are to incorporate educational technology into their ECEC work, the more likely they are to do so. In compared to earlier research, this work makes a significant contribution to the discipline.

Our findings imply that when preschool teachers use educational technology, they prefer to concentrate on their attitudes regarding it in ECEC and their desire or intention to use it. The idea of planned behavior, which states that a person's attitudes and intentions impact their actual actions, strongly supports this result (Iancu, et al., 2018; Samfira, & Sava, 2021).

## 5. Conclusions

The purpose of this study was to construct a viable questionnaire for assessing preschool teachers' technology acceptability in online instruction in ECEC, based on data collected from 182 Romanian preschool instructors, using the theory of planned behavior framework. Our application of theory of planned behavior in technology adoption in ECEC is extraordinarily good, with 66 percent explained variance of actual usage of technology in class. The scientific literature supports the findings that intention to use technology and a positive attitude toward technology are the most powerful predictors of actual technology usage. Although more research is needed to confirm these findings in larger and more complex samples, there is compelling evidence that the prediction methodology can be used to predict preschool teachers' level of technology acceptance and assist educational decision-makers in designing timely interventions that improve success chances.

There are several unique constraints to the present work. To reach our results, we analyzed cross-sectional data from preschool teachers' self-reports. Preschool teachers' attitudes and intentions toward using instructional technology may shift over time. The longitudinal technique might be used to look into how preschool teachers' behavioral intentions change over time and what variables impact them. This study's data was acquired through online questionnaires at a time when the government was implementing social isolation measures to prevent the COVID-19 epidemic. The results may be exaggerated due to social variables. Systematic interviews can be used to collect objective data and predict future results. Observations and interviews can also be used to collect data in a complete and unbiased manner. Caution should be exercised when repeating and validating results on a large sample.

Our current findings are based on a sample of preschool instructors. As a result, the current findings may differ from those of other elementary and secondary school teachers, as well as high schools, universities, and vocational institutions. Given the diversity of work content and expertise,

future research should look at engaging teachers from diverse educational levels. Finally, the current study focused on a limited set of predictors of actual technology usage. Other factors to consider include perceived norm, computer discomfort, and output quality (Legris et al., 2003).

We contribute to current information by focusing on the behavioral intentions of Romanian preschool educators who completed a semester of home-based online teaching under the COVID-19. Our findings contribute to the expanding body of information concerning the factors that influence preschool teachers' propensity to adopt instructional technology. The findings will help to develop specific practical ways to increase preschool teachers' willingness to use technology and, as a result, the quality of online education.

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