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Can Emotional Intelligence Affect the Micro Teaching Performance of Science Teacher Candidates?

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Abstract— *The aim of this study is to reveal the changes in micro teaching performance scores of science teacher candidates according to their emotional intelligence score levels. The study was conducted using the correlational survey design. The sample of the study consists of 71 (57 female, 14 male) teacher candidates who continue their education in the Department of Science Teaching in Nevşehir. Emotional Intelligence Scale –EIS (33 items, 5-point Likert scale) and Micro Teaching Performance Form –MTP (35 items, three-level scoring) were used as data collection tools. The secondary school science topics that the teacher candidates would present were distributed by the researcher. After the visual preparation and provision of materials/equipment, the teacher candidates were provided with a teaching performance in 15-20 minutes. EIS was applied to the sample at the very beginning of the research process, while the MTP form was used while each participant was performing their micro teaching performance. In the analysis of the collected data, appropriate statistical methods (descriptive statistics, unrelated t test, correlation analysis) were used in accordance with the purpose of the research. According to the findings obtained as a result of the analysis, it was seen that the micro teaching performance scores of the science teacher candidates showed a statistically significant difference (t69=5.89 - p< 0.01) according to the levels of their emotional intelligence scores. In other words, it can be said that the teacher candidates with high emotional intelligence scores (85.33) showed a relatively better performance during the presentation. Another result supporting this finding is the moderate, positive and significant (r= 0.675 - p< 0.01) correlation coefficient between emotional intelligence and micro teaching scores. In addition, the behaviours and attitudes of the candidates in the sample who interacted with the researcher during the preparation phase of the presentations also support this result.*

Keywords— ***Emotional Intelligence, Microteaching, Academic Success, Science Teaching, Teacher Education***

I. INTRODUCTION

The most important element of the development and progress of modern countries in areas such as economy, culture, art, industry, technology and agriculture is to have a qualified education system. Again, in developed countries, education systems are considered to be an open system. In other words, the education system has a structure consisting of inputs, processes, outputs and feedback (Sönmez, 2007). One of these inputs is the function of the teachers present in the education system. Therefore, the qualifications of teachers, who are one of the key elements of the education system, are very important for the development of society. The qualification of teachers means that they are at the desired level in terms of professional knowledge and skills. The qualification of teachers is based on the quality of their training processes (Remesh, 2013). As it is known, various strategies, techniques and activities have been used in recent years to

train teacher candidates. It is extremely important to provide candidates with different teaching opportunities before they meet real students in real classroom environments. One of the methods that can provide these opportunities is the micro teaching method.

Micro teaching was developed to provide pre-service teachers with prior experience and practical skills and covers the process of teaching a course topic (Bell, 2007). In this context, the micro teaching process consists of the stages of "plan, teach, observe, re-plan, re-teach and re-observe" (Aslan and Elmas, 2019). Micro teaching is a method that allows prospective teachers to practice their teaching in an artificial and risk-free environment and prepares them for teaching in a real and natural classroom environment.

This method is used primarily in teacher education, as well as in medicine, guidance, special education, sports, etc. (Higgins & Nicholl, 2003). However, the most basic function of microteaching is to provide pre-determined, critical teacher behaviors to prospective teachers in the learning-teaching process. Microteaching is a scaled-down teaching that is applied to a group of 3-5 students/participants in a short time to demonstrate that prospective teachers exhibit the desired teacher skills in the pre-service process. An example of microteaching is when a prospective teacher prepares a topic and presents it to his/her peers in order to demonstrate his/her professional skills (Benton Kupper, 2001).

In micro teaching, the most basic task of the teacher candidate is to take on the role of a teacher and teach a model lesson on a certain subject to other students in the class. In the micro teaching application, some critical teacher behaviors that are essential in a learning-teaching process are determined and exhibited. In this way, important teacher behaviors are better perceived and these behaviors are easier to acquire. Micro teaching is a teaching application that is more limited, minimized and somewhat artificialized than the real classroom environment. Micro teaching is a laboratory teaching method that aims to ease the complexity experienced in the learning-teaching processes. In this method, pre-service professional experience is gained by teacher candidates in artificial environments (laboratories) where the risk of failure is minimal and teaching skills are high (Görgen, 2003).

When the literature review on micro teaching is examined, it will be seen that studies have been conducted in general into two groups. These can be listed simply as “studies on the results or effects of micro teaching” (Şen, 2010; Kuru, 2017; Yaka, 2013; Hacısalihoğlu Karadeniz, 2014; Kartal, Yamak, & Kavak, 2017; Kaleli Yılmaz & Ergün, 2017; Arsal, 2014; Karışan, 2017, Bulut, 2015; Shah & Masrur, 2011) and “studies on views on micro teaching” (Atav, Kunduz, & Seçken, 2014; Küçükoğlu, Köse, Taşgın, Yılmaz, & Karademir, 2012; Karataş & Cengiz, 2016; Özçelik, 2017; Göçer, 2016; Kılıç, 2016). In these studies, it was generally observed that micro teaching had a positive effect on teaching professional skills or that the participants had positive views about micro teaching practices. However, no study was found that quantitatively revealed the micro teaching performances of teacher candidates and their relationship with emotional intelligence. As it is known, it is stated in the relevant literature that emotional intelligence, which is now being mentioned among the 21st century skills, can affect many behaviors and attitudes of individuals.

The first discussion on emotional intelligence was made by Salovey and Mayer (1990). According to Salovey and Mayer (1990), emotional intelligence is the capacity of a person to recognize their own emotions and the emotions of those around them, to distinguish between them, and to use them to guide decisions and actions. Goleman (2006) defines emotional intelligence as the capacity to persevere in the face of difficulties, manage mood, postpone desires, take initiative, and empathize (as cited in Pursun & Efilti, 2019). According to Bar-On (2006), emotional social intelligence refers to the socio-emotional skills that allow individuals to understand and express themselves, understand others, and cope with the demands of daily life and interpersonal relationships. This model has five components: intrapersonal, interpersonal, stress control, general mood, and adaptability (Bar-On, 2006).

Emotions occur as a response to an internal or external event that has positive or negative meaning for the individual. Epstein (1998) states that emotions are very important in the processing of environmental stimuli and are necessary for both learning processes and decision-making mechanisms. Various definitions of emotional intelligence have emerged over time. While Cooper and Sawaf (2003) define emotional intelligence as an individual's ability to effectively manage their emotions, Brackett et al. (2004) see it as the ability to use, understand and regulate emotions to support cognitive processes. Deniz et al. (2013) state that emotional intelligence is generally examined within the framework of trait and information processing approaches. Similarly, Petrides and Furnham (2000) evaluate emotional intelligence from two different perspectives: emotional intelligence traits and the information processing model of emotional intelligence. Accordingly, they conceptualize their own model as emotional self-efficacy, while they characterize Mayer and Salovey's (1990) model as emotional cognitive ability.

In this study, which focuses on the change and correlation of the micro teaching method, which is one of the important teaching methods in the training of science teacher candidates, with emotional intelligence, the research questions were determined as follows.

RsQ 1. Do the participants' micro teaching performance (MTP) mean scores vary by grade level?

RsQ 2. Do the participants' micro teaching performance (MTP) mean scores vary by gender?

RsQ 3. Do the participants' micro teaching performance (MTP) mean scores vary by academic success?

RsQ 4. Do the participants' micro teaching performance (MTP) mean scores vary by emotional intelligence level?

RsQ 5. What is the correlation between the participants' micro teaching performance (MTP) mean scores and emotional intelligence scores?

II. METHOD

2.1. Design of the Research

The aim of this study is to reveal the changes in micro teaching performances of science teacher candidates at different grade levels according to their emotional intelligence scores. In order to obtain more detailed data from the sample in accordance with the purpose of the study, the study was carried out with the correlational survey design, one of the quantitative research methods. Since the correlational survey design is used in determining the interactions between more than one variable; the means of the groups can also be compared in the analyses aimed at determining the "relationship, effect or difference" (Şimşek, 2012, p.92). As stated in the purpose of the study, the "micro teaching performance scores" and "the emotional intelligence scores they have" of the teacher candidates were determined as the variables considered in the current study. The observation notes kept by the researcher, who also conducted the science teaching courses of the participants, throughout the process were also used in this study.

2.2. Sample

The sample of the study consists of 71 (57 female, 14 male) teacher candidates who continue their education in the Department of Science Teaching at the Faculty of Education of one of the universities in Nevşehir. The participants were selected from different grade levels and it was aimed to collect comprehensive data appropriate to the purpose of the study. In this context, it can be said that the participants of the study were determined by the appropriate sampling method. The appropriate sampling method is the selection of the sample from easily accessible and applicable segments due to some limitations in terms of time, cost and labor (Büyüköztürk et al. 2021).

2.3. Data Collection Tools

2.3.1 Schutte- Emotional Intelligence Test (33 items, 5-point Likert, single-dimensional):

To assess prospective teachers' emotional intelligence levels, the Schutte Emotional Intelligence Scale, translated and adapted into Turkish by Tatar et al. (2017), was used. The scale consists of 33 items and follows a single-factor structure. The minimum and maximum scores that can be obtained from this five-point Likert scale are 33 and 165 points, respectively.

During the data collection process, the data belonging to this scale were collected by the researcher in a single session at each grade level. The Emotional Intelligence Scale was applied to the participants in September 2023.

2.3.2 Micro Teaching Performance (MTP) Form (35 items, 3-level scoring):

In order to determine the micro teaching performances of the participants, the "Teaching Practice Evaluation Form in Educational Institutions Affiliated to the Ministry of National Education" was used. This form consists of a total of 35 items, including Subject Area Knowledge (4 items), Field Education Knowledge (5 items), Teaching Process (11 items), Classroom Management (9 items), and Communication (6 items). The items and dimensions in the form were presented to academicians who are experts in the field in order to ensure validity. In terms of reliability, the form was used by science teachers working in internship schools affiliated to the Ministry of National Education at different times and by academicians to evaluate the same teacher candidates. The correlation coefficient between the data sets obtained from these repeated measurements is always greater than 0.80 (Polat, 2023). Therefore, this form can be considered reliable. In this study, the evaluation statements in the data collection tool used as the micro teaching performance (MTP) form are scored as "deficient - 1 point", "acceptable level - 2 points" and "well-trained - 3 points". The minimum and maximum scores that can be obtained from the MTP are 35 and 105 points, respectively. In addition, the items and dimensions in the form were shown to each participant again before the micro teaching.

2.4. Data Collection Processes

At the beginning of the data collection process, the Emotional Intelligence Scale was applied to the participants in the first week of the term. In the following three weeks, the middle school science topics

(temperature, pressure, electrical resistance, optics, etc.) that the prospective teachers would present in order to demonstrate their micro teaching performance were given to the participants by the researcher. Thus, sufficient time was given for them to prepare for their micro teaching presentations. Before the presentation, they were provided with guidance on teaching strategies and concepts, principles and practices related to the subject area. In the following weeks, after the visual preparation and provision of materials/tools, the prospective teachers were provided with a micro teaching performance in a period of 15-20 minutes. All data were collected in approximately nine weeks.

2.5. Data Analysis

In order for the data set of quantitative findings obtained in this study to be subjected to certain statistical analyses, some of its parameters must first be revealed. The normality assumptions regarding each measurement taken from the participant group were examined through skewness and kurtosis coefficients. As a result of the examination, since it was determined that the skewness and kurtosis coefficients of the data obtained from the scales were between +2 and -2 (George and Mallery 2010), it was accepted that the variables had a normal distribution. For this reason, it was decided to use parametric analysis tests in the analysis of the data set. Appropriate statistical analysis techniques (unrelated t test, correlation test, descriptive statistics, etc.) were used in the analysis of the obtained data. It can be said that descriptive analysis was also performed in the analysis of the observation notes kept by the researcher throughout the process.

III. FINDINGS

RsQ 1. Do the participants' micro teaching performances (MTP) mean scores vary by grade level?

The results of the unrelated t-test conducted to reveal the change in the participants' MTP score averages according to their grade levels are presented in Table 1.

Table 1. Unrelated t-Test Results of MTP Scores According to Grade Level

Grade Level	N	Mean	t	df	p
3rd grade	37	78,33	-1,402	69	0,165*
4th grade	34	83,15			

*p>.05

According to Table 1, the mean micro teaching performance scores of science teacher candidates did not create a statistically significant difference (t69=-1.40 – p> 0.05) according to the grade level. In other words, the mean MTP scores of the participants in both grade levels were quite close to each other.

RsQ 2. Do the participants' micro teaching performances (MTP) mean scores vary by gender?

The results of the unrelated t-test conducted to reveal the change in the participants' MTP score averages according to gender are presented in Table 2.

Table 2. Results of Unrelated T-Test of MTP Scores According to Gender

Gender	N	Mean	t	df	p
Female	57	81,75	1,313	69	0,193*
Male	14	76,07			

*p>.05

According to Table 2, the mean micro teaching performance scores of science teacher candidates did not create a statistically significant difference (t69=1.31 – p> 0.05) according to gender. In other words, the mean MTP scores of female and male participants were quite close to each other.

RsQ 3. Do the participants' micro teaching performance (MTP) mean scores vary by academic success?

The results of the unrelated t-test conducted to reveal the change in the participants' MTP score averages according to academic success are presented in Table 3.

Table 3. Unrelated t-Test Results of MTP Scores According to Academic Success

Academic success	N	Mean	t	df	p
Academic success (Low)	24	65,92	-8,779	69	0,00*
Academic success (High)	47	88,15			

*$p<.05$

According to Table 3, the mean micro teaching performance scores of science teacher candidates constitute a statistically significant difference (t69=-8.78 - p< 0.05) according to academic success. In other words, it can be said that the MTP scores of participants with high academic success are relatively higher.

RsQ 4. Do the participants' micro teaching performances (MTP) mean scores vary by emotional intelligence level?

The results of the unrelated t-test conducted to reveal the change in the participants' MTP score averages according to their emotional intelligence levels are presented in Table 4.

Table 4. Unrelated t-Test Results of MTP Scores According to Emotional Intelligence Level

Emotional Intelligence	N	Mean	t	df	p
E. Intelligence Score (Low)	17	65,71	-5,89	69	0,00*
E. Intelligence Score (High)	54	85,33			

*$p<.05$

According to Table 4, the mean micro teaching performance scores of science teacher candidates constitute a statistically significant difference (t69=-5.89 - p<0.05) according to their emotional intelligence level. In other words, it can be said that the participants with high scores in terms of emotional intelligence have relatively higher MTP scores.

RsQ 5. What is the correlation between the participants' micro teaching performance (MTP) mean scores and emotional intelligence scores?

Data regarding the correlation between participants' MTP score averages and emotional intelligence scores are presented in Table 5.

Table 5. Correlation Between MTP Scores and Emotional Intelligence Scores

		Emotional Intelligence Scores
MTP Scores	Pearson Correlation (r)	0,626
	Sig. (2- tailed)	0,00
	N	71

According to Table 5, it can be said that there is a moderate, positive and significant (r= 0.626 - p< 0.05) correlation between emotional intelligence and micro teaching performance scores. In other words, it can be said that as the emotional intelligence scores of the teacher candidates increase, their micro teaching scores also increase.

Finally, it is necessary to mention the observer notes in the findings section. Although they were not written in the data collection tools of the study, the observation notes kept by the researcher who conducted the course of the participants for fourteen weeks will also be listed in Table 6. Thus, it was aimed to present the study area, work atmosphere and general situation to the reader with some qualitative data accompanying the quantitatively obtained data.

Table 6. Findings Obtained from Observation Notes

Category Related to Research Question	Findings Obtained from Observation Notes
In Terms of Grade Levels	The fact that the classes were held on different days provided me with the opportunity to observe both the 3rd and 4th graders better. There were no major differences between them in terms of microteaching performance, either in the preparation phase or in the presentation phase itself. Of course, there were talented and diligent participants who stood out from the others in each grade. It is possible to say that these students were generally more enterprising, more adequate in terms of academic success, and had a social personality. However, it can still be said that the participants in this group exhibited slightly better microteaching performance due to being seniors. One reason for this may be the number of courses they took and the length of time they spent at the faculty.
In Terms of Gender	In terms of the scores obtained from the scales, I would actually expect to see a clear difference in favor of women here. Participants prepare for microteaching performance for the specified periods (approximately 2 weeks). During this preparation phase, female students visit me more as an academic advisor and receive more feedback on their work/teaching materials. In terms of emotional intelligence, female participants had a more advantageous profile. Their efforts were certainly higher than men. However, although men were less aesthetic and less meticulous during the preparation phase, they taught with a more confident attitude during the presentation phase.
In Terms of Academic Success	There was a very obvious situation in terms of academic success during the process. Those who were good at science courses such as physics, chemistry, biology, ecology, and mathematics were definitely good and satisfying in their micro teaching performances. They carried out the process more confidently in themselves and their emotions from the preparation and presentation stages. Because bringing science-related concepts and theories to a level that middle school children can understand requires academic success. If you do not know physics or chemistry well, you cannot present the information in that discipline well in the teaching environment. It can be said that those who often had difficulties in answering unexpected questions from their peers during the presentations of the participants were those with weak academic success. Participants who could not achieve the desired level of success, especially in subject-related courses or courses related to science education, had difficulty in continuing their presentations in a healthy way.
In Terms of Emotional Intelligence	The concept of emotional intelligence actually defines multiple skills together. Empathy, being aware of emotions, knowing emotional strengths and weaknesses, understanding the emotions of the person in front of you, including emotions in decision-making mechanisms, etc. During this study conducted with teacher candidates, I observed that especially males are weaker in terms of emotional intelligence. Perhaps one reason for this may be that their numbers (5 or 6 people) are quite low at each grade level. These aspects may have been weak in environments where the same gender was few.

IV. DISCUSSION AND CONCLUSION

The purpose of this study is to reveal the changes in micro teaching performance scores of science teacher candidates according to their emotional intelligence score levels. The study was conducted using the relational screening method. The quantitative and qualitative results obtained in the study are listed below.

The micro teaching method, which focuses on acquiring teacher behaviors, offers new and different opportunities for teacher candidates to plan and implement teaching strategies. However, in its most basic function and meaning, micro teaching is a method of acquiring predetermined, critical teacher behaviors in the learning-teaching process. Micro teaching is a scaled-down teaching applied to a group of 3-5 students/participants in a short time to demonstrate that teacher candidates exhibit the desired teacher skills during the pre-service education process. An example of micro teaching is a teacher candidate preparing for a lesson and presenting this lesson to his/her friends in order to demonstrate his/her professional skills (Benton Kupper, 2001).

As a result of the analyses conducted to reveal the changes in micro teaching performance scores according to the determined variables; it was observed that these scores of the participants did not create a statistically significant difference according to the class levels and gender variable (Table 1 and Table 2). A possible reason for this result may be that the class levels are very close to each other. Because, even though they are in different class levels, the students follow similar curricula and take common courses in the same academic terms. As can be understood from the observation notes kept by the researcher (Table 5), it will be seen that the students exhibit very similar profiles in terms of their class levels. The reason for the slightly higher micro teaching performance scores of the participants in the last year can be shown as the number of courses they have taken and the more time they have spent at the faculty. However, in another study, Polat (2023) concluded that the micro teaching performance scores of teacher candidates show a significant difference according to the gender variable.

The microteaching performance scores of science teacher candidates showed a significant difference according to their academic success levels. As expected, the difference was in favor of the students with high success. A possible reason for this difference may be the success in basic courses such as physics, chemistry, and biology, which constitute a large part of the participants' academic success. Teacher candidates who are successful in these courses can be more self-confident and instructive during their microteaching performance. The study conducted by Polat (2023) also emphasizes that academic success is effective in microteaching performance. Similar results were obtained from the observation notes kept by the researcher (Table 5). Since the researcher was in constant interaction with the participants during the eight weeks during which they demonstrated their performance, his observations can provide detailed information about the effect of academic success. According to these observations; the participants encountered difficulties in matching science subject matter knowledge with science education skills in instant/unexpected questions from their peers during microteaching. Participants with low academic success generally had difficulties in adhering to and continuing the lesson plan they prepared for microteaching performance. In fact, this result obtained is similar to the results of microteaching etc. This is in line with a similar study (Upadhyay, 2017) which lists the benefits that applications provide (providing the opportunity to receive instant feedback, simulating the real classroom environment, reducing confusion).

The mean micro teaching performance scores of science teacher candidates constitute a statistically significant difference ($t_{69}=5.89$ - $p<0.05$) according to the level of emotional intelligence. In other words, it can be said that the participants with high scores in terms of emotional intelligence have relatively higher MEP scores. In addition, it can be said that there is a moderate, positive and significant ($r=0.626$ - $p<0.01$) correlation between performance scores and emotional intelligence scores. In other words, it can be said that as the emotional intelligence scores of teacher candidates increase, their micro teaching scores also increase.

Feelings such as approaching the problems they encounter differently, finding solutions, making the right decisions, communicating well, empathizing, and being thoughtful should also be taught in the education of teacher candidates. Developing emotional intelligence will positively affect mental skills and abilities and will enable students to be more successful in their academic lives (Ada, 2009). In micro teaching, the most basic task of the teacher candidate is to take on the role of a teacher and teach a sample lesson on a certain subject to other students in the class. In micro teaching practice, some critical teacher behaviors that are indispensable in a learning-teaching process are determined and exhibited (Yeşilyurt, 2021). While developing these behaviors, teacher candidates will evaluate themselves and their peers, realize their mistakes, and in this way, realize their weaknesses and strengths and eliminate their deficiencies (Görgen, 2003). For this reason, teacher candidates being aware of their emotional intelligence skills and focusing on eliminating their deficiencies in emotional intelligence can produce better results in terms of their professional development.

Ethics Commitment: Part of the data used in this study was presented at the 13th International Congress of Academic Research in 2024.

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