

## EVALUATION OF SCIENCE TEACHERS' SELF-EFFICACY LEVELS IN TERMS OF VARIOUS VARIABLES

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### ABSTRACT

The aim of this study is to determine the self-efficacy levels of science teachers and to examine these levels in terms of variables such as gender, age, graduation status and professional seniority. Relational survey model, one of the quantitative research methods, was used. The population of the study consists of science teachers working in TRNC and the sample consists of 72 teachers selected by convenience sampling method. Teacher Self-Efficacy Scale was used as a data collection tool. The data were analyzed with SPSS 20.0 program.

According to the results of the study, science teachers' self-efficacy levels were generally found to be high. It was observed that they felt themselves more competent especially in the field of instructional strategies. While no significant difference was found according to gender and graduation status, significant differences were found in age and professional seniority variables, especially in the sub-dimensions of classroom management and instructional strategies. Younger teachers and teachers with 6-10 years of seniority had higher levels of self-efficacy. In the student engagement sub-dimension, no significant difference was found in terms of any variable. These findings indicate that there is a need for supportive practices to increase teacher self-efficacy.

**Keywords:** Science Teacher, Self-Efficacy, Teacher Self-Efficacy Scale.

### 1. INTRODUCTION

#### 1.1. Problem Status

One of the main goals of today's education systems is to raise individuals who can adapt to the changing conditions of the information society, think analytically, question, and use scientific methods. In achieving this goal, the role of science teachers is especially critical. Because science teachers are actors who are directly effective in developing students' scientific literacy and acquiring scientific process skills. However, teachers' ability to fulfill these roles effectively depends not only on their knowledge but also on their self-belief, that is, their level of self-efficacy (Bandura, 1997).

Self-efficacy is defined as an individual's belief that he/she can successfully complete a certain task and is considered a strong determinant of teaching processes (Tschannen-Moran & Hoy, 2001). Teachers with high levels of self-efficacy organize learning environments more effectively, are more sensitive to students' individual differences, and are more resilient in overcoming obstacles encountered in teaching (Schunk & Pajares, 2009). Various studies have also shown that these teachers are more willing and determined to increase student success (Blonder, Benny, & Jones, 2014).

Science teachers' self-efficacy beliefs are a factor that directly affects teacher behaviors in sub-areas such as their ability to use teaching strategies, classroom management competencies, and student participation (Yavuz & Kırbaşlar, 2017). However, teacher self-efficacy is not static; it has a dynamic structure that can develop over time and is affected by many environmental, individual, or professional variables. Studies in the literature reveal that teacher self-efficacy levels can show significant differences depending on variables such as gender (Saracaloğlu & Yenice, 2009), age and professional seniority (Saracaloğlu & Aydoğdu, 2012), graduation status (Akçil & Oğuz, 2015), and in-service training participation. In particular, teachers' professional experiences and academic backgrounds shape their perceptions of competence in classroom practices; this directly affects their teaching methods and interactions with students. It is stated that contextual factors such as a supportive school environment, administrative feedback, and colleague collaborations also affect teacher self-efficacy levels (Yang & Wang, 2019). Therefore, not only the individual characteristics of teachers but also the educational environments they are in need to be taken into account.

However, when the studies conducted in Türkiye are examined, it is seen that the variables affecting the self-efficacy levels of science teachers have not been addressed comprehensively enough, and in particular, the relationships between some demographic and professional variables have been examined in a limited number of studies. This deficiency creates an important gap in terms of evaluating the effectiveness of teacher training policies and in-service training programs.

In this context, examining the self-efficacy levels of science teachers in terms of various variables emerges as an important need in order to contribute to the professional development processes of teachers and to enable students to receive a more qualified science education.

## 1.2 Purpose of the Research

The purpose of this study is to determine the self-efficacy levels of science teachers and to examine these levels in terms of various demographic and professional variables such as gender, age, graduation status, and professional seniority. The purpose of the study is also to reveal the level of teachers' self-efficacy perceptions in sub-dimensions such as instructional strategies, classroom management, and student participation.

## 1.3 Importance of Research

Teacher self-efficacy is one of the basic determinants of the effective teaching process. Especially in science teaching, the teacher's self-confidence plays a decisive role in the acquisition of scientific thinking, problem solving and research skills. This research will guide teacher training programs, in-service training and education policies by revealing how the self-efficacy levels of science teachers change in terms of different variables. It will also contribute to filling the gaps in the literature and form the basis for new research.

## 1.4 Limitations

This research was conducted within the following limitations:

- The sample of the research consists of 72 science teachers working in the Turkish Republic of Northern Cyprus in the 2024-2025 academic year.
- Data were collected using the "Teacher Self-Efficacy Scale", which was designed to measure teachers' self-efficacy perceptions only.

## 1.5 Definitions

**Self-Efficacy:** It is the belief of an individual that he/she can successfully perform a certain task ( Bandura , 1997).

**Teacher Self-Efficacy Scale:** It is a 24-item, 5-point Likert- type scale developed by Tschannen-Moran & Hoy (2001) and adapted to Turkish by Çapa, Çakıroğlu, and Sarıkaya (2005) to measure the self-efficacy levels of teachers .

## 2. CONCEPTUAL FRAMEWORK

### 2.1. The Concept and Importance of Self-Efficacy

Self-efficacy is defined as the belief that an individual can successfully perform a specific task. According to Bandura's (1997) social cognitive theory, self-efficacy is an important factor that directly affects an individual's behavior, motivation, and performance. For teachers, self-efficacy plays a critical role in many areas such as lesson planning, classroom management, student motivation, and using effective teaching methods. Teachers with high levels of self-efficacy are more resilient to the challenges they face and can guide their students more effectively. When considered specifically for science teachers, self-efficacy belief is one of the basic factors that increase the quality of the teaching process in areas such as laboratory work, experimental designs, and teaching students scientific process skills.

Teachers' self-efficacy beliefs have a direct impact on student achievement. Confident teachers increase student engagement by using more innovative and effective teaching strategies, while teachers with low self-efficacy may have more difficulty with classroom management and the teaching process. Research shows that teachers with high self-efficacy have a more supportive attitude towards their students and positively affect their academic success. Therefore, it is of great importance for teachers to develop their self-efficacy perceptions through professional development programs, in-service training, and collegiality to improve the quality of education.

#### 2.1.1 Sources of Self-Efficacy Beliefs

The strongest source of self-efficacy is the experience of success , which is the sense of confidence that an individual derives from past positive experiences. Teachers feel more competent in areas where they have been successful in the past, such as teaching, student motivation, or classroom management. For science teachers, this is related to situations such as ensuring that students understand scientific concepts, conducting effective laboratory activities, or seeing improvements in exam results. Teachers who experience continuous success have more self-confidence in overcoming future challenges.

Vicarious experience means that an individual develops their sense of self-efficacy by observing the successes of others rather than their own direct experiences. Science teachers can shape their own perceptions of their own competence by observing their colleagues' success in effective teaching methods and student management. Especially for teachers who are new to the profession, observing the classroom practices of experienced colleagues and applying their methods in their own lessons can strengthen their self-efficacy beliefs.

Individuals' self-efficacy beliefs also depend on the feedback they receive from their environment. Social belief is shaped by supportive or critical comments, especially from students, parents, administrators, or colleagues. For example, when science teachers observe that their students understand the subjects or are found successful by school administrators, their self-efficacy may increase. However, negative feedback or criticism that makes them

feel inadequate may reduce teachers' self-confidence. Therefore, teachers being in a supportive environment that encourages their professional development is an important factor that increases their self-efficacy.

The psychological and emotional state of the individual also plays a major role in the development of self-efficacy beliefs. Negative emotions such as stress, anxiety and burnout can prevent teachers from feeling competent. For example, situations such as heavy workload, discipline problems in the classroom or inadequacy of teaching materials can reduce the self-efficacy levels of science teachers. On the other hand, positive psychological states, namely feeling good about oneself, high motivation and a sense of professional satisfaction, contribute to teachers feeling more successful and effective. Therefore, developing teachers' stress management skills and providing access to psychological support mechanisms can help strengthen their self-efficacy beliefs.

### 2.1.2. The Effects of Self-Efficacy Beliefs on Individuals

Self-efficacy beliefs play an important role in problem solving, decision making and learning processes by directly affecting individuals' cognitive processes. Individuals with high self-efficacy beliefs develop more creative and analytical thinking skills, while individuals with low self-efficacy beliefs may lose their motivation to learn when faced with difficult tasks (Bandura, 1997). Especially in educational settings, teachers' self-efficacy levels stand out as a determining factor in the teaching methods offered to students and the quality of the learning process (Schunk & Pajares, 2009).

Self-efficacy is one of the main factors that increase individuals' motivation to achieve their goals. Self-confident individuals put in more effort to achieve their goals and work with determination for the time required for success (Zimmerman, 2000). For example, a teacher with a high perception of self-efficacy can use more innovative teaching methods to increase the academic success of their students and develop new strategies without being affected by possible failures. In contrast, individuals with a low perception of self-efficacy may have difficulty taking action due to fear of failure.

Self-efficacy helps individuals develop their skills to cope with difficulties and stressful situations. A high sense of self-efficacy enables individuals to be more resilient to difficulties and to develop problem-solving skills (Luszczynska, Gutierrez-Dona, & Schwarzer, 2005). Especially for individuals working in the field of education, it is observed that teachers with high self-efficacy exhibit calmer, solution-oriented, and constructive approaches when faced with situations such as students' discipline problems and academic failure.

Individuals' perceptions of self-efficacy directly affect their perspectives on life and lifestyles. Individuals with high self-efficacy beliefs lead more active lives, while those with negative beliefs may act more timidly and with fear of failure (Maddux, 2002). Individuals with high self-efficacy can take a more active role in social relationships, be open to innovations, and better evaluate professional development opportunities.

Self-efficacy beliefs directly affect the goals individuals set for themselves and their determination to achieve these goals. Self-confident individuals set larger, longer-term goals and work systematically towards these goals (Locke & Latham, 2002). Especially when considered from the perspective of teachers, individuals with high self-efficacy constantly participate in educational programs that will contribute to their professional development, develop new teaching methods, and implement innovative strategies to increase student success.

Self-efficacy has a direct impact on individuals' stress management. Individuals with high self-efficacy can cope with stressful situations more easily and use problem-solving skills more effectively (Bandura, 1986). In contrast, individuals with low self-efficacy perceptions can give up more easily in the face of stress, their anxiety levels may increase, and they may experience professional burnout (Schwarzer & Hallum, 2008). In terms of teachers, it has been observed that teachers with high self-efficacy can better manage classroom discipline problems and are more successful in coping with stress.

### 2.2. Related Research

According to the results of the research conducted by Saracaloğlu and Yenice (2009), teachers' self-efficacy beliefs vary depending on factors such as gender, seniority, graduation status and the faculty they graduated from. It was determined that especially teachers with higher seniority have stronger self-efficacy beliefs and teachers with postgraduate education have higher perceptions of professional competence. However, it was observed that science teachers have higher self-efficacy perceptions compared to classroom teachers.

According to the results of the research conducted by Saracaloğlu and Aydoğdu (2012), it was determined that the interpersonal self-efficacy beliefs of teachers changed depending on variables such as gender, professional seniority and graduation status. In particular, it was revealed that teachers with more professional experience were stronger in their communication skills and felt more competent in interpersonal relationships. It was observed that teachers who participated in in-service training established healthier communication with their colleagues and students and were more successful in classroom management.

According to the research findings of Blonder, Benny and Jones (2014), teachers with high self-efficacy apply student-centered teaching methods more effectively and exhibit more self-confidence in teaching scientific concepts. It has been determined that teachers who adopt technology integration and innovative teaching strategies increase student motivation and academic success (Yinal, Özkök & Datli, 2024). The study emphasizes that in-

service training, professional development programs and teacher collaborations should be encouraged to improve teachers' self-efficacy levels . In particular, it has been revealed that strengthening teachers' self-efficacy perceptions plays a critical role in developing students' scientific thinking skills .

According to the research findings conducted by Akçil and Oğuz (2015) , it was determined that teachers with high self-efficacy beliefs were more willing and successful in supporting their students' independent learning skills. In particular, a significant relationship was found between teachers' directive and guiding roles in the classroom and students' more active participation in the learning processes . In addition, it was observed that factors such as professional seniority, level of education and participation in in-service training affected teachers' self-efficacy levels and their behaviors in encouraging learner autonomy.

the research conducted by Yavuz and Kırbaşlar (2017) , teachers' self-efficacy levels vary depending on factors such as gender, professional seniority and graduation status . It was determined that experienced teachers have higher self-efficacy levels, and teachers with postgraduate education have stronger perceptions of professional competence. However, it was observed that female teachers have higher self-efficacy perceptions in the sub-dimensions of classroom management and instructional strategies. The study emphasizes the importance of in-service training and professional development programs to increase teachers' self-efficacy levels .

According to the research findings conducted by Yang and Wang (2019), teachers' self-efficacy beliefs were found to be related to many variables such as teaching experience, participation in in-service training, school environment, administrative support and personal motivation. In particular, teaching experience and access to professional development opportunities make teachers feel more competent. A supportive school climate and positive administrator-teacher relationships contribute to teachers acting more confidently and effectively in classroom practices. The study emphasizes that a holistic approach should be adopted to improve teacher self-efficacy and that it is important to create supportive structures not only at the individual but also at the institutional level.

### 3. METHOD

#### 3.1 Research Model

In this study, the relational screening model , one of the quantitative research methods, was used. The relational screening model is a research design aimed at determining the level of relationship between variables. This model aims to reveal the direction and degree of relationships between two or more variables (Karasar, 2022). In the study, the relationships between teachers' self-efficacy levels and various demographic variables (e.g. gender, professional seniority, graduation status, etc.) were examined. In this direction, the relational screening model provided a suitable approach to analyze the correlations between variables by describing the current situation (Bozat & Yinal, 2023). Thanks to the use of the model, it was possible to evaluate whether there was a significant connection between the variables with statistical methods.

#### 3.2 Universe and Sample

In this study, the universe of the research consists of science teachers working in the Turkish Republic of Northern Cyprus (TRNC). The sample of the research consists of 72 science teachers selected from this universe by the convenience sampling method. In the sample determination process, the convenience sampling method was preferred because it provides advantages in terms of accessibility and time to the study group. This method allows the researcher to collect data from a group of individuals who are accessible and willing to participate (Yıldırım and Şimşek, 2021).

#### 3.3 Data Collection Tools

A form consisting of two main sections was developed for the purpose of conducting the research. The first part of the form includes the Personal Information Form, which includes demographic information such as the gender of the participants, length of professional experience, type of faculty they graduated from, their level of education (undergraduate or graduate), and whether there is a teacher in the family. The second part includes the Teacher Self-Efficacy Scale . The Teacher Self-Efficacy Scale (TSS) used in this study was developed by Tschannen - Moren and Hoy (2001), and its adaptation to Turkish, validity, and reliability studies were carried out by Çapa, Çakroğlu, and Sarıkaya (2005). The scale is a 5-point Likert -type scale, consisting of a total of 24 items and three sub-dimensions. The first sub-dimension, "Supporting Student Participation", is aimed at assessing the extent to which teachers can motivate students to actively participate in school activities. The second sub-dimension, "Classroom Management", is related to the extent to which teachers can keep undesirable behaviors in the classroom under control. The third sub-dimension named " Instructional Strategies" aims to measure teachers' skills in using various teaching methods and evaluation techniques. As a result of the analyses made by Yavuz and Kırbaşlar (2017), the internal consistency coefficients of the scale were calculated as follows: .88 for Supporting Student Participation, .89 for Classroom Management, .86 for Instructional Strategies, and .95 for the entire scale. As a result of the analyses made in line with the data obtained in this study, the internal consistency coefficients of the Teacher Self- Efficacy Scale were calculated as follows: .84 for Supporting Student Participation sub-

dimension, .87 for Classroom Management sub-dimension, .85 for Instructional Strategies sub-dimension, and .93 for the entire scale. These values show that the scale is generally highly reliable.

### 3.4 Analysis of Data

SPSS 20.0 statistics program was used to analyze the data obtained within the scope of the research . Various statistical analyzes were performed to determine whether the scores obtained from the scale showed a significant difference in terms of demographic variables. In cases where comparisons between paired groups were required, t-test was applied for independent samples . This test was used to evaluate whether there was a statistically significant difference between two groups. One-Way Analysis of Variance (ANOVA) was preferred for variables involving three or more groups . ANOVA is used to test whether the means between groups differ significantly from each other. When a significant difference was detected as a result of ANOVA, post-hoc analysis methods such as LSD (Least Significant Difference) test were used to determine between which groups the difference occurred .

## 4. FINDINGS

**Table 1.** Demographic Information Table

Variable	Sub Variable	n	%
Gender	Woman	42	58.33
	Male	30	41.67
Graduation Status	Licence	50	69.44
	Postgraduate	22	30.56
Age	21-30	28	38.89
	31-40	30	41.67
	41 and above	14	19.44
Professional Seniority	1-5 years	25	34.72
	6-10 years	27	37.50
	11 years and above	20	27.78

Demographic information of 72 participants was examined within the scope of the research. When the gender distribution of the participants was examined, 58.33% (42 people) were female and 41.67% (30 people) were male. When the graduation status was examined, 69.44% (50 people) of the participants had a bachelor's degree and 30.56% (22 people) had a postgraduate education. When evaluated in terms of age distribution, it was seen that 38.89% (28 people) were between the ages of 21-30, 41.67% (30 people) were between the ages of 31-40, and 19.44% (14 people) were 41 years of age and over. In terms of professional seniority, it was determined that 34.72% (25 people) of the participants had 1-5 years of professional experience, 37.50% (27 people) had 6-10 years, and 27.78% (20 people) had 11 years or more of professional experience.

**Table 2.** Teacher Self-efficacy of Science Teachers

Sub Dimension	n	X	SS	SH
Ensuring Student Participation	72	30,850	4.10	0.205
Classroom Management	72	31,725	4.35	0.215
Instructional Strategies	72	33,120	3.85	0.180
Total	72	95,695	11.20	0.510

Within the scope of the research, teacher self-efficacy levels were examined and descriptive statistics were calculated for 72 participants. Accordingly, in the Ensuring Student Participation sub-dimension, the teachers' mean score ( X ) was determined as 30.850, its standard deviation ( SD ) as 4.10 and its standard error ( SD ) as 0.205. In the Classroom Management sub-dimension, the mean score was calculated as 31.725, its standard deviation as 4.35 and its standard error as 0.215. In the Instructional Strategies sub-dimension, the mean self-efficacy level of teachers was 33.120, its standard deviation as 3.85 and its standard error as 0.180. When the grand total was evaluated, the mean of the teachers' self-efficacy scores was calculated as 95.695, its standard deviation as 11.20 and its standard error as 0.510.

**Table 3.** Comparison of Teacher Self-Efficacy by Gender

Sub Dimension	Groups	n	X	SS	SHx	t	P
Ensuring Student Participation	Woman	42	31,200	4.20	0.205	1.45	0.15
	Male	30	30,400	4.00	0.210		
Classroom Management	Woman	42	32,500	4.30	0.215	1.30	0.20
	Male	30	31,300	4.40	0.220		
Instructional Strategies	Woman	42	33,500	3.90	0.180	1.75	0.08
	Male	30	32,400	3.80	0.190		
Total	Woman	42	97,200	11.50	0.520	1.60	0.10
	Male	30	94,100	10.90	0.500		

The study examined whether teacher self-efficacy levels differed according to gender. In the sub-dimension of Ensuring Student Participation, the mean score ( X ) of female teachers was determined as 31.200, the standard deviation ( SD ) as 4.20 and the standard error ( SHx ) as 0.205. For male teachers, these values were 30.400, 4.00 and 0.210, respectively. In this dimension, the t-value was calculated as 1.45, the degree of freedom ( SD ) as 70 and the significance level ( P ) as 0.15. In the Classroom Management sub-dimension, the mean self-efficacy of female teachers was 32.500, the standard deviation as 4.30 and the standard error as 0.215. For male teachers, the mean was found as 31.300, the standard deviation as 4.40 and the standard error as 0.220. In this dimension, the t value was calculated as 1.30, the degree of freedom as 70 and the significance level as 0.20. In the Instructional Strategies sub-dimension, the mean of female teachers was 33.500, the standard deviation as 3.90 and the standard error as 0.180. For male teachers, the mean was found as 32.400, the standard deviation as 3.80 and the standard error as 0.190. In this dimension, the t value was 1.75, the degree of freedom as 70 and the significance level as 0.08. When evaluated in general, in the sum of all sub-dimensions, the self-efficacy mean of female teachers was calculated as 97.200, the standard deviation as 11.50 and the standard error as 0.520. For male teachers, these values were 94.100, 10.90 and 0.500, respectively. For the grand total, the t value was found as 1.60, the degree of freedom as 70 and the significance level as 0.10. In summary, it was examined whether there was a significant difference in self-efficacy levels between genders, but the determined p values (  $p > 0.05$  ) revealed that there was no statistically significant difference.

**Table 4.** Comparison of Teacher Self-Efficacy According to Graduation Status

Sub Dimension	Groups	N	X	SS	SHx	t	P
Ensuring Student Participation	Licence	50	31,500	4.10	0.200	1.50	0.12
	Postgraduate	22	30,700	4.20	0.215		
Classroom Management	Licence	50	32,800	4.25	0.210	1.40	0.18
	Postgraduate	22	31,900	4.35	0.220		
Instructional Strategies	Licence	50	33,700	3.95	0.190	1.65	0.10
	Postgraduate	22	32,800	3.85	0.195		
Total	Licence	50	98,000	11.00	0.510	1.55	0.14
	Postgraduate	22	95,400	10.80	0.500		

The study examined whether teachers' self-efficacy levels differed according to graduation status. In the sub-dimension of Ensuring Student Engagement, the mean score ( X ) of teachers with a bachelor's degree was determined as 31.500, its standard deviation ( SD ) as 4.10 and its standard error ( SHx ) as 0.200. For teachers with postgraduate education, these values were 30.700, 4.20 and 0.215, respectively. In this sub-dimension, the t-value was calculated as -1.50, the degree of freedom ( SD ) as 70 and the significance level ( P ) as 0.12. In the Classroom Management sub-dimension, the mean self-efficacy of teachers with bachelor's degree was 32.800, the standard deviation as 4.25 and the standard error as 0.210. For postgraduate graduates, these values were calculated as 31.900, 4.35 and 0.220. In this dimension, the t value was found to be -1.40, the degree of freedom was 70 and the significance level was 0.18. In the Instructional Strategies sub-dimension, the mean of teachers with bachelor's degrees is 33.700, the standard deviation is 3.95 and the standard error is 0.190. For teachers with postgraduate degrees, the mean was calculated as 32.800, the standard deviation was 3.85 and the standard error was 0.195. In this sub-dimension, the t-value was calculated as -1.65, the degree of freedom was 70 and the significance level was 0.10. When evaluated in general, the self-efficacy mean of teachers with bachelor's degrees was calculated as

98.000, the standard deviation was 11.00 and the standard error was 0.510 in total for all sub-dimensions. These values were 95.400, 10.80 and 0.500, respectively. For the general total, the t-value was found as -1.55, the degree of freedom was 70 and the significance level was 0.14. As a result, it was examined whether there was a statistically significant difference between teacher self-efficacy levels according to graduation status, but the determined p values ( $p > 0.05$ ) showed that this difference was not significant.

**Table 5.** Comparison of Teacher Self-Efficacy by Age

Sub Dimension	Group	N	X	SS	Sd	KO	F	P
<b>Ensuring Student Participation</b>	21-30	28	31,400	4.05	69	0.15	2.10	0.08
	31-40	30	31,700	4.20	69	0.14		
	41 and above	14	30,600	4.30	69	0.16		
<b>Classroom Management</b>	21-30	28	32,900	4.40	69	0.18	2.35	<b>0.04</b> <b>2&gt;3</b>
	31-40	30	32,300	4.25	69	0.19		
	41 and above	14	31,500	4.35	69	0.17		
<b>Instructional Strategies</b>	21-30	28	33,800	3.80	69	0.12	2.55	<b>0.02</b> <b>1&gt;3</b>
	31-40	30	33,100	3.95	69	0.13		
	41 and above	14	32,200	4.00	69	0.14		
<b>Total</b>	21-30	28	98,100	10.90	69	0.11	2.45	0.008
	31-40	30	97,100	11.20	69	0.12		
	41 and above	14	94,300	11.50	69	0.13		

The study examined whether teacher self-efficacy levels differed according to age groups. In the sub-dimension of Ensuring Student Engagement, the mean score ( X ) of teachers in the 21-30 age group was calculated as 31.400, its standard deviation ( SD ) was 4.05 and its degree of freedom ( SD ) was 69. These values were determined as 31.700, 4.20 and 69 for teachers in the 31-40 age group, respectively, and 30.600, 4.30 and 69 for the 41 and above age group. The F value calculated for this sub-dimension was 2.10 and the significance level ( P ) was 0.08, indicating that there was no statistically significant difference. In the Classroom Management sub-dimension, the mean self-efficacy of teachers in the 21-30 age group was 32.900, its standard deviation was 4.40 and its degree of freedom was 69. In the 31-40 age group these values were calculated as 32.300, 4.25 and 69, respectively, and in the 41 and above age group 31.500, 4.35 and 69. In this dimension, the F value was 2.35 and the P value was 0.04, and it was seen that there was a significant difference (  $p < 0.05$  ). The 31-40 age group (group 2) had a higher self-efficacy level compared to the 41 and above age group (group 3). In the Instructional Strategies sub-dimension, the mean score of the teachers in the 21-30 age group was 33.800, with a standard deviation of 3.80, 33.100 and 3.95 in the 31-40 age group, and 32.200 and 4.00 in teachers aged 41 and above. The F value calculated for this dimension is 2.55 and the P value is 0.02, indicating a statistically significant difference between the age groups (  $p < 0.05$  ). The 21-30 age group (group 1) has a higher self-efficacy level compared to the 41 age group and above (group 3). When the general self-efficacy levels of teachers are evaluated, the total self-efficacy average of those in the 21-30 age group was calculated as 98.100, those in the 31-40 age group was 97.100 and the 41 age group and above was 94.300. The F value calculated for this dimension is 2.45 and the P value is 0.008, indicating a significant difference between the age groups (  $p < 0.01$  ). In summary, significant differences were found between the age groups in the Classroom Management, Instructional Strategies and General Self-Efficacy dimensions. It is observed that the self-efficacy levels of teachers in the younger age group are higher. In the dimension of Ensuring Student Participation, no significant difference was found between age groups (  $p > 0.05$  ).

**Table 6.** Comparison of Teacher Self-Efficacy According to Professional Seniority

Sub Dimension	Group	N	X	SS	Sd	KO	F	P
<b>Ensuring Student Participation</b>	1-5 years	25	31,200	4.10	69	0.14	2.05	0.06
	6-10 years	27	31,800	4.30	69	0.15		
	11 years and above	20	30,500	4.50	69	0.16		
<b>Classroom Management</b>	1-5 years	25	32,700	4.40	69	0.18	2.75	0.008
	6-10 years	27	33,200	4.25	69	0.17		
	11 years and above	20	31,900	4.35	69	0.19		

Sub Dimension	Group	N	X	SS	Sd	KO	F	P
<b>Instructional Strategies</b>	1-5 years	25	33,500	3.90	69	0.12	2.45	<b>0.03 &gt;1-3</b>
	6-10 years	27	34,100	3.95	69	0.13		
	11 years and above	20	32,600	4.10	69	0.14		
<b>Total</b>	1-5 years	25	97,400	11.20	69	0.11	2.55	0.006
	6-10 years	27	98,600	10.90	69	0.10		
	11 years and above	20	95,000	11.30	69	0.12		

The study examined whether teacher self-efficacy levels differ according to professional seniority. In the sub-dimension of Ensuring Student Engagement, the mean score ( X ) of teachers with 1-5 years of seniority was determined as 31.200, its standard deviation ( SD ) was 4.10 and its degree of freedom ( Sd ) was 69. These values were calculated as 31.800, 4.30 and 69 for teachers with 6-10 years of seniority, respectively, and 30.500, 4.50 and 69 for teachers with 11 years of seniority and above. The F value calculated in this sub-dimension was 2.05 and the P value was 0.06, and there was no statistically significant difference (  $p > 0.05$  ). In the sub-dimension of Classroom Management, the mean score of teachers with 1-5 years of seniority was 32.700, its standard deviation was 4.40 and its degree of freedom was 69. For 6-10 years of seniority, these values were calculated as 33.200, 4.25 and 69, and for 11 years and above seniority, they were calculated as 31.900, 4.35 and 69. In this dimension, the F value was 2.75 and the P value was 0.008, indicating that there was a significant difference between professional seniority groups (  $p < 0.01$  ). It was observed that especially teachers with 6-10 years of seniority had higher self-efficacy perception in terms of classroom management. In the Instructional Strategies sub-dimension, the mean score of teachers with 1-5 years of seniority was 33.500, the standard deviation was 3.90, 34.100 and 3.95 for those with 6-10 years of seniority, and 32.600 and 4.10 for teachers with 11 years of seniority and above. In this dimension, the F value is 2.45 and the P value is 0.03, indicating a statistically significant difference between the professional seniority groups (  $p < 0.05$  ). It can be said that teachers with 6-10 years of experience have higher self-efficacy perception in instructional strategies. When the general self-efficacy levels of teachers are evaluated, the total self-efficacy average of teachers with 1-5 years of experience was calculated as 97.400, those with 6-10 years of experience as 98.600 and those with 11 years of experience as 95.000. In this dimension, the F value is 2.55 and the P value is 0.006, indicating a significant difference between the professional seniority groups (  $p < 0.01$  ). In summary, significant differences were found in the Classroom Management, Instructional Strategies and General Self-Efficacy dimensions in terms of professional seniority. It is seen that teachers with 6-10 years of experience generally have higher self-efficacy perception. However, no statistically significant difference was found between seniority groups in the dimension of Ensuring Student Participation (  $p > 0.05$  ).

## 5. CONCLUSION AND RECOMMENDATIONS

Within the scope of the research, the self-efficacy levels of science teachers were generally found to be high. It was observed that teachers felt more competent, especially in the field of instructional strategies; they also had similarly positive perceptions in the dimensions of ensuring student participation and classroom management. In the analyses made according to gender, it was seen that the mean self-efficacy scores of female teachers were higher than those of male teachers; however, this difference was not found to be statistically significant. In the comparisons made according to graduation status, it was found that the scores of teachers with postgraduate education were higher, however, it was determined that this difference was not statistically significant. In the analyses made according to the age variable, it was concluded that there were significant differences in the levels of classroom management, instructional strategies and general self-efficacy of teachers depending on their age. It was noted that younger teachers had higher self-efficacy perceptions in these areas. When evaluated according to professional seniority, it was determined that teachers with 6-10 years of experience had higher levels of self-efficacy perceptions in the areas of classroom management, instructional strategies and general self-efficacy, and these differences were statistically significant. However, no significant difference was found in the dimension of student participation in both age and seniority variables.

The results show that the self-efficacy levels of science teachers are generally positive; however, they indicate that some demographic and professional variables may be determinative on these perceptions. In this context, it can be said that there is a need for practices and educational policies that will support the professional development of teachers.

At the end of the research, the following recommendations were prepared:

- In-service training programs should be diversified. Practical and interactive training should be provided to develop the professional competence of teachers with lower self-efficacy levels, especially in the sub-dimensions of classroom management and instructional strategies.



- A supportive professional environment should be created in schools. Teachers can feel competent not only through their individual efforts but also through the support of school administration and colleagues. Therefore, a school culture based on collaboration should be strengthened.
- Teacher training programs should be reviewed. Teacher candidates should be given more experience, especially in practical skills such as classroom management and student participation.
- Similar studies should be repeated with different sample groups. Since this study is limited to science teachers working in TRNC, similar studies to be conducted in different regions and different branches may provide more comprehensive results regarding teacher self-efficacy.
- Individual development tools should be used to increase self-efficacy levels. Self-assessment forms, digital development tracking systems and personalized learning plans that will increase teachers' self-awareness should be disseminated.

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