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The Predictive Effect of Pre-Service Teachers' Use of 21st-Century Learner Skills on Their Use of 21st-Century Teacher Skills

Öğretmen Adaylarının 21. Yüzyıl Öğrenen Becerileri Kullanımının 21. Yüzyıl Öğreten Becerileri Kullanımı Üzerindeki Yordayıcı Etkisi

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The Predictive Effect of Pre-Service Teachers' Use of 21st-Century Learner Skills on Their Use of 21st-Century Teacher Skills

ABSTRACT

The purpose of this study is to examine the degree to which pre-service teachers' utilization of 21st-century learner skills predicts their utilization of 21st-century teacher skills. The research was conducted with 197 senior pre-service teachers using a relational survey design. Data were collected through the 21st-Century Learner Skills Usage Scale and the 21st-Century Teacher Skills Usage Scale, developed by Orhan-Göksün (2016). Simple and multiple linear regression analyses were employed in the analysis process. The results demonstrated that pre-service teachers' use of learner skills significantly predicted their use of teacher skills. The use of learner skills significantly predicted administrative skills when all dimensions were considered together, with cognitive and collaboration–flexibility skills emerging as influential predictors in this dimension. The use of learner skills also significantly predicted technopedagogical skills when all dimensions were considered together, with cognitive, collaboration–flexibility, and innovativeness skills identified as significant predictors in this dimension. In addition, when all dimensions were considered together, the use of learner skills significantly predicted affirmative, flexible teaching, and generative skills; cognitive skills emerged as the strongest predictor across these dimensions. Conversely, the use of autonomous skills showed a negative predictive effect on administrative and affirmative skills. Accordingly, supporting pre-service teachers' use of learner skills—particularly cognitive skills—may be considered an important focus for enhancing the development of their use of teacher skills.

Keywords: *21st-century skills, Pre-service teacher, Learner skills, Teacher skills, Regression analysis.*

ÖZ

Bu araştırma, öğretmen adaylarının 21. yüzyıl öğrenen becerileri kullanımının 21. yüzyıl öğreten becerileri kullanımını ne ölçüde yordadığını belirlemeyi amaçlamaktadır. Çalışma, ilişkisel tarama modeli çerçevesinde, 197 son sınıf öğretmen adayı ile gerçekleştirilmiştir. Veriler, Orhan-Göksün (2016) tarafından geliştirilen 21. Yüzyıl Öğrenen Becerileri Kullanım Ölçeği ile 21. Yüzyıl Öğreten Becerileri Kullanım Ölçeği aracılığıyla toplanmıştır. Analiz sürecinde basit ve çoklu doğrusal regresyon analizinden yararlanılmıştır. Araştırma sonucunda, öğretmen adaylarının 21. yüzyıl öğrenen becerileri kullanımının, öğreten becerileri kullanımını anlamlı biçimde yordadığı belirlenmiştir. Öğrenen becerileri kullanımının tüm boyutları birlikte ele alındığında, yönetsel becerileri kullanımını anlamlı düzeyde yordadığı; bu boyutta özellikle bilişsel ve iş birliği-esneklik becerileri kullanımının etkili olduğu bulunmuştur. Öğrenen becerileri kullanımının tüm boyutları birlikte ele alındığında, teknopedagojik becerileri kullanımını anlamlı biçimde yordadığı; bilişsel, iş birliği-esneklik ve yenilikçilik becerileri kullanımının bu boyutta anlamlı yordayıcılar olduğu saptanmıştır. Öğrenen becerileri kullanımının tüm boyutları birlikte ele alındığında onamacı, esnek öğretme ve üretimsel becerileri kullanımını anlamlı biçimde yordadığı; bu boyutlarda bilişsel becerileri kullanımının en güçlü yordayıcı olduğu belirlenmiştir. Öte yandan otonom becerileri kullanımının ise yönetsel ve onamacı becerileri kullanımını negatif yönde yordayıcı etki gösterdiği görülmüştür. Bu doğrultuda, öğretmen adaylarının özellikle bilişsel becerileri kullanımının desteklenmesinin, öğreten becerileri kullanımının gelişimi açısından önemli bir odak noktası olabileceği düşünülmektedir.

Anahtar Sözcükler: *21. yüzyıl becerileri, Öğretmen adayı, Öğrenen becerileri, Öğreten becerileri, Regresyon analizi.*

INTRODUCTION

Education, as one of the important components of the modern world, holds great significance for the happiness and well-being of individuals and society, as well as for social and economic development. The effectiveness of education largely depends on the decisive role of teachers who plan, manage, and implement the instructional process (Kozikoğlu & Özcanlı, 2020). In this context, it has become increasingly important for teachers to demonstrate effective classroom management, integrate educational technologies into the instructional process, establish interdisciplinary connections, implement process-oriented assessment and evaluation practices, support values education through activities, and use modern instructional techniques (Koç et al., 2022). The reflection of these qualities in instructional processes has attracted increasing attention in the 21st century as a way of enhancing teachers' instructional quality (Kim et al., 2019). The 21st century is a period in which access to information and technological change have rapidly increased; not only possessing knowledge but also using, transforming, and sharing knowledge has gained critical importance (Trilling & Fadel, 2009). The acquisition of the competencies that stand out in this period directly depends on the teacher skills of teachers who manage the instructional process.

21st-Century Teacher Skills

21st-century teacher skills consist of an administrative dimension that includes classroom management and the organization of instructional processes, a technopedagogical dimension that requires the integration of technology and pedagogy, an affirmative dimension focused on feedback that supports student behavior and achievement, a flexible teaching dimension that expresses the ability to adapt instruction to different contexts and needs, and a generative dimension that involves developing original instructional materials and environments (Orhan-Göksün, 2016). However, difficulties are encountered when this comprehensive and multidimensional skill set is transferred into classroom practices (Kim et al., 2019). Studies indicate that instructional time may be lost due to the need to maintain classroom discipline and order (Organisation for Economic Co-operation and Development [OECD], 2025a), that challenges are experienced in translating technology into pedagogical practices that support learning (Ertmer & Ottenbreit-Leftwich, 2010), and that there are significant barriers preventing formative assessment/feedback from becoming widespread and systematic in classroom practice (OECD, 2005b). In addition, it is reported that adapting instruction to diverse needs (Schwab & Woltran, 2023) and sustaining processes of developing original instructional materials (Cayabas & Sumeg-ang, 2023) may not be maintained at the desired level due to reasons such as time constraints, workload, and limited resources/support. These challenges also make visible the gap between the existence of these skills—or their being reported through self-reports—and their effective and consistent enactment in the classroom; indeed, research with both in-service teachers and pre-service teachers (Akça, 2023; Kıyasoğlu & Çeviker-Ay, 2020; Orhan-Göksün & Kurt, 2017) shows that although these skills are generally reported as being used, the reported level of competence does not always translate into effective and consistent instructional practices. It is emphasized that these practical challenges are closely related to a lack of context-specific understanding regarding instructional practices and to the inadequacy of professional development opportunities that support teachers in using these skills meaningfully (Seidman et al., 2018; Wolf et al., 2018). This situation highlights the need for 21st-century teachers who can communicate effectively with students, recognize their characteristics, and guide them throughout teaching–learning processes.

In Türkiye, the institutions responsible for meeting this need, in other words for educating 21st-century teachers, are faculties of education. Faculties of education are responsible for preparing prospective teachers as qualified individuals who can plan, implement, and evaluate the instructional process under current conditions (Orhan-Göksün & Kurt, 2017). This necessitates addressing teacher skills systematically not only through in-service practices but also during pre-service education.

In the context of Türkiye, this necessity is also clearly reflected in national policy documents and competency frameworks that guide the teacher education process. The *General Competencies for the Teaching Profession* (Ministry of National Education, 2017) address teachers' professional knowledge, skills, and attitudes through a holistic perspective and emphasize competencies related to the planning, implementation, and evaluation of the instructional process. These competencies require teachers to possess not only subject matter knowledge but also pedagogical and practice-oriented skills that enable them to manage the instructional process effectively. Similarly, the *Teacher Education Undergraduate Programs* that shape teacher preparation at the higher education level

(Council of Higher Education, 2018) aim to equip prospective teachers with the teacher skills required by the 21st century and to prepare them as active, productive, and responsible individuals in learning and teaching processes. In this respect, teacher education programs primarily aim to prepare pre-service teachers for the teaching role required by the 21st century; at the same time, they address, within a holistic framework, the learner skills that are necessary for this role to be enacted effectively. Therefore, although the fundamental role expected of pre-service teachers is teaching, the quality of this role also necessitates possessing 21st-century learner skills.

21st-Century Learner Skills

21st-century learner skills are defined through their cognitive dimension involving information processing and awareness of this process, their autonomous dimension related to self-management and self-regulation, their collaboration–flexibility dimension reflecting cooperation and adaptability, and their innovative dimension characterized by openness to technological developments (Orhan-Göksün, 2016). Similarly, the Partnership for 21st Century Learning [P21] framework (2019) emphasizes core learning and innovation skills such as creativity, critical thinking, communication, and collaboration. These skills directly shape how individuals think and behave within the learning process (Beers, 2011). These uses of skills that regulate the learning process may also be reflected in pre-service teachers' ways of planning, implementing, and evaluating instruction, thereby laying the groundwork for their use of teacher skills.

Theoretical Relationship Between 21st-Century Teacher Skills and Learner Skills

These learner skills go beyond being merely an intended outcome in the professional development of prospective teachers; rather, they function as a foundational element that directly shapes how they teach. Learning and teaching are mutually reinforcing processes, and individuals' ways of teaching are closely related to how they themselves learn. In other words, individuals often teach in ways similar to how they learn (Korthagen, 2010; Pratt, 2002). Therefore, the learner skills that prospective teachers possess or develop emerge as a critical factor determining the quality of their future teaching practices. This perspective indicates that learning and teaching processes cannot be theoretically addressed as independent constructs. Constructivist approaches, which emphasize learning as an active process grounded in individual experiences, also suggest that teaching practices are shaped by teachers' own learning experiences (Fosnot, 2013). As prospective teachers are both active participants in learning processes and future facilitators of these processes, their learner skills directly influence the nature of the teacher skills they will exhibit in their professional careers. In particular, learner skills such as critical thinking, problem solving, and self-regulation are highlighted as key cognitive foundations that shape how prospective teachers plan, implement, and evaluate instruction (Darling-Hammond et al., 2017). In this context, addressing pre-service teachers' 21st-century skills related to both learner and teaching roles together enables a holistic understanding of the learning–teaching cycle. Theoretically, this suggests that pre-service teachers' use of learner skills functions as a resource that shapes their teaching practices and that learner and teacher skill use should be considered as interconnected constructs.

The conceptual model of the present study is based on the assumption that pre-service teachers' learner skill use (at both the overall and sub-dimension levels) can explain their teacher skill use (at both the overall and sub-dimension levels). This assumption is grounded in the premise—consistent with the learning–teaching interaction and the constructivist approach—that individuals' learning experiences and learner characteristics are reflected in their teaching practices.

Literature Review and Present Study

In the literature, the use of 21st-century learner and teacher skills has been examined in samples of both in-service teachers (Akça, 2023; Erten, 2022; Kıyasoğlu & Çeviker-Ay, 2020; Nuhoğlu & Güvercin-Seçkin, 2021; Yıldız-Poyraz & Yıldız, 2025; Zaloğlu & Tabak, 2024) and pre-service teachers (Aydemir et al., 2020; Orhan-Göksün & Kurt, 2017; Tican & Deniz, 2019). The overall trend of these studies indicates that participants in both groups generally use 21st-century learner and teacher skills, and that this use may vary according to certain variables. In addition, significant relationships have been found between overall skill use and its sub-dimensions, and some studies have shown that learner skill use can predict teacher skill use.

As can be seen, the focus of research in the literature has largely concentrated on in-service teachers, whereas studies involving pre-service teachers have remained relatively limited. Research conducted with pre-service teachers has generally addressed the use of 21st-century learner and teacher skills descriptively or examined the relationships between these skill uses at an overall level. However, studies that specify through which sub-dimensions—and to what extent—learner skill use predicts teacher skill use appear to be quite scarce. Particularly in samples of pre-service teachers, the limited number of predictive studies testing the extent to which learner skill use explains the sub-dimensions of teacher skill use makes this gap in the literature more pronounced. Therefore, the gap is not confined to whether "a relationship exists/does not exist," but also encompasses the need to clarify through which sub-dimensions the relationship is established and in which components of skill use the predictive strength is concentrated. Yet, pre-service teachers constitute a critical group for understanding how these two sets of skill uses interact, as they are both learners of the 21st century and future teachers.

In this context, the present study includes senior pre-service teachers from different subject areas and examines, through simple and multiple linear regression analyses, the extent to which 21st-century learner skill use predicts 21st-century teacher skill use not only at the overall level but also on the basis of each sub-dimension. This approach provides a more detailed and functional account of how learner skill use is reflected in pre-service teachers' instructional behaviors. Identifying which learner skill uses are more decisive for which teacher skill uses offers important implications for restructuring the content and practices of teacher education programs. Accordingly, this study not only addresses the relationship between learner and teacher skill use in terms of overall levels, but also fills an important gap in the literature by examining this relationship within a framework of cross-dimension predictive effects. The findings provide an evidence-based framework regarding which skill uses should be prioritized and supported during the pre-service period, thereby offering original theoretical and practice-oriented contributions to teacher education. To clarify the focus of the study, the research was guided by the following questions:

- Does pre-service teachers' use of 21st-century learner skills significantly predict their use of 21st-century teacher skills?
- Do the subdimensions of pre-service teachers' use of 21st-century learner skills significantly predict their use of administrative skills?
- Do the subdimensions of pre-service teachers' use of 21st-century learner skills significantly predict their use of technopedagogical skills?
- Do the subdimensions of pre-service teachers' use of 21st-century learner skills significantly predict their use of affirmative skills?
- Do the subdimensions of pre-service teachers' use of 21st-century learner skills significantly predict their use of flexible teaching skills?
- Do the subdimensions of pre-service teachers' use of 21st-century learner skills significantly predict their use of generative skills?

METHOD

Research Design

A relational survey model was adopted in the present study. The relational survey design is used to identify relationships among two or more variables and to explore their effects on causes or outcomes. Such studies can assist researchers in making more informed predictions (Fraenkel et al., 2012). In this study, the primary aim was to determine the extent to which pre-service teachers' use of 21st-century learner skills predicts their use of 21st-century teacher skills. Accordingly, regression analysis was employed as an appropriate statistical method, as it allows for the examination of the predictive power of one or more independent variables on a dependent variable. This approach is consistent with the aim of the study and enables a more detailed interpretation of the predictive relationships between learner skills and teacher skills.

Participants

The study sample comprised 197 senior pre-service teachers enrolled in the faculty of education at a public university located in Türkiye's Southeastern Anatolia Region. Participants were selected through a convenience sampling approach, taking into account constraints related to time, cost, and accessibility. Senior pre-service teachers were purposefully included because this is the stage at which their teacher skills can be reliably observed and evaluated, because they have the opportunity within the Teaching Practicum I and II courses to plan and conduct the teaching–learning process, manage classroom interactions, and carry out technopedagogical practices, and because they are therefore able to demonstrate their teacher skills in an authentic, field-based manner. This provides a more realistic, comprehensive, and practice-oriented evaluation of the learner and teacher skills examined in the study.

An examination of the demographic characteristics of the participants shows that their ages range from 20 to 37. Of the 197 pre-service teachers, 125 (63.5%) are female and 72 (36.5%) are male. In terms of departments, 65 (33%) are elementary mathematics, 37 (18.8%) science, 35 (17.8%) primary school, 29 (14.7%) early childhood, and 31 (15.7%) social studies pre-service teachers.

Data Collection Instruments

The 21st-Century Learner Skills Use Scale and the 21st-Century Teacher Skills Use Scale, developed by Orhan-Göksün (2016), were used to collect data in this study.

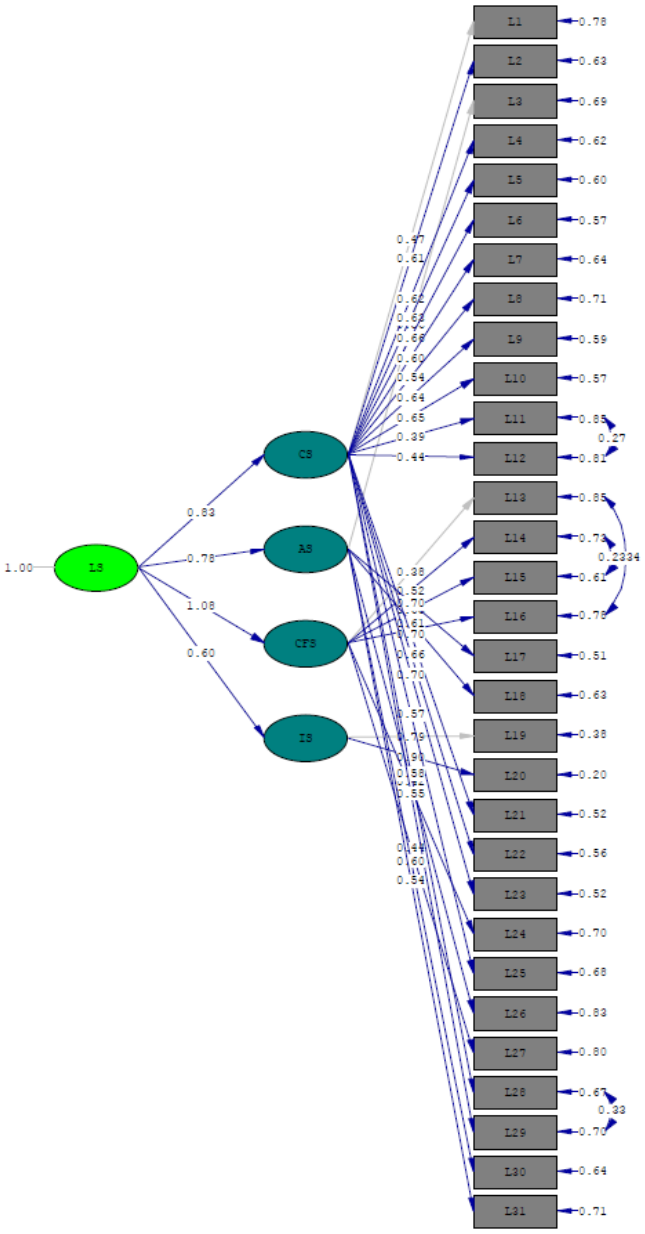
21st-Century Learner Skills Usage Scale

This scale includes 31 items, which are categorized into four subdimensions—Cognitive Skills (CS), Autonomous Skills (AS), Collaboration–Flexibility Skills (CFS), and Innovativeness Skills (IS). The CS dimension refers to the processing and encoding of information through mental processes, as well as awareness of the outcomes produced by these cognitive operations. A sample item for this dimension is *"I am aware of the limits of my knowledge on a given topic."* The AS dimension describes autonomous learning behaviors that emerge from the integration of self-management, self-regulation, and the ability to work individually or in groups. A representative item for this dimension is *"I make important decisions on my own."* The CFS dimension encompasses behaviors related to participating in collaboration-based activities and contributing to making learning environments more flexible. A sample item for this dimension is *"I actively participate in student communities."* The IS dimension is addressed in this study within the scope of adapting to new technologies and using technological tools in learning processes. A sample item for this dimension is *"I use new technologies in my learning processes."* A five-point Likert-type response structure was used, and the scale demonstrated an internal consistency coefficient of .89. The results of the confirmatory factor analysis (CFA) indicate a high level of model fit (χ^2/df = .65, RMSEA = .00, SRMR = .05, NFI = .96, NNFI = 1.00, CFI = 1.00).

A second-order CFA was conducted by the researcher to evaluate whether the four-factor structure of the scale fit the data obtained from the pre-service teachers participating in this study. With the modifications (L11-L12, L13-L16, L14-L15, and L28-L29) performed, a four-factor structural model—consistent with the original form of the scale—was established, and acceptable model fit was achieved (χ^2/df = 1.84, RMSEA = .066, SRMR = .075, NFI = .90, NNFI = .95, CFI = .95). The path diagram for the four-factor model obtained from the second-order CFA is presented in Figure 1.

Figure 1.

Path Diagram of the Four-Factor Model Obtained from the Second-Order CFA



The reliability of the measurements was recalculated within the scope of this study using the Cronbach's alpha method, and the coefficient for the overall scale was found to be .91. The coefficient was .90 for the CS, .73 for the AS, .69 for the CFS, and .82 for the IS. It should be noted that some subdimensions include a limited number of items, which may lead to relatively lower Cronbach's alpha coefficients. As suggested by Raines-Eudy (2000), alpha values above .50 can be considered acceptable in exploratory and multidimensional measurement contexts.

21st-Century Teacher Skills Usage Scale

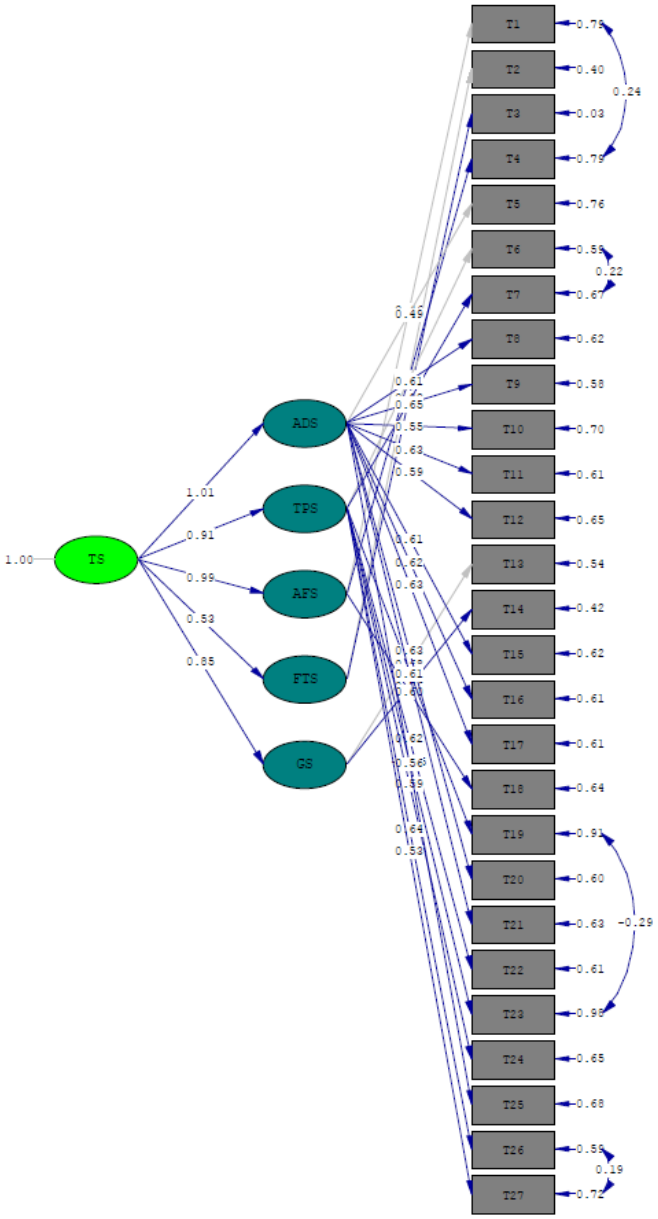
This scale measures pre-service teachers' self-reported use of 21st-century teacher skills, focusing on the instructional behaviors they demonstrate during the teaching–learning process rather than their perceived teaching ability or self-efficacy. This scale includes 27 items, which are categorized into five subdimensions: Administrative Skills (ADS), Technopedagogical Skills (TPS), Affirmative Skills (AFS), Flexible Teaching Skills (FTS), and Generative Skills (GS). ADS refer to pre-service teachers' abilities related to classroom management and the effective organization of instructional processes; a sample item is "I establish classroom rules together with my students." TPS refer to pre-service teachers' ability to integrate technology into instructional processes in

a pedagogically meaningful way; a sample item is "I enrich instructional activities with technology." AS describe teaching behaviors based on reinforcing appropriate and positive student behaviors; a representative item is "I reinforce my students' positive behaviors." FTS encompass behaviors through which pre-service teachers make instruction independent of the classroom environment; a sample item is "I organize educational activities outside the classroom." GS refer to pre-service teachers' ability to develop instructional materials; a representative item is "I prepare original instructional materials for my courses." A five-point Likert-type response structure was used, and the scale demonstrated an internal consistency coefficient of 87. The results of the confirmatory factor analysis indicate a high level of model fit (χ^2/df = .87, RMSEA = .00, SRMR = .05, NFI = .95, NNFI = 1.00, CFI = 1.00).

A second-order CFA was conducted by the researcher to evaluate whether the five-factor structure of the scale fit the data obtained from the pre-service teachers participating in this study. With the modifications (T1-T4, T6-T7, T19-T23, and T26-T27) performed, a five-factor structural model—consistent with the original form of the scale—was established, and acceptable model fit was achieved (χ^2/df = 2.06, RMSEA = .074, SRMR = .071, NFI = .91, NNFI = .95, CFI = .95). The path diagram for the five-factor model obtained from the second-order CFA is presented in Figure 2.

Figure 2.

Path Diagram of the Five-Factor Model Obtained from the Second-Order CFA



The reliability of the measurements was recalculated within the scope of this study using the Cronbach's alpha method, and the coefficient for the overall scale was found to be .91. The coefficient was .87 for the ADS, .64 for the TPS, .58 for the AFS, .86 for the FTS, and .66 for the GS. It should be noted that some subdimensions include a limited number of items, which may lead to relatively lower Cronbach's alpha coefficients. As suggested by Raines-Eudy (2000), alpha values above .50 can be considered acceptable in exploratory and multidimensional measurement contexts.

Data Analysis

In this study, the factor structures of the scales were examined to determine whether they fit the data obtained from the pre-service teachers, using the LISREL 8.54 program. For this purpose, various fit indices were employed in the confirmatory factor analysis (CFA). The fit indices used included χ^2/df, RMSEA, SRMR, NFI, NNFI, and CFI. The fit indices used to evaluate the model–data fit of the scales and the recommended threshold values (Schermelleh-Engel et al., 2003) are presented in Table 1.

Table 1

Goodness-of-Fit Indices and Threshold Values

Fit Index	χ^2/df	RMSEA	SRMR	NFI	NNFI	CFI
Threshold Values	≤ 3	≤ .08	≤ .10	≥ .90	≥ .95	≥.95

In this study, simple linear regression analysis (SLRA) was performed in IBM SPSS Statistics 20 to assess how pre-service teachers' use of 21st-century learner skills predicts their use of teacher skills. Additionally, multiple linear regression analysis (MLRA) was performed to determine the extent to which the subdimensions of learner skills predict the subdimensions of teacher skills. Before proceeding with the analyses, the basic assumptions for the dataset obtained from the sample were tested.

During the data analysis process, the dataset was first reviewed to identify any incorrectly entered data and to detect missing values. The missing values observed in the dataset were replaced with values representing the series means. Next, to identify outliers, the scores were standardized and converted into z-scores, and observations falling outside the $|z| > 3.29$ range—recommended by Field (2018) and Tabachnick and Fidell (2013)—were considered outliers. Accordingly, seven univariate outliers were identified and removed from the dataset. In the following step, the univariate normality assumption was tested on the dataset after the removal of outliers. Since the skewness and kurtosis coefficients fell within the [-1, +1] range, the univariate normality assumption was deemed to be met (Büyüköztürk, 2011; Çokluk et al., 2012). In addition, the elliptical patterns observed in the scatterplot matrix indicated that the assumptions of multivariate normality and linearity were also satisfied (Field, 2018; Tabachnick & Fidell, 2013). To determine whether multicollinearity existed among the independent variables, correlation coefficients, VIF (Variance Inflation Factors), TV (Tolerance Values), and CI (Condition Indices) were calculated. According to Çokluk et al. (2012), correlation coefficients below .90, VIF below 10, CI below 30, and TV greater than .10 indicate the absence of multicollinearity. Based on these criteria, no multicollinearity problem was detected among the variables. Cronbach's alpha coefficients were used to assess the reliability of the scales, and since the reliability coefficients were above .50, the scales were considered reliable (Raines-Eudy, 2000). The results of the assumption tests conducted prior to the data analysis are presented in Table 2.

The correlation coefficients obtained to interpret the strength of the relationships among the variables were evaluated according to the classification proposed by Büyüköztürk (2011). Based on this classification, coefficients smaller than .30 indicate a low-level correlation, coefficients between .30 and .70 indicate a moderate-level correlation, and coefficients greater than .70 indicate a high-level correlation.

Table 2

Assumption Test Results

Variables		CS	AS	CFS	IS	z (min-max)	Skew.	Kurt.	α	TV	VIF	CI
LS	CS	1				-2.91-1.87	-.181	.052	.896	.591	1.692	12.903
	AS	.533**	1			-2.38-2.12	-.077	-.459	.733	.603	1.658	15.666
	CFS	.571**	.575**	1		-2.57-2.62	-.047	-.272	.693	.506	1.977	19.825
	IS	.388**	.248**	.473**	1	-2.77-1.47	-.357	-.208	.823	.749	1.334	28.659
TS	ADS					-2.29-1.69	-.303	-.421	.865			
	TPS					2.92-2.43	-.518	.518	.635			
	AFS					-3.08-.93	-.828	.392	.575			
	FTS					-3.07-1.44	-.735	.233	.862			
	GS					-2.79-1.86	-.335	-.561	.664			
LS						-2.48-2.39	-.117	-.079	.912			
TS						-2.34-1.99	-.264	-.355	.908			

**p<.001

Ethics Committee Declaration

Ethical approval for the study was obtained from the Social and Human Sciences Ethics Committee of Dicle University, and the research was deemed ethically appropriate (Approval No: 266182, Date: 11.04.2022).

FINDINGS

Findings Related to the Prediction of 21st-Century Teacher Skills Usage

In the SLRA conducted to examine the prediction of 21st-century teacher skills usage, the total score for the use of 21st-century learner skills was included as the independent variable, and the total score for the use of 21st-century teacher skills was included as the dependent variable. The findings related to the analysis are presented in Table 3.

Table 3

Findings from the SLRA regarding the Prediction of 21st-Century Teacher Skills Use

Variables	B	SE_B	ß	t	p	Zero-order	Partial
Constant	51.170	5.651		9.054	.000		
LS	.492	.047	.599	10.444	.000	.599	.599
R=.599 R^2=.359							
$F_{(1,195)}$=109.074 p=.000							

When Table 3 is reviewed, it becomes evident that the use of 21st-century learner skills is positively and moderately associated with the use of 21st-century teacher skills, and this association is statistically significant ($R = .599$; $F_{(1,195)} = 109.074$, $p < .001$). The use of learner skills explains approximately 36% of the variance in the use of teacher skills and significantly predicts teacher skills usage ($R^2 = .359$). This finding indicates that pre-service teachers who report higher levels of learner skills also tend to demonstrate higher levels of teacher skills.

Findings Related to the Prediction of the "Administrative Skills" Dimension of 21st-Century Teacher Skills

The findings related to the MLRA conducted to examine the prediction of administrative skills usage are presented in Table 4.

Table 4

Findings from the MLRA Predicting Administrative Skills Usage

Variables	B	SE_B	ß	t	p	Zero-order	Partial
Constant	20.841	3.039		6.858	.000		
CS	.343	.055	.464	6.241	.000	.560	.411
AS	-.258	.114	-.166	-2.254	.025	.264	-.161
CFS	.470	.122	.311	3.868	.000	.489	.269
IS	.071	.254	.018	.278	.781	.304	.020
R=.611 R^2=.373							
$F_{(4,192)}$=28.608 p=.000							

When Table 4 is examined, it is seen that all dimensions of 21st-century learner skills use, taken together, form a moderate, positive, and statistically significant relationship with the use of managerial skills ($R = .611$; $F_{(4,192)} = 28.608$, $p < .001$). Together, these variables explain approximately 37% of the variance in administrative skills use ($R^2 = .373$). Based on the standardized regression coefficients, the predictor variables influencing administrative skills use can be ranked in the following order of importance: cognitive skills ($\beta = .464$), collaboration–flexibility skills ($\beta = .311$), autonomous skills ($\beta = –.166$), and innovativeness skills ($\beta = .018$).

According to the significance tests of the regression coefficients, the innovativeness skills variable is not a significant predictor ($p > .05$), whereas all other predictor variables included in the analysis significantly predict administrative skills use. The highest zero-order correlation is observed between administrative skills use and cognitive skills use. There is a positive and moderate relationship between these two variables ($r = .560$), and when the other variables are controlled, the partial correlation is found to be $r = .411$.

Findings Related to the Prediction of the "Technopedagogical Skills" Dimension of 21st-Century Teacher Skills

The findings related to the MLRA conducted to examine the prediction of technopedagogical skills usage are presented in Table 5.

Table 5

Findings from the MLRA Predicting Technopedagogical Skills Use

Variables	B	SE_B	ß	t	p	Zero-order	Partial
Constant	13.643	1.861		7.331	.000		
CS	.135	.034	.303	4.004	.000	.501	.278
AS	-.003	.070	-.004	-.050	.960	.323	-.004
CFS	.164	.074	.180	2.198	.029	.469	.157
IS	.578	.156	.250	3.708	.000	.452	.259
R=.590 R^2=.348							
$F_{(4,192)}$=25.641 p=.000							

When Table 5 is examined, it is seen that all dimensions of 21st-century learner skills use, taken together, form a moderate, positive, and statistically significant relationship with the use of technopedagogical skills ($R = .590$; $F_{(4,192)} = 25.641$, $p < .001$). Together, these variables explain approximately 35% of the variance in technopedagogical skills use ($R^2 = .348$). Based on the standardized regression coefficients, the predictor variables influencing technopedagogical skills use can be ranked in the following order of importance: cognitive skills ($\beta = .303$), innovativeness skills ($\beta = .250$), and collaboration–flexibility skills ($\beta = .180$).

According to the significance tests of the regression coefficients, the autonomous skills variable is not a significant predictor ($p > .05$), whereas all other predictor variables included in the analysis significantly predict technopedagogical skills use. The highest zero-order correlation is observed between technopedagogical skills use and cognitive skills use. There is a positive and moderate relationship between these two variables ($r = .501$), and when the other variables are controlled, the partial correlation is found to be $r = .278$.

Findings Related to the Prediction of the "Affirmative Skills" Dimension of 21st-Century Teacher Skills

The findings related to the MLRA conducted to examine the prediction of affirmative skills usage are presented in Table 6.

Table 6

Findings from the MLRA Predicting Affirmative Skills Use

Variables	B	SE_B	ß	t	p	Zero-order	Partial
Constant	8.572	.779		11.003	.000		
CS	.097	.014	.566	6.881	.000	.441	.445
AS	-.078	.029	-.216	-2.654	.009	.072	-.188
CFS	-.011	.031	-.032	-.363	.717	.177	-.026
IS	.018	.065	.020	.279	.780	.171	.020
R=.481 R^2=.232							
$F_{(4,192)}$=14.476 p=.000							

When Table 6 is examined, it is seen that all dimensions of 21st-century learner skills use, taken together, form a moderate, positive, and statistically significant relationship with the use of affirmative skills ($R = .481$; $F_{(4,192)} = 14.476$, $p < .001$). Together, these variables explain approximately 23% of the variance in affirmative skills use ($R^2 = .232$). Based on the standardized regression coefficients, the predictor variables influencing affirmative skills use can be ranked in the following order of importance: cognitive skills ($\beta = .566$), autonomous skills ($\beta = –.216$), collaboration–flexibility skills ($\beta = –.032$), and innovativeness skills ($\beta = .020$).

According to the significance tests of the regression coefficients, the collaboration–flexibility skills and innovativeness skills variables are not significant predictors ($p > .05$), whereas the other predictor variables included in the analysis significantly predict affirmative skills use. The highest zero-order correlation is observed between affirmative skills use and cognitive skills use. There is a positive and moderate relationship between these two variables ($r = .441$), and when the other variables are controlled, the partial correlation is found to be $r = .445$.

Findings Related to the Prediction of the "Flexible Teaching Skills" Dimension of 21st-Century Teacher Skills

The findings related to the MLRA conducted to examine the prediction of flexible skills usage are presented in Table 7.

Table 7

Findings from the MLRA Predicting Flexible Teaching Skills Use

Variables	B	SE_B	ß	t	p	Zero-order	Partial
Constant	2.162	1.010		2.140	.034		
CS	.036	.018	.168	1.969	.050	.348	.141
AS	.053	.038	.117	1.383	.168	.308	.099
CFS	.054	.040	.123	1.332	.185	.344	.096
IS	.135	.085	.121	1.596	.112	.274	.114
R=.413 R^2=.170							
$F_{(4,192)}$=9.846 p=.000							

When Table 7 is examined, it is seen that all dimensions of 21st-century learner skills use, taken together, form a moderate, positive, and statistically significant relationship with the use of flexible teaching skills ($R = .413$; $F_{(4,192)} = 9.846$, $p < .001$). Together, these variables explain approximately 17% of the variance in flexible teaching skills use ($R^2 = .170$). Based on the standardized regression coefficients, the predictor variables influencing flexible teaching skills use can be ranked in the following order of importance: cognitive skills ($\beta = .168$), collaboration–flexibility skills ($\beta = .123$), innovativeness skills ($\beta = .121$), and autonomous skills ($\beta = .117$).

According to the significance tests of the regression coefficients, only the cognitive skills variable is a significant predictor of flexible teaching skills use (p = .05), whereas the other predictor variables included in the analysis are not significant predictors. The highest zero-order correlation is observed between flexible teaching skills use and cognitive skills use. There is a positive and moderate relationship between these two variables (r = .348), and when the other variables are controlled, the partial correlation is found to be r = .141.

Findings Related to the Prediction of the "Generative Skills" Dimension of 21st-Century Teacher Skills

The findings related to the MLRA conducted to examine the prediction of generative skills usage are presented in Table 8.

Table 8

Findings from the MLRA Predicting Generative Skills Use

Variables	B	SE_B	ß	t	p	Zero-order	Partial
Constant	3.528	.758		4.652	.000		
CS	.052	.014	.320	3.796	.000	.408	.264
AS	-.026	.029	-.075	-.898	.370	.211	-.065
CFS	.053	.030	.159	1.746	.082	.344	.125
IS	.083	.063	.097	1.300	.195	.278	.093
R=.443 R^2=.196							
$F_{(4,192)}$=11.724 p=.000							

When Table 8 is examined, it is seen that all dimensions of 21st-century learner skills use, taken together, form a moderate, positive, and statistically significant relationship with the use of generative skills (R = .443; $F_{(4,192)}$ = 11.724, p < .001). Together, these variables explain approximately 20% of the variance in generative skills use (R^2 = .196). Based on the standardized regression coefficients, the predictor variables influencing generative skills use can be ranked in the following order of importance: cognitive skills (β = .320), collaboration–flexibility skills (β = .159), innovativeness skills (β = .097), and autonomous skills (β = –.075).

According to the significance tests of the regression coefficients, only the cognitive skills variable is a significant predictor of generative skills use (p < .05), whereas the other predictor variables included in the analysis are not significant predictors. The highest zero-order correlation is observed between generative skills use and cognitive skills use. There is a positive and moderate relationship between these two variables (r = .408), and when the other variables are controlled, the partial correlation is found to be r = .264.

DISCUSSION

The interaction between learner and teacher skills is a decisive factor in their ability to manage their own learning processes and to guide their future students effectively. By revealing the predictive effect of pre-service teachers' use of 21st-century learner skills on their use of teacher skills, this study clarifies both the direction and the strength of this interaction.

The findings of the study show that pre-service teachers' use of 21st-century learner skills significantly predicts their use of teacher skills. This result indicates that the development of learner skills among pre-service teachers is a direct determinant of the quality of their teacher skills. Similar results have been reported in previous studies, which found that as teachers' (Akça, 2023) and pre-service teachers' (Orhan-Göksün & Kurt, 2017) levels of learner skills increase, their teacher skills also increase significantly. Korthagen (2010) and Pratt (2002) emphasize that teachers' instructional practices are closely related to their own learning approaches. Likewise, according to Nuhoğlu and Güvercin-Seçkin (2021), the parallel between teachers' learning and teaching implies that they structure their instructional activities and content in accordance with their own learning styles. Collectively, these findings suggest that pre-service teachers who actively use learner skills are more likely to transfer these competencies into their instructional practices. Because teachers tend to teach in ways that reflect how they learn, effective learning behaviors may shape pre-service teachers' instructional planning, classroom management, and teaching decisions. Therefore, an increase in pre-service teachers' use of learner skills—who are the future

educators—contributes to their ability to implement more competent, productive, and student-centered instructional practices.

The study revealed that pre-service teachers' use of 21st-century learner skills significantly predicts their use of administrative skills. In particular, the use of cognitive skills and collaboration–flexibility skills emerged as strong predictors of pre-service teachers' administrative skill use. This finding indicates that the cognitive awareness and social interaction skills pre-service teachers develop in their roles as learners may directly influence their ability to carry out administrative tasks in teaching processes. Previous studies have similarly shown that teachers (Akça, 2023; Kıyasoğlu & Çeviker-Ay, 2020; Nuhoğlu & Güvercin-Seçkin, 2021) and pre-service teachers (Tican & Deniz, 2019) who demonstrate stronger cognitive and social learner skills tend to exhibit more effective administrative behaviors during instruction. Furthermore, the study's finding that the use of autonomous skills negatively predicts administrative skill use is noteworthy. This result suggests that an excessive orientation toward individual learning may limit pre-service teachers' effectiveness in administrative responsibilities. Overall, these findings suggest that administrative skill use among pre-service teachers is closely shaped by the cognitive and social dimensions of their learning experiences, whereas an overly individual-oriented learning approach may constrain the development of such skills.

The findings of the study show that pre-service teachers' use of 21st-century learner skills has a significant predictive effect on their use of technopedagogical skills. In particular, the use of cognitive skills, collaboration–flexibility skills, and innovativeness skills emerged as key predictors of pre-service teachers' competence in effectively integrating technology into instructional processes. This result indicates that the cognitive, collaborative–flexible, and innovative skills pre-service teachers acquire in their roles as learners strengthen their ability to integrate technology with pedagogical approaches in their teaching practices. This finding is also consistent with previous research. Tican and Deniz (2019) reported that improvements in pre-service teachers' learner skills significantly enhanced their technopedagogical competence levels. Similarly, in the study conducted by Çiğilli and Eryaman (2023), a moderate, positive, and significant relationship was found between elementary teachers' technological pedagogical content knowledge and their 21st-century teacher skills. Likewise, Şentürk (2019) identified a moderate, positive relationship between pre-service teachers' technopedagogical education competence and their lifelong learning tendencies. Taken together, these findings indicate that pre-service teachers' technopedagogical skill use is shaped by the cognitive, collaborative–flexible, and innovative learner skills they develop during their own learning processes. In this respect, learner skills appear to function as underlying mechanisms that support pre-service teachers' ability to integrate technology with pedagogy in instructional contexts.

The study revealed that pre-service teachers' use of 21st-century learner skills significantly predicts their use of affirmative skills. In particular, cognitive skills emerged as the strongest predictor of affirmative skills use, which can be defined as the demonstration of approving and reinforcing appropriate behaviors by transforming them into instructional practices (Orhan-Göksun, 2016). In this context, it can be argued that pre-service teachers who are competent in cognitive processes such as accessing information, evaluating it, analyzing it, and making meaning out of it are better able to evaluate their students' performance accurately and manage feedback processes more effectively in learning–teaching environments. Similar findings have also been reported in studies conducted with in-service teachers. Research by Kıyasoğlu and Çeviker-Ay (2020), Nuhoğlu and Güvercin-Seçkin (2021), Akça (2023), and Zaloğlu and Tabak (2024) demonstrated that improvements in teachers' cognitive skills significantly enhanced their affirmative competencies. Likewise, Tican and Deniz (2019) found that increases in pre-service teachers' cognitive skill levels positively influenced their affirmative competencies. The study also revealed that the use of autonomous skills negatively predicts affirmative skills use. This finding suggests that pre-service teachers with higher levels of self-management and self-regulation may exhibit limited use of multi-dimensional feedback and similar evaluation-oriented behaviors. Overall, strengthening pre-service teachers' cognitive skills enhances their effectiveness in affirmative skills such as assessment, feedback provision, and monitoring student achievement.

The results indicate that cognitive skills play a central role in pre-service teachers' flexible teaching practices. Flexibility refers to openness to a wide range of instructional approaches, including teacher-led strategies. Rather than imposing a predetermined and rigid instructional design or method, it aims to establish an adaptable structure

that accommodates the diverse circumstances of individual learners (Evans, 1993). This suggests that pre-service teachers who are competent in cognitive processes such as accessing, analyzing, and evaluating information are better able to adjust to students' varying characteristics, learning paces, and needs throughout the instructional process. Consistent with this finding, Tican and Deniz (2019) also reported that improvements in pre-service teachers' cognitive skills enhanced their flexibility and creativity within the teaching process. The present study further revealed that autonomous, collaboration–flexibility, and innovativeness skills did not significantly predict flexible teaching skills. This result suggests that these learner skills may not directly translate into flexible instructional practices within the scope of this study. However, these findings should be considered within the scope of the study and its methodological framework. It may be inferred that autonomous, collaborative, and innovative skills, although not showing a direct predictive effect, could indirectly support flexible teaching by reinforcing cognitive skill use.

The study revealed that pre-service teachers' use of 21st-century learner skills significantly predicts their use of generative skills. In particular, cognitive skills were found to be the strongest predictor of generative skills use. Generative skills are directly associated with pre-service teachers' ability to develop instructional materials (Orhan-Göksün, 2016) and creatively design learning environments. Accordingly, individuals with greater cognitive depth in their learner skills are more inclined to generate innovative ideas and experiment with diverse instructional strategies during the teaching process. Similarly, Zaloğlu and Tabak (2024) found that improvements in teachers' cognitive skill use significantly enhanced their generative competencies. Khan et al. (2023) reported a strong and positive relationship between students' cognitive engagement and academic productivity. In the study conducted by Coget and Espinosa (2025), metacognitive learning strategies were shown to play a critical role in enhancing the effect of memory retention skills on academic productivity. In this respect, cognitive skills appear to support generative skills by enabling pre-service teachers to analyze instructional needs, integrate information creatively, and transform their knowledge into original instructional materials and learning designs.

CONCLUSION

This study examined the extent to which pre-service teachers' use of 21st-century learner skills predicts their use of 21st-century teacher skills, both at the overall level and across subdimensions, thereby presenting the relationship between learning and teaching processes within a holistic framework. The findings revealed that learner skills use significantly explained teacher skills use at the total score level, and that, at the subdimension level, the predictive effects varied: certain learner skill subdimensions significantly predicted specific teacher skill subdimensions, whereas others were not significant. Notably, cognitive skills emerged as the strongest predictor, indicating that the higher-order cognitive competencies pre-service teachers employ in their learning processes are directly related to their professional behaviors in teaching contexts. The negative predictive effects of autonomous skills on administrative and affirmative skills further suggest that learning approaches do not always progress in parallel with teaching behaviors and that this relationship may possess a multidimensional structure.

Overall, the study highlights the strong connection between the use of 21st-century learner skills and teacher skills, demonstrating that the competencies pre-service teachers develop in their learning processes are meaningfully reflected in their teaching practices. Accordingly, the findings provide valuable contributions to the literature on understanding pre-service teachers' professional competencies and strengthen the theoretical framework explaining the relationship between learning and teaching. These findings also carry important implications for teacher education practices and policy. Supporting pre-service teachers' cognitive learner skills through structured instructional experiences and reflective practices in teacher education programs may contribute directly to the development of their teacher skills and, consequently, to the quality of future teaching practices.

LIMITATIONS AND RECOMMENDATIONS

This study is limited to the pre-service teachers who participated in the research, the data collection instruments employed, and the variables included in the model. Therefore, the findings should be interpreted only within the scope of the characteristics of this sample group and the validity of the measurement tools used. In the study, the predictive effects of the sub-dimensions of 21st-century learner skills on the sub-dimensions of teacher skills were examined through multiple regression analysis; thus, the findings may vary when different samples or alternative modeling approaches are used.

Based on the limitations of the study and the findings obtained, several recommendations can be made for future research and teacher education practices. First, it is possible to develop various structural models by including different independent variables—such as digital literacy, critical thinking, and creativity—into the research model. In addition, the use of qualitative or mixed-methods designs would allow for a deeper analysis of pre-service teachers' perceptions regarding their learner and teacher skills. Conducting applied studies and action research aimed at improving these skills may increase the transferability of the findings to educational settings. Furthermore, studies conducted with larger and more diverse sample groups from different universities would strengthen the generalizability of the results. In teacher education programs, increasing the number of practice-oriented courses that support cognitive skills, incorporating more problem-solving and analytical thinking activities, providing applied learning environments for the development of technopedagogical skills, and expanding group work and project-based practices that enhance collaboration–flexibility skills are recommended. Finally, developing modules that integrate cognitive skills with teacher skills and implementing micro-teaching activities focusing on management, assessment, and technology integration processes would enhance the holistic quality of teacher education programs.

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Conflict of Interest

The author reports no conflicts of interest related to the conduct, authorship, or publication of this study.

Author Contribution

The sole author of this study was responsible for the conceptualization, research design, data collection, statistical analyses, interpretation of the findings, and writing of the manuscript. The author critically reviewed, revised, and approved the final version of the article and assumes full responsibility for the accuracy, integrity, and originality of the work.

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GENİŞ ÖZET

Araştırmanın Amacı

Bu araştırma, öğretmen adaylarının 21. yüzyıl öğrenen becerileri kullanımının, 21. yüzyıl öğreten becerileri kullanımını ne ölçüde yordadığını incelemeyi amaçlamaktadır. Öğrenme ve öğretme süreçlerinin birbirini beslediği, bireylerin kendi öğrenme biçimlerinin öğretme stillerini şekillendirdiği varsayımından hareketle, öğretmen adaylarının sahip olduğu öğrenen becerilerinin mesleki yeterliklerinin temel belirleyicilerinden biri olduğu düşünülmektedir.

Yöntem

Çalışma, ilişkisel tarama modeli çerçevesinde, Türkiye'nin Güneydoğu Anadolu Bölgesi'ndeki bir kamu üniversitesinin eğitim fakültesinde öğrenim gören 197 son sınıf öğretmen adayı ile gerçekleştirilmiştir. Katılımcıların 125'i kadın (%63.5), 72'si erkek (%36.5) olup, yaşları 20 ile 37 arasında değişmektedir. Öğretmen adayları beş farklı ana bilim dalından (ilköğretim matematik, fen bilgisi, sınıf öğretmenliği, okul öncesi ve sosyal bilgiler) oluşmaktadır. Veriler, Orhan-Göksün (2016) tarafından geliştirilen 21. Yüzyıl Öğrenen Becerileri Kullanım Ölçeği ve 21. Yüzyıl Öğreten Becerileri Kullanım Ölçeği aracılığıyla toplanmıştır. Öğrenen becerileri ölçeği; bilişsel beceriler, otonom beceriler, iş birliği-esneklik becerileri ve yenilikçilik becerileri olmak üzere dört alt boyuttan oluşmaktadır. Öğreten becerileri ölçeği ise; yönetsel beceriler, teknopedagojik beceriler, onamacı beceriler, esnek öğretme becerileri ve üretimsel beceriler olmak üzere beş alt boyuttan oluşmaktadır. Analiz sürecinde basit ve çoklu doğrusal regresyon analizlerinden yararlanılmıştır. Analiz öncesinde, veri setinde kayıp değerlerin tamamlanması, uç değerlerin temizlenmesi, normallik, doğrusallık ve çoklu bağlantı sorunu olmadığına ilişkin varsayımlar test edilmiş ve tüm varsayımların karşılandığı görülmüştür.

Bulgular

Basit doğrusal regresyon analizinden elde edilen bulgulara göre, 21. yüzyıl öğrenen ile öğreten becerileri kullanımı arasında pozitif yönde ve orta düzeyde bir ilişki olduğu, bu ilişkinin anlamlı olduğu ortaya çıkmıştır. Öğrenen becerileri kullanımı, öğreten becerileri kullanımındaki varyansın yaklaşık %36'sını açıklamaktadır.

Çoklu doğrusal regresyon analizinden elde edilen bulgulara göre, 21. yüzyıl öğrenen becerileri kullanımının tüm boyutları birlikte ele alındığında, yönetsel beceriler kullanımı ile orta düzeyde, pozitif ve anlamlı bir ilişki olduğu görülmektedir. Bu değişkenler yönetsel beceriler kullanımındaki varyansın yaklaşık %37'sini açıklamaktadır. En güçlü yordayıcı bilişsel beceriler kullanımı olup, bunu iş birliği-esneklik becerileri kullanımı izlemektedir. Otonom beceriler kullanımı negatif yönde anlamlı bir yordayıcı iken, yenilikçilik becerileri kullanımı anlamlı bir yordayıcı değildir. En yüksek ilişki bilişsel beceriler kullanımı ile yönetsel beceriler kullanımı arasında görülmüştür. 21. yüzyıl öğrenen becerileri kullanımının tüm boyutları birlikte ele alındığında, teknopedagojik beceriler kullanımı ile orta düzeyde, pozitif ve anlamlı bir ilişki bulunmaktadır. Bu değişkenler teknopedagojik beceriler kullanımındaki varyansın yaklaşık %35'ini açıklamaktadır. En güçlü yordayıcı bilişsel beceriler kullanımı olup, ardından yenilikçilik ve iş birliği-esneklik becerileri kullanımı gelmektedir. Otonom beceriler kullanımı anlamlı bir yordayıcı değildir. En yüksek ilişki bilişsel beceriler kullanımı ile teknopedagojik beceriler kullanımı arasında görülmüştür. 21. yüzyıl öğrenen becerileri kullanımının tüm boyutları birlikte ele alındığında, onamacı beceriler kullanımı ile orta düzeyde, pozitif ve anlamlı bir ilişki bulunmaktadır. Bu değişkenler onamacı beceriler kullanımındaki varyansın yaklaşık %23'ünü açıklamaktadır. En güçlü yordayıcı bilişsel beceriler kullanımı olup, otonom beceriler kullanımı negatif yönde anlamlıdır. İş birliği-esneklik ve yenilikçilik becerileri kullanımı anlamlı bir yordayıcı değildir. En yüksek ilişki bilişsel beceriler kullanımı ile onamacı beceriler kullanımı arasında görülmüştür. 21. yüzyıl öğrenen becerileri kullanımının tüm boyutları birlikte ele alındığında, esnek öğretme becerileri kullanımı ile orta düzeyde, pozitif ve anlamlı bir ilişki bulunmaktadır. Bu değişkenler esnek öğretme

becerileri kullanımındaki varyansın yaklaşık %17'sini açıklamaktadır. Yordayıcılar arasında yalnızca bilişsel beceriler kullanımı anlamlı bir yordayıcıdır. Diğer beceriler kullanımı anlamlı değildir. En yüksek ilişki bilişsel beceriler kullanımı ile esnek öğretme becerileri kullanımı arasında görülmüştür. 21. yüzyıl öğrenen becerileri kullanımının tüm boyutları birlikte ele alındığında, üretimsel beceriler kullanımı ile orta düzeyde, pozitif ve anlamlı bir ilişki bulunmaktadır. Bu değişkenler üretimsel beceriler kullanımındaki varyansın yaklaşık %20'sini açıklamaktadır. En güçlü yordayıcı bilişsel beceriler kullanımı olup, yalnızca bu değişken anlamlı bir yordayıcıdır. Diğer beceriler kullanımı anlamlı değildir. En yüksek ilişki bilişsel beceriler kullanımı ile üretimsel beceriler kullanımı arasında görülmüştür.

Tartışma ve Sonuç

Bu araştırma, öğretmen adaylarının 21. yüzyıl öğrenen becerileri kullanımının, öğreten becerileri kullanımını hem genel düzeyde hem de alt boyutlar üzerinden ne ölçüde yordadığını inceleyerek öğrenme ve öğretme süreçleri arasındaki ilişkiyi bütüncül bir çerçevede ortaya koymuştur. Elde edilen bulgular, öğrenen becerileri kullanımının toplam puan düzeyinde öğreten becerileri kullanımını anlamlı biçimde açıkladığını; bunun yanı sıra tüm alt boyutların, öğretme becerilerinin ilgili alt boyutları üzerinde anlamlı yordayıcı etkilere sahip olduğunu göstermiştir. Özellikle bilişsel becerilerin; yönetsel, teknopedagojik, onamacı, esnek öğretme ve üretimsel becerilerin en güçlü yordayıcısı olarak öne çıkması, öğretmen adaylarının öğrenme süreçlerinde kullandıkları üst düzey zihinsel yetkinliklerin öğretim süreçlerindeki mesleki davranışlarıyla doğrudan ilişkili olduğunu ortaya koymaktadır. Araştırmada otonom becerilerin yönetsel ve onamacı beceriler üzerinde negatif yönde yordayıcı etki göstermesi ise, öğrenme yaklaşımlarının öğretme davranışlarıyla her zaman paralel ilerlemediğini ve bu ilişkinin çok boyutlu bir yapıya sahip olabileceğini göstermektedir.

Genel olarak çalışma, 21. yüzyıl öğrenen becerileri kullanımı ile öğreten becerileri kullanımı arasındaki güçlü bağlantıyı ortaya koymakta; öğretmen adaylarının öğrenme süreçlerinde geliştirdikleri becerilerin öğretme süreçlerine anlamlı biçimde yansıdığını göstermektedir. Bu doğrultuda elde edilen bulgular, öğretmen adaylarının mesleki yeterliklerinin anlaşılmasına yönelik alan yazınına önemli katkılar sunmakta ve öğrenme–öğretme ilişkisini açıklayan kuramsal yapıyı güçlendirmektedir.