INVESTIGATION OF TEACHERS' CLASSROOM MANAGEMENT AND CLASSROOM MEASUREMENT AND EVALUATION COMPETENCIES

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ABSTRACT

Faculties of education aims to train qualified teachers. Beyond doubt, the training of a qualified teacher will have numerous positive outcomes on the education system. In this regard, this research ceters upon the examination of the classroom management and classroom measurement and evaluation of internship teachers by prospective teachers as observers who have taken both classroom management and classroom measurement and evaluation courses. The present study is of quantitative nature with the relational survey design. The data were collected from the fourth-year students studying in the faculties of education and taking teaching practice courses. Within the scope of the research, a questionnaire containing demographic data of teacher candidates applied online, classroom measurement and evaluation scale and classroom management competency perception scale were also used. The data were analyzed through MARS analysis method. Besides, during the analysis process, classroom measurement and management variables were included as the model-dependent variables. For the MARS analysis, the earth package program on the R platform was utilized. The findings showed that the variables that are effective according to the importance levels of the classroom measurement and evaluation and classroom management competency perceptions of prospective teachers are age, classroom management course passing grade, choice of profession again, measurement and evaluation course passing grade and school type. It is understood that the achievements and skills of teacher candidates play a key role in the perception of both classroom management and classroom measurement and evaluation competencies of teachers. Notably, prospective teachers who are relatively older (22 years old), those with a high course passing grades, those who receive professional guidance before university education and those who willingly chose the teaching profession perceive teachers' classroom management and classroom measurement and evaluation competencies more strongly.

Keywords: Classroom management, classroom measurement and evaluation, MARS, binary dependent variable

INTRODUCTION

This research primarily aims to explore the variables affecting the classroom measurement and evaluation and classroom management competencies of prospective teachers based on their perceptions. It can be argued that high level of assessment and evaluation and classroom management competencies of teachers are the essential factor in becoming a qualified/ equipped teacher. In this regard, a teacher who falls behind in managing his/her classroom cast doubts on gaining necessary acquisitions to students at desired level. Moreover, the fact that teachers are not only able to manage the classroom but also have high level of classroom measurement and evaluation competencies ensures the development of academic achievement.

Changes in teaching practices is increasingly characterized by student-centered approaches to learning, highlighting the development of students' critical thinking, life skills and self-regulated and cooperative learning, and these changes have greatly impacted the classroom management skills and ways of teaching of teachers (Letina & Diković, 2021). Viewed from this perspective, according to Demirdağ (2015), schools should provide training and professional development to all teachers on classroom management strategies and approaches so that they can efficiently use those approaches and control students' discipline problems.

According to Fowler and Şaraplı (2010), classroom management is a concern for most teachers, notably those who have not yet started their career in the field of education. Domike, et. al., (2017) states that effective classroom management is a must in terms of teaching and learning to occur uneventfully along with positive outcomes. Classroom management plays a pivotal role in constructive interactions that support successful classroom environments for both teachers and students (Oliver & Reschly, 2010) and it is an effective teaching strategy as well as being the major concern for most teachers while providing important teaching approaches for students (Cothran, et. al., 2009). The majority of discipline problems in classes may be attributed to teachers' incompetence in classroom management skills (Kayıkçı, 2009).

Demirdag (2015) notes that classroom management centers upon students and their surroundings, and aims to increase students' success through planning, assessment and evaluation processes. However, Çakan (2004) found that most of the teachers perceived themselves as unqualified in terms of assessment and evaluation field. In this context, teachers' assessment and evaluation competencies are to be addressed along with their classroom management skills.

A study conducted by Mason, et. al., (2002) revealed that student evaluations are one useful source of information regarding a teacher's performance, yet that the evaluations are influenced by factors other than teaching effectiveness. According to Kilinç (2019), assessment and evaluation is an integral part of education. The major objective of evaluation practices in education is to identify the needs of students. The second is, however, to determine their achievements in order to enable them to progress in their training. Gencel and

Özbaşi (2013) emphasize that the knowledge of assessment and evaluation is a significant part of teacher competence. Tthe quality of an education system depends on how qualified and trained the teachers are. Teacher candidates struggle to improve their competence in classroom management, especially during their internship (Adams, et. al., 2021) and the way to determine their attitudes towards assessment and evaluation course is based on the evaluation of attitudes on this subject (Aktaş & Alıcı, 2012).

Prospective teachers take classroom measurement and evaluation and classroom management courses theoretically in the faculties of education. Nevertheless, both the practices of these courses and the teacher candidates' perceptions within the scope of internship courses will reveal two situations. The former is to identify the competencies of internship teachers and the latter is that teacher candidates evaluate the information they have theoretically learnt according to a real class environment. Thus, the gap between theory and practice can also be addressed based on the opinions of teacher candidates. The evaluation of classroom measurement and evaluation and classroom management competencies of teacher candidates and internship teachers with professional experience in Turkish education system may yield certain findings on theory and practice. Serving as a model for prospective teachers, internship teachers hold a number of responsibilities such as ensuring that teacher candidates are well-qualified and showing how the practice is carried out in education.

In the analysis of the data in the current research, data mining methods are employed. The use of data mining methods on the data in education is considered within the scope of educational data mining. Educational data mining is an interdisciplinary research field, concerned with developing methods for exploring the unique patterns and data coming from educational settings (Baker & Siemens, 2014; Romero & Ventura, 2010). In this study, Multivariate Adaptive Regression Splines (MARS) is used as one of data mining methods for the research data obtained in the field of education. With the use of the MARS data mining method, it is possible to obtain meaningful information patterns from the raw data and to show the relationships between the variables by including them in the analysis of non-linear variables in order to ascertain hidden patterns and structures. In addition, a more in-depth analysis is conducted, which allows flexibility.

The MARS analysis method ensures flexibility in terms of performing this type of analysis due to the fact that the present research comprises of two dependent variables. Especially for the data yielded in the field of education, non-parametric methods are used that take into account the mean rank as well as the actual mean of the data in cases where assumptions such as normality, linearity and homogeneity are not provided. The use of data mining method such as the robust MARS, which is not affected by assumptions fur such data sets, in education contributes to the achievement of unbiased results. In sum, the growing use of data mining methods, which have been frequently mentioned in recent years, in education is valuable in terms of statistically contributing to the field.

Classroom Management

Kalin, et. al., (2017) emphasize that teaching becomes one of the most complex professions in modern society due to the complexity of educational goals (cognitive, motivational, and social) to be achieved by teachers. Teachers are first required to provide the learning environment so as to achieve their educational goals. Nonetheless, providing a learning environment is also a very difficult skill, and creating a classroom environment that is conducive to learning is a vital practice that a teacher can perform (Findley & Varble, 2006). According to Igbinoba and Marvelous (2015), one of the most challenging tasks of a classroom teacher is classroom management and control. The teacher's effectiveness in teaching is evaluated by the ability to use a variety of classroom management techniques to control students toward effective and meaningful learning during teaching. Classroom management entails a competent skill since, according to Oral (2012), classroom is a dynamic environment in which numerous activities take place at the same time, and a teacher should be aware of everything while performing teaching in this environment. Furthermore, classroom management is a process that needs to be established, maintained, and rearranged when disrupted in order to ensure effective learning and teaching (Sahin, 2015).

According to Igbinoba and Marvelous (2015), classroom management is often deemed as the same as discipline in the past. Research on management from a historical perspective has focused on teachers' reactions to students' undesirable behaviours, yet many researchers argue that they are not the same by suggesting that classroom management is far beyond controlling students and preventing those undesirable behaviours. Classroom management is defined as "the actions taken by teachers for creating an environment that supports and facilitates both academic and social emotional learning" (Evertson & Weinstein, 2006). Ayeni (2017) suggests that classroom management is the process of planning instructional tasks by setting specific, measurable, achievable, realistic, and time-bound goals and developing workable strategies, organizing human and learning materials, allocating tasks for the individual and groups, and directing and controlling the use of resources. According to Good and Brophy (2007), classroom management is explained as the process of creating and maintaining a suitable learning environment.

Classroom management can be stated to require a professional competence and to be carried out along with a technical skill. Marzano and Marzano (2003) addressed four general components of classroom management: "(1) rules and procedures, (2) disciplinary interventions, (3) teacher- student relationships, and (4) mental set". Being able to carry out all these skills and providing the learning environment is a challenging task, and a teacher must effectively manage the classroom to be able to achieve the teaching objectives at the highest level. In the same vein, according to Talsik (2015), classroom management is a vital component of teaching process since classroom management strategies significantly affect the stability of behavior change. Farooq (2011) argues that classroom management is an important key to a teacher's success in the classroom, and creating a healthy and productive classroom environment depends on studying classroom management. Besides, classroom management is

deemed as the methods and strategies that an educator uses to maintain a classroom environment that is conducive to student achievement and learning. Although there are many pedagogical strategies involved in classroom management, researchers agree that it is related to making students feel that they are in an environment that allows them to succeed (Hans & Hans, 2017).

Undoubtedly, classroom management entails a skill and educational activities are unlikely to achieve their purpose if the classroom is poorly managed since, according to Daher (2022), students' creativity can be developed in the classroom by the teacher through classroom management. Similarly, Ayeni (2017) posits that, in classroom management, the teachers is expected to encourage students' participation in learning activities by giving immediate feedback to students, groups and the entire class, monitoring students' feedback and participating in parents' observations regarding academic activities/ exercises to expand learning. The implementation of classroom management is conducted with their mastery in organizing and disciplining students; teachers also alleviate problems by providing good and clear input and solutions and by providing opportunities that support learning activities (Rahmawati & Sholeh, 2021). It can be stated that effective classroom management plays a key role in students' academic and social achievement. In other words, it can be uttered that classroom management skills have a major role in providing an effective learning environment. Therefore, those skills should be acquired in universities while they are still teacher candidates. According to Adams, Koster and Brok (2021), classroom management is one of basic issues in the educational processes of teacher candidates and it is vital in the curriculum.

Creating an effective learning environment, controlling events in the classroom at the same time and meeting student needs entail technical skills. So as to realize effective learning and to gain certain responsibilities to students, it is crucial for teachers to provide classroom management basically. It is unlikely to develop an effective learning environment without classroom management. Akar, et. al., (2010) reports that classroom management should be considered in order to provide an effective education environment. Generating an appropriate classroom environment, planning learning processes and order, and determining in-class actions and rules are the steps that should be implemented to perform effective classroom management. Igbinoba and Marvelous (2015) emphasize that classroom management has a vital role in an effective learning and is also one of essential dimensions of an effective teacher. Kalin et. al., (2017) put forward that a teacher's classroom management competencies largely determine the potential to achieve educational goals and help students develop integrative personalities. Added to this, Vairamidou and Stravakou (2020) highlight that teachers need more training to ensure effective classroom management.

Teachers are required to manage the instructional process effectively by including different methods, techniques, presentations, assessment, and evaluation activities in order to ensure students' better learning (Usta & Uğurlu, 2018). Viewed from this perspective, teachers should be competent in traditional or alternative classroom measurement and evaluation. Previous study has shown that teachers are satisfied with traditional

tests as valid measures of student skills, particularly in recent years (Watt, 2005). The understanding of assessment and evaluation on the basis of these roles and tasks, contrary to the traditional approach, the use of assessment and evaluation activities by teachers throughout the teaching process underpins that it should be regarded as a process which supports learning by revealing students' deficiencies, and strengths- weaknesses and making necessary arrangements in teaching (Abell & Siegel, 2011; Black & Wiliam, 1998; Shepard, 2000). Formative or summative evaluations are expected to use classical or alternative methods. Kilinç (2019) notes that classroom measurement and evaluation techniques are complementary. Furthermore, they are used to get feedback from students, which allows immediate restructuring of feedback-based teaching and assessment of the effectiveness of teaching. The techniques are student-centered and are beneficial for both teachers and students. Yaşar (2014) states that teachers have to test students to see whether target behaviours are acquired at the desired level. To this end, teachers are expected to be qualified in the field of measurement and evaluation. According to Aktaş and Alıcı (2012), one of the main factors affecting the competencies that a teacher should have in the field of measurement and evaluation is his/her attitude towards this field.

Classroom Measurement and Evaluation

Teachers need knowledge and skills about formative assessment, and a set of assessment competencies for teachers should reflect that (Brookhart, 2011). This may be due to the fact that performing assessments in the process provides an important insight into how the teaching activity works. Formative assessment is a pre-planned and systematic process that is carried out by taking into account a set of predetermined goals. Moreover, formative and summative assessment depends on one another (Bhat & Bhat, 2019). Both formative and summative assessments can be classified as a type of classroom measurement and evaluation. Bhat and Bhat (2019) emphasize that formative and summative assessment tells where a student stands on the way his/her destination of learning, how much s/he is ahead or behind his/her classmates, to what extent the behavioral changes occurred in him/her are acceptable, and how far s/he can apply his/her present acquired knowledge. It is clear that the proper interpretation of outcomes through classroom measurement and evaluation activities that spread throughout the process and carried out in a qualified manner will positively affect the in-class teaching activities and student achievement (Bell & Cowie, 2001; Black & Wiliam; 1998).

The results of a study conducted by Özdemir (2010) showed that classroom teachers felt more competent in using "portfolio", "self-assessment", "peer assessment" and "diagnostic tree" compared to the branch teachers of the second stage of primary education. However, it was found that branch teachers felt more competent in "project assessment" and "performance task". According to Gök and Şahin (2009), when examining teachers' competency levels related to the use of traditional evaluation approaches, it was revealed that almost all teachers felt competent in this regard. On the contrary, Önel, et. al., (2020) reported that participants did not feel competent in measurement and evaluation, notably in the preparation, implementation and evaluation of alternative measurement and evaluation tools, yet they were still willing to receive these trainings. Gencel and Özbaşi (2013) concluded in their study that teachers' perceived measurement and evaluation competencies were

at a moderate level and that teachers felt least competent in alternative measurement and evaluation methods. Gelbal and Kelecioğlu (2007) argue that teachers felt more competent in using traditional measurement and evaluation methods to determine student success.

Önel, et. al., (2020) found that teachers adopt constructivist approach and that although they did not have difficulty in preparing and implementing alternative evaluation methods, it was seen that they preferred traditional measurement and evaluation methods to a greater extent due to certain factor as class, school, student and parent profiles during evaluation process. It has been concluded that their knowledge is insufficient in this regard since they have difficulty in scoring within the framework of alternative evaluation methods. Along with the reform-style practices of the constructivist approach launched by the Ministry of National Education (MoNE) in 2006, in contrast to traditional measurement and evaluation, the Ministry has considered the educational process as a whole and has defined classroom measurement and evaluation activities as a process work and has assigned different roles and duties to teachers (İzci & Şardağ, 2016). According to the understanding of measurement and evaluation based on the constructivist approach, for a successful measurement and evaluation, teacher must:

a. Underline conceptual learning and critical thinking instead of rote learning.

b. Support the learning process by encouraging students to learn using their existing knowledge and experience.

c. Evaluate students' progress through various measurement methods at each stage of educational process and encourage students to participate in the lesson.

d. Use the results of measurement and evaluation in order to examine learning and teaching processes with the purpose of making necessary changes in teaching (Abell & Siegel, 2011; Black & Wiliam, 1998; Shepard, 2000).

Regardless of classic or alternative measurement and evaluation methods to be used, teachers are expected to have competency in classroom assessment and evaluation techniques since a process that cannot be measured cannot be evaluated. Therefore, it can be stated that there is a call for classroom measurement and evaluation activities as an integral part of educational activities.

Rationale of the Study

Teachers' success in classroom management does not only impact on themselves, but also affects student achievement (Sanli, 2019). Effective classroom management skills are needed to enhance student engagement and success (Kayhan, 2022). Sorakin-Balli, et. al., (2020) emphasize that research on classroom management shows that teachers may encounter difficulties in managing undesirable behaviours, and their approaches does

not often become efficient. According to Nanyele et. al., (2018), educational authorities need to retrain teachers in the jurisdiction regarding appropriate classroom management style.

Teachers are required to have the ability to measure and evaluate students' needs in order to achieve success (Gencel & Özbaşi, 2013). Gök and Şahin (2009) asserted that, in recent years, certain studies that have been carried out in Turkish education system under the name of educational reforms are witnessed, that changes in learning- teaching processes alone cannot ensure the quality in education, and that when considering measurement and evaluation methods, it is necessary to allow the use of novel evaluation approaches in addition to traditional ones. Uçar and Ozcan (2017) contend that teachers in Turkish education system have used traditional measurement and evaluation tools, yet they have not used modern measurement and evaluation tools. According to the results of a study carried out by Erdoğdu and Kurt (2012), the measurement and assessment competency perceptions of teachers are generally at moderate level. In addition, the results also showed that the teachers who followed professional developments and shifts in the measurement and assessment field and who always consider complying with professional ethics and organizational commitment had a higher level of competency perceptions in measurement and assessment. Çakan (2004) it has been observed that teachers need to be informed about certain issues. The elimination of these deficiencies with the cooperation of MoNE and universities can alleviate the problems of our education system to a certain extent. Altinişik et. al., (2011) postulate that some activities should be performed to revive the current and past schemas of the student while giving the student a scientific perspective, and it is vital to measure and evaluate student learning and development in the organization and implementation process of these activities.

Effective conduct of instructional activities commences with the joint evaluation of the teacher's skills for both classroom management competency and classroom measurement and evaluation techniques. Educational authorities who evaluate teachers' competencies may also be teacher candidates since they have learnt theoretical information about both classroom management and classroom measurement and evaluation techniques during teacher candidacy training process. Besides, they have the opportunity to use this information and to examine and question the practices of the internship teacher through internship practices. This paper set out to seek answers to the question of '*From the perspectives of teacher candidates, what are the predictor variables regarding classroom management and classroom measurement and evaluation competency levels of novice teachers?*'

METHOD

The study was executed alone quantitative dimension using relational survey design. Relational survey design allows researchers to gather information about a large group through the examination of a sample (Leedy & Ormrod, 2005).

Research Data

The research data were yielded by the responses of 312 students who studied in their senior year of the faculties of education in the spring semester of 2022-2023 and took teaching practice course to the questionnaires. The teachers ought to take the courses of measurement and assessment in education and classroom management successfully to qualify for inclusion in the research. The demographic information of the participants is presented in Table 1.

Table 1. Descriptive statistics of predictor variables

Predictors	Types of Variables	Categories	%
Gender	Nominal	Male	28.3
		Female	71.7
Department	Nominal	Verbal	22.6
		Equally Weighted	51.9
		Quantitative	10.8
		Applied Sciences	2.7
		Foreign Languages	12.1
Age Range	Ordinal	20 and 21 years	17.2
		22 years	35.7
		23 and 24 years	34.7
		25 years and above	12.5
Type of school that you go for teaching practice (internship)	Ordinal	Primary school	46.8
		Secondary school	85.5
		High school	14.5
The way of learning you take measurement and evaluation in education course	Nominal	Face-to-face	31.6
		Distance (synchronous or asynchronous)	68.4
Your passing grade in measurement and evaluation in education course	Ordinal	FF or 0-49	2.0
		FD or 50-59	3.4
		DD or 60-64	4.0
		DC or 65-69	5.1
		CC or 70-74	13.5
		CB or 75-79	16.5
		BB or 80-84	23.2
		BA or 85-89	20.9
		AA or 90-100	11.4
The way of learning you take classroom management course	Nominal	Face-to-face	33.0
		Distance (synchronous or asynchronous)	67.0
Your passing grade in classroom management course	Ordinal	FF or 0-49	1.0
		FD or 50-59	1.7
		DD or 60-64	1.3
		DC or 65-69	1.0
		CC or 70-74	12.8
		CB or 75-79	15.2
		BB or 80-84	22.2
		BA or 85-89	18.2
		AA or 90-100	26.6
Are you a teacher high school graduate?	Nominal	Yes	4.4
		No	95.6
Are any of the family members practicing teaching profession?	Nominal	Yes	23.9
		No	76.1
	Nominal	Yes	25.3

Did you receive professional guidance before choosing the department you are studying?		No	74.7
Did you choose this department willingly?	Nominal	Yes	80.5
		No	19.5
Would you choose another profession if your score was higher?	Nominal	Yes	56.2
		No	43.8
If you were to make a choice again, would you prefer this profession?	Nominal	Yes	79.5
		No	20.5
Do you see yourself as a successful teacher in the future?	Nominal	Yes	94.6
		No	5.4

Table 1 displays descriptive statistics on the variables in which the demographic information of the participants is included. Regarding the variables, "types of variables", the sub-categories of the variables, and the percentages for those categories are also included.

Instruments

In this study, a form consisting of three sections was administered to teacher candidates in order to generate data to answer the research question. The first section involves various demographic information about teacher candidates (Table 1). The second part is the in-class measurement and evaluation scale, which focuses on the process of internship practice and is designed to evaluate the teacher based on the process through teacher candidates' perspectives (Baygül & Buldur, 2021). In the third part, a classroom management competency scale which centers upon teachers' classroom management competency based on the process through teacher candidates' perspectives is employed (Elçiçek, et. al., 2015). The scales were applied following the necessary permissions were taken. In order to collect evidence for validity and reliability of the scales used, McDonalds coefficient omega (ω) were examined by calculating confirmatory factor analysis results for validity.

The Classroom Measurement and Assessment Efficacy Perception Scale (CMAEPS), developed by Alkharusi (2007) and adapted into Turkish by Baygül and Buldur (2021), consists of 20 items with a four-factor structure (communicating assessment, assessment standard and criteria, student-involved assessment and non-achievement based grading factors). As a result of the findings of confirmatory factor analysis, CFI, GFI, AGFI and RMSEA points were found to reach acceptable values as 0.92, 0.88, 0.87 and 0.073 respectively. Therefore, it was seen that the structure was similarly verified under four sub-dimensions. Since it was seen that the factor load values for the scale items were not equal, McDonalds coefficient omega (ω) was computed as the reliability index and this value was found as 0.94 for the scale which is a highly acceptable value for reliability.

The Prospective Teachers' Classroom Management Competency Scale (PTCMCS), developed by Elçiçek, et. al., (2015), comprises of 30 items and 5 dimensional structures (relationship management, instructional management, behavior management, physical layout management and time management). As a result of the findings of confirmatory factor analysis, the fit index values were found to be CFI= 0.92, GFI= 0.87, AGFI=0.85 and RMSEA= 0.066 which are concluded to give a good fit. It was seen that the structure was similarly verified under

five sub-dimensions. Since the factor load values for the scale items were not equal, McDonalds coefficient omega (ω) was computed as the reliability index and this value was found as 0.95 for the scale which is a highly acceptable value for reliability.

A Priori Processes (Testing Assumptions)

Similar to any other field, the methods used to analyze data sets in the field of education vary depending on the parametric or non-parametric structure of the data set. Recently, however, the availability of data mining and machine learning approaches to the analysis of both types of data sets refers to a period in which the distinction between these two approaches are gradually decreasing (Strobl, et. al., 2009). Various analysis methods that can be used particularly in the analysis of data sets with non-parametric characteristics add richness by offering a wide spectrum (Strobl, et. al., 2009).

The present research aims to ascertain in-class measurement and evaluation and classroom management competency levels of prospective teachers. To this end, a comprehensive model has been generated to investigate the correlation between the binary dependent variable and a set of independent variables. Therefore, the assumptions provided independently by the data obtained for the dependent variables were also tested.

First, the normal distribution of the data was examined based on the results of the Kolmogorov Smirnov test. For this test, the significance level ($p > 0.05$) and above is interpreted as exhibiting normal distribution (Büyüköztürk, 2011). It was seen that the residual values of the data obtained through CMAEPS showed a normal distribution ($0.091 - p > 0.05$); however, the PTCMCS did not show a normal distribution ($0.00 - p < 0.05$). Secondly, according to the standardized residual values graph for CMAEPS and PTCMCS and the scattering plots of the variables, it was seen that the variables exhibited a symmetrical structure with the dependent variable and CMAEPS and the PTCMCS exhibited an elliptical structure. Therefore, CMAEPS was said to provide the linearity assumption whereas PTCMCS could not provide this assumption. Finally, the results of the Levene test were examined for the homogeneity test. This value ought to be above the significance level ($p > 0.05$), which is the critical value for homogeneity. It was revealed that the results of Levene test for CMAEPS was found as 0.602 and for PTCMCS as 0.000, and that the homogeneity of the variances was ensured for CMAEPS, yet not for PTCMCS.

Data Analysis (Multivariate Adaptive Regression Splines)

In this study, it was unearthed that the CMAEPS variable, one of dependent variables, provided the assumptions that parametric tests are required to have, while the PTCMCS variable could not provide these assumptions. The current research adopted MARS analysis method, one of data mining methods, in data analysis. The MARS analysis method does not need to provide these assumptions and is classified as a non-parametric method in the literature.

MARS, which is translated into Turkish as multivariate adaptive regression extensions, is classified under nonlinear regression methods as well as under data mining methods in the literature. MARS provides statistical

modeling by combining the regression lines obtained in the data set in pieces with spline functions (mathematical functions used to approximate complex correlations between variables). In other words, linear regression methods perform analysis with a single regression line, whereas MARS method performs analysis by combining more than one regression line together. That is only possible with spline functions and the sum of these functions forms the regression equation of the MARS.

The MARS analysis method may be preferred in case the dependent variable is more than one (two). In this respect, MARS is more flexible and interpretable than linear regression methods. MARS is also called as a non-parametric regression method.

Through forward step of MARS, the basic functions among all possible relationships are established and the model is allowed to reach the most complex level. Then, through backward step (pruning), the final model is created by removing the basic functions that contribute little or no to the model (Friedman, 1991). Thus, a rank of each variable according to the level of importance on the dependent variable is provided. In addition, as a result of the interaction more than one variable with each other, it allows examining the effect on the dependent variable as it was an independent variable through the basic functions. Undoubtedly, the number of interactions must be determined by the researcher before the installation of the model. During the MARS model setup phase, if the interaction is selected as one, each basic function consists of only single variable. If the number of interactions is chosen as two, some of the basic functions consist of one variable while some functions involve two variables. The phase of deciding on the number of interactions is a case that depends on the subject of the research and the structure of the variables. The researcher should make a decision on this issue at the onset of the model setup phase for the variables that s/he thinks may interact with one another.

MARS has also been widely used in studies in numerous fields, such as health, finance, economics, engineering and education, where complex relationships and interactions between variables need to be accurately modeled (De Andres et. al., 2011; Friedman & Roosen, 1995; Şevgin & Önen, 2022; Zhang et. al., 2015).

FINDINGS

In this section, the results of the study are presented in terms of metric values. Using the MARS analysis method, the "earth" package program on the R open-source platform was used. In this context, toward the first research problem of the study, the MARS model was established by dealing with the classroom measurement and evaluation competency perceptions of prospective teachers and the classroom management competency perception independently. Then, a MARS model was generated in which both variables assumed the role of dependent variables.

Prior to the establishing of MARS model, it was intended to determine the maximum number of basic functions. In this process, it was selected as 30, at least twice the number of variables and the analysis process was commenced. This number was then increases one by one and the analysis process was continued in an iterative manner till the lowest Generalized Cross Validation (GCV) value was obtained. At the end of this process, it was

detected that the lowest Generalized Cross Validation (GCV) value was obtained at the point where the number of basic functions was 49. Besides, interaction between variables was allowed in the generation of the model and this value was determined as 2. In the MARS analysis, which commenced with a maximum number of 49 basic functions, the model became the most complex state in the number of 37 basic functions. Nevertheless, through backward pruning, basic functions with little or no contribution to the model were deleted and 9 basic functions were determined to be used for the most appropriate model.

When examining the values obtained, R2 values yielded by the model established as a binary dependent variable was calculated as%11.8 for the Classroom Measurement and Assessment Efficacy Perception Scale (CMAEPS) and%13.7 for the Prospective Teachers' Classroom Management Competency Scale (PTCMCS). These results indicate that the independent variables in the mode were common and that these variables explained %11.8 of CMAEPS and %13.7 of PTCMCS respectively. As can be seen in Table 2, the regression equation as a result of the generated model is the same for both dependent variables, yet their coefficients are different.

Table 2. Regression Equation for the Most Appropriate Model

CMAEPS = 74.1 - 3.39 * bf1 – 3.51 * bf2 + 13.0 * bf3 - 3.22 * bf4 – 13.8 * bf5 – 4.99 * bf6 - 0.146 * bf7 + 2.34 * bf8 + 6.03 * bf9
PTCMCS = 108.0 - 4.29 * bf1 - 2.4 * bf2 + 23.9 * bf3 - 0.916 * bf4 – 20.3 * bf5 – 11.8 * bf6 + 7.09 * bf7 + 1.43 * bf8 + 4.34 * bf9

As shown in Table 2, while the MARS analysis method creates the regression equation for the most appropriate model for the binary dependent variable, it commenced the equation with the constant 74.1 for CMAEPS and formed the regression equation as a result of multiplying each of the 9 basic functions by the model coefficients. In the same vein, the equation started with the constant 108 for PTCMCS and formed the regression equation by multiplying each of the 9 basic functions by the model coefficients. The variables comprising the basic functions used in the establishing of the model for CMAEPS and PTCMCS are presented in Table 3.

Table 3. Basic Function Equations for the Optimal Model

Basic Functions	
bf1	max(0, Age-2)
bf2	max(0, ClassroomManagementCoursePassingGrade-8) * max(0, TypeoftheSchool-2)
bf3	max(0, 2-Age) * max(0, MeasurementCoursePassingGrade-7)
bf4	max(0, 2-Age) * ClassroomManagementCcoursePassingGrade-8
bf5	max(0, Age-2) * Professional-Guidance-before-Choosing-Profession
bf6	max(0, 2-Age) * Choosing-the-Profession-again
bf7	max(0, 2-Typeofthe School) * Classroom-Management-Course-Passing-Grade-8
bf8	max(0, 2-TypeoftheSchool) * Professional-Guidance-before-Choosing-Profession
bf9	max(0, 2-Typeofthe School) * max(0, MeasurementCoursePassingGrade-7)

As seen in Table 3, the basic functions used for this model with the binary dependent variable are the same, yet their coefficients are different as in Table 2. In light of the examination of the data yielded by this research, wher the classroom measurement and management competency perceptions of teacher candidates were investigated

through the MARS analysis method, the independent variables included in the model and the importance levels of these variables on classroom measurement and evaluation and classroom management competency perceptions of prospective teachers are listed in Table 4.

Table 4. The Level of Importance of the MARS Analysis Method Variables

Independent Variables	Score
Age Range	100.0
Classroom Management Course Passing Grade	100.0
Re-selecting the Profession	96.9
Measurement and Evaluation Course Passing Grade	79.3
Professional Guidance before Choosing Profession	79.3
Type of the School	68.0
Gender	0.0
The Way of Teaching of Measurement and Evaluation Course	0.0
The Way of Teaching of Classroom Management Course	0.0
Graduating from Teacher High School	0.0
The Presence of Family Members Practising Teaching Profession	0.0
Choosing the Department Willingly	0.0
Other Career Choice When Getting Higher Scores	0.0
Seeing oneself Successful in the Future	0.0

According to Table 4, the variables with little or no contribution to the model were found as *"gender, the way of teaching of measurement and evaluation course, the way of teaching of classroom management course, graduating from teacher high school, family members practicing teaching profession, the presence of family members practicing teaching profession, choosing the department willingly, choosing other careers when getting higher score and seeing oneself successful in the future"*. Nevertheless, based on Table 4, the variables that were found as the most important for the classroom measurement and evaluation competency perceptions of prospective teachers by the MARS analysis method were *"age, classroom management course passing grade, willing to choosing the same profession again if possible, classroom measurement and evaluation course passing grade, receiving professional guidance before choosing the department they are studying and the type of the school where teacher candidates undergo internship"*.

CONCLUSION and DISCUSSION

In the study, a single model was established with the dependent variables of CMAEPS and PTCMCS of prospective teachers and the variables considered to impact upon both dependent variables were analyzed through MARS analysis method. In this respect, in the model generated as a single predictor variable, the important variables according to the predictive importance level of the variables affecting CMAEPS and PTCMCS are discussed in this section.

For the CMAEPS and PTCMCS predictor variables, the age range variable was found to be one of the variables with the highest score. Indeed, in Table 3, which shows the expansion of the basic functions, it is seen that the age variable contributes to the model both under a single function (bf1) and to the model under other variables

and other functions (bf3, bf4, bf5, bf6) interactively. Again, in the same table, it is understood that the subcategory of the 2nd subcategory (22 years, see Table 1) of the age variable has an effect on the dependent variables and contributes to the model. The classroom management course passing grade variable was determined to be the other variable with the highest score. In fact, in Table 3, which shows the expansion of the basic functions, it is seen that the classroom management course passing grade-8 and type of the school are included in the model under other basic functions (bf2, bf4, bf7) in a binary way interactively. As can be seen in the same table, it is seen that the 8th subcategory of the classroom management course passing grade variable, namely BA or 85-90 (see Table 1), has an effect on the dependent variables and contributes to the model. It can be stated that the variables of classroom measurement and evaluation course passing grade and receiving professional guidance before choosing profession got the same score, therefore they were ranked in the fourth place. However, in the table showing the expansion of basic functions, it can be said that the 7th subcategory for the classroom measurement and evaluation course passing grade, namely BB or 80-84 (See Table 1), has an impact upon the dependent variables and contributes to the model. It has been observed that the variable of classroom measurement and evaluation course passing grade-7 is included in the model in interaction with age and type of the school (bf3, bf9).

There are a number of studies addressing the variables expressing the result of the current research in the related body of literature. As Raba (2016) found, there is a %53,7 decrease in the classroom management skills of newly appointed teachers. Theory and practice in classroom management should be given to students before starting the profession. According to Güleç and Durmus (2019), based on years in service, it was revealed that teachers with professional seniority between 16-20 years exhibited democratic classroom management approaches at greater levels. In addition, Altinişik, et. al., (2011) posit that teachers' views on alternative measurement and evaluation activities did not show difference depending on gender or professional experience, yet those with 0-5 and 26 and above years in service had more positive opinions. As teachers' seniority increases, it is seen that they hold such factors as discipline problems and classroom management less responsible for ensuring the discipline of the class (Dağlı & Baysal, 2012). In an analysis conducted based on teachers' seniority, it was unveiled that there was no significant difference in classroom management skills in general. This corresponds with the analysis based on age range. On the contrary, in the analysis based on skills, there were significant different in favour of experienced teachers in 4 skills when compared to young teachers (Özgan, et. al., 2011). Unlike these findings, no significant difference was detected in the classroom management anxiety levels of secondary school teachers in terms of gender, marital status, age, education level, years in service, branch and title (Çınar & Tutkun, 2022). Although there is no significant difference in terms of age, seniority, and graduation in general, as mentioned above, there is a significant difference in favor of experienced teachers in certain classroom management skills (Özgan, et. al., 2011).

Of all the 18 criteria, a significant relationship was found only between teacher competencies and gender and school type variables concerning the criterion of "taking into account the appropriateness of the item to age and

grade level" (İnceçam, et. al., 2018). It was determined that the majority of classroom teachers paid importance to practices based on measurement and evaluation principles, albeit they do not carry out these practices at the level the attach importance to the education process. Except for certain applications, there was no significant relationship between the measurement and evaluation practices of classroom teachers and gender, years in service, department graduated and class size variables (Kaplan, 2007). It was found that there was a moderate, positive and significant relationship between preschool teachers' classroom management skills and professionalism. Besides, it was revealed that the classroom management skills of preschool teachers showed significant difference based on age, educational status, years in service, number of children in class and age group variables while it was determined that teachers' professionalism showed significant difference according to the variables of age, educational status and years in service (Zembat, R., & İlçi-Küsmüş, 2020).

According to Sivri and Balcı (2015), prospective teachers with high academic achievement tend to perceive themselves as more competent in terms of classroom management. It was concluded that the perceptions of formation students regarding the conception of academic achievement were generally positive. It can be stated that academic achievement triggers greater success by creating a snowball effect (Demirbilek, 2021). İlğan and Kıranlı (2008) postulate that there is a moderate and significant relationship between the predictor variables of classroom management course and students' achievement scores in the course. Accordingly, together, all the variables that predict classroom management explain %28 of the total variance in classroom management course success. Of this variance, %15 results from study time spent on the exam, %7 from gender and %3 from the interest of the course and the remaining %3 from other independent variables. The results of a study by Kaplan (2007) demonstrate that most of the classroom teachers pay attention to practices based on measurement and evaluation, yet the y do not carry out these practices at the level they give importance in the education process. Apart from certain applications, there was no significant relationship between measurement and evaluation practices of classroom teachers and gender, years in service, the department graduated, and class size variables.

The variable of choosing the teaching profession again if possible, which is the variable in which the preferences of teacher candidates are asked if they have the opportunity to re-elect, was ranked in the third place in terms of effectiveness on CMAEPS and PTCMCS. This variable was seen to be included in the model in interaction with the variables of age and measurement and evaluation course passing grade-7 and to create a new variable and contribute to the model. The variable of professional guidance before university education, which received the same score as the measurement and evaluation course passing grade variable, was ranked in the same order. It is seen that this variable is involved in the model interactively with the type of the school variable in the basic function table and contributes to the model as a new variable (bf8). It can be said that the CMAEPS and PTCMCS type of the school variable of teacher candidates are ranked in the sixth place. In the expansion table of basic functions, it is seen that the variables of classroom management course passing grade, classroom measurement and evaluation course passing grade and professional guidance before university education (bf2, bf7, bf8, bf9)

are included in the model in interaction with the type of school-2 (Secondary school) variable where the teacher candidates undergo internship.

There are many studies corroborating the findings mentioned above in the related literature. Gelbal and Kelecioğlu (2007) state that teachers consider themselves more competent than traditional measurement instrument while evaluating student achievement. In general, students' attitudes towards the profession are quite positive Gülşen & Seyratlı, 2014). The attitudes of 4th grade students toward the teaching profession were determined at moderate level of agreement. It was concluded that the reason for preferring the teaching profession of the students with the highest average was "the desire to teach" (Ergen & Töman, 2014). There are also results that most of the participants do not want to be teachers again, that the negative situations they encounter are more than positive ones, and that there is a decrease in their enthusiasm towards the profession over time (Kaysi & Gürol, 2016).The gender of teachers, their branch, whether they want to be a teacher, their satisfaction with the departments and the conditions of the country and their general life satisfaction significantly affect their attitudes towards teaching (Orhan & Ok, 2014). Berger and Girardet (2021), the willingness of teacher candidates to become teachers affects their classroom management and sense of responsibility. Demiraslan-Cevik and Andre (2013) argue that, in teacher education programs, the classroom management approaches of prospective teachers were not aimed at prevention or positive change, yet in the direction of control and suppression strategies.

SUGGESTIONS

In light of the findings above and the results in the body of literature, it is understood that the achievements and skills of teacher candidates play a pivotal role in the perception of both classroom management and classroom measurement and evaluation competencies of teachers. Especially, prospective teachers who are older (22 years old), those with a high course passing grades, those who receive professional guidance before university education and those who willingly chose the teaching profession perceive teachers' classroom management and classroom measurement and evaluation competencies more strongly. Within the scope of this research, following suggestions can be suggested:

- ✓ It is essential to select students who have interest, love, and predisposition to the teaching profession.
- ✓ Pre-professional rehabilitation activities should be carried out. To this end, individuals who can practice the teaching profession should be accepted to the faculties.
- ✓ Student who do not feel that belonging to the teaching profession in the first years of university should be allowed to transfer to other programs.
- ✓ Likewise, students who are interested in the teaching profession from other programs should be allowed to transfer to this department.

✓ The teaching profession internship practice hours can be increased and this course can be taken each semester. Thus, the teacher candidate can be informed about the profession more realistically.

ETHICAL TEXT

Ethics committee permission for this study was approved by the Van Yüzüncü Yıl University Social and Human Sciences Publication Ethics Committee with the decision dated 23-02-2023 and numbered 2023/04. In this article, the process was carried out in accordance with the journal writing rules, publishing principles, research and publication ethics rules, and journal ethics rules. Authors are responsible for any violations that may occur.

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