ELECTRONIC JOURNAL FOR RESEARCH
IN SCIENCE & MATHEMATICS EDUCATION
VOL. 30, NO. 1, 23-42

Longitudinal Investigation of Pre-service Science Teachers' Future Career Expectations during a Teacher Education Program

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ABSTRACT

The purpose of this study is to examine the future career expectations of 86 Turkish pre-service science teachers at the beginning and graduation stages of a four-year teacher education program. The research design included both the longitudinal (within-subject) and between-subject differences by investigating whether future expectations changed over the four-year time period, and according to participants' gender, and orientation toward the teaching profession. The explanatory-sequential mixed-method design was used in the study, where a panel study was employed in the initial quantitative data collection phase. The quantitative data were collected with the Future Expectations Scale, whereas the qualitative data were obtained through open-ended questions and semi-structured interviews. The findings indicated that the future career expectations of participants were generally positive. These expectations did not differ by participants' gender and semester (freshman-senior) of the teacher education program; however, teaching career-oriented participants were found to have more positive future career expectations than their non-teaching career-oriented peers. The qualitative data indicated that the majority of the participants were willing to be immediately appointed as science teachers after graduation but many of them possessed pessimism due to their concerns about the Turkish teacher appointment system and stated that they unwillingly postponed the start of their teaching career. Based on the semi-structured interview data, some participants were found to hold fears about their future. The most common fears were classified as being afraid of experiencing disappointment, burnout, and failure of facing a generation gap after a certain time.

Keywords: Pre-service science teacher; future career expectation; longitudinal study; panel study; career orientation

Introduction

Improving the systemic and humane elements of educational systems is a common educational reform target for many countries throughout history to increase the quality of education (Plecki et al., 2012). Teacher quality is one of the major factors for improving the quality of education; directing qualified and willing candidates to the teaching profession is critical (Eren, 2012a; Organization for Economic Co-operation and Development [OECD], 2005). However, a significant number of qualified candidates who enter teacher education programs do not complete these programs due to their personal preferences, or quit the profession within a short time after starting teaching (Gallant

& Riley, 2014; Kyriacou & Kunc, 2007; Peters et al., 2017). Common reasons for this attrition are shown as the content and difficulty level of the teacher education programs, social environment (Meens & Bakx, 2019), negative learning or teaching experiences, financial problems (Lin et al., 2016), declined interest in teaching, and other personal problems (Ryan et al., 2024).

The major reasons for the shortage of qualified teachers are reported as limited numbers of qualified candidates entering teacher education programs, teacher candidates giving up during these programs, some graduates who do not start teaching at all, and many new teachers leaving the profession early in their career (Lunenburg, 2011; Rots et al., 2012; van Rooij et al., 2019). Thus, to be able to make long-term predictions about the future of the teaching profession, the motivations of pre-service teachers and their career goal orientations bear great importance (Thomson & McIntyre, 2013). In this context, this study aimed to examine pre-service teachers' future expectations longitudinally over a four-year program and to address whether career expectations change over time.

Goal Orientation

Goal orientations can be defined as an individual's mental representations of a desired future state (Rüprich & Urhahne, 2015). Goal orientations play decisive roles in many aspects during decision-making and goal-reaching processes. According to the goal-attainment theory, individuals with a goal begin to perceive their environment with a goal-oriented perspective (Thomson & McIntyre, 2013). The importance placed on any phenomenon, the effort exerted on the subject, and perseverance until the target is met, are closely related to future expectations, which are shaped by goal orientations (Çetin & Eren, 2019). People with more positive future expectations are likely to place more importance on situations that they believe will lead to a positive result, apply more effort towards being successful, and strive to achieve success by persevering, even in cases of failure (Arslantaş, 2021). For this reason, one of the most important sources of motivation for any subject is an individual's future expectations about that subject (Rüprich & Urhahne, 2015).

Future Expectations and Teaching Profession

Since the choice of personal profession is one of the main determinants of one's future social status, it is perhaps the most important individual decision where future expectations dominate (Ekinci, 2017). While choosing a profession, individuals tend to make decisions that will satisfy them in different aspects in the future (Eren, 2012b). This situation manifests itself in the choice of the teaching profession as well (Anthony & Ord, 2008; Yavuz Tabak et al., 2021). Therefore, one of the most important indicators of prospective teachers' opinions about their profession is their future career expectations.

Prospective teachers who have more positive future career expectations are likely to aim to work as more willing teachers for a long period (Aydin & İşlek, 2021; Lysaght et al., 2018). For example, prospective teachers with positive attitudes towards teaching stated that when sufficient working conditions are provided, they would not consider low wages a problem (Lysaght et al., 2018; Manuel & Hughes, 2006). Teacher candidates have also expressed that their enjoyment of the teaching profession would be more dominant, even in anxious situations they might encounter in the future (Eren, 2014). It is also noteworthy that a significant portion of teacher candidates with unrealistic/low future career expectations are reported to either leave teacher education programs or leave the profession in a short time after starting teaching (Purcell et al., 2005; Wilhelm et al., 2000). For example, especially in developed countries such as the UK and the USA, a significant portion of qualified teacher candidates do not complete teacher education programs after enrolling, and about half of those who start teaching leave within the first five years in the profession (Kyriacou & Kunc, 2007; Lunenburg, 2011; Manuel & Hughes, 2006; Struyven & Vanthournout, 2014). It is also reported

that many teachers in the workforce do not plan to remain in the profession for the long term, and some teachers plan to retire earlier than the anticipated retirement age (Lysaght et al., 2018; Peters et al., 2017).

The effects of negative future expectations for the teaching profession are mostly studied in developed countries; but since this problem is not unique to developed countries, it should be considered a global problem. The most important reason these problems are not adequately discussed in other developing or undeveloped countries is the lack of relevant scientific studies and the lack of focus on the effectiveness of teacher education programs (Eren, 2012b). Based on these gaps in the related literature, this study focused on the future career expectations of pre-service science teachers (PSTs) in Turkey.

Science Teacher Recruitment in Turkey

Teacher training in Turkey is carried out in universities under the regulations of the Council of Higher Education (CHE), which is the sole decision-making authority for all Turkish universities. Similar to the other majors, a common science teacher education program prepared by the CHE is used in all Turkish universities.

Turkish student selection for undergraduate programs is based on a centralized exam that is administered annually to high school graduates. Based on their central exam scores, individual preferences, and program quotas, candidates are entitled to enter undergraduate programs. Science teacher education programs in Turkey require completing four-years of coursework. Graduates earn their science teaching degree in 5-8th grade science courses at middle schools. In the first two years, Turkish PSTs take basic science (Biology, Chemistry, Physics) and science laboratory courses. In the third and fourth years of the program, specialized science courses (Anatomy, Astronomy, Ecology, Evolution, Geology, etc.) and science education methods courses are taken concurrently. During the four-year coursework, PSTs also take general education courses such as Introduction to Education, Educational Psychology, Teaching Principles and Methods, Measurement and Evaluation, and Classroom Management. In the fall semester of their senior year, PSTs enroll in the School Experience course to make observations at schools followed by the Teaching Practicum course in their final spring semester, which requires teaching 5-8th grade science courses under the supervision of an experienced middle school science teacher.

Graduates of science teacher education programs become entitled to work in private and state middle schools affiliated with the Turkish Ministry of National Education (MNE). The primary employment area for the majority of the Turkish teacher candidates is state schools. A vast majority of Turkish PSTs primarily prefer state schools over private schools because of better working conditions and long-term job security (Cheema et al., 2025; Ergen & Çokkeser, 2022).

However, Turkish PSTs cannot be directly assigned to state schools. To be assigned to a state school, graduates must be successful in the Public Personnel Selection Exam (PPSE), which consists of two different exams. The first exam of the PPSE consists of educational sciences/general ability topics and the second exam of the PPSE measures content area/teaching methods knowledge covering the whole four-year undergraduate teacher education program coursework. Both PPSE exams are conducted on separate sessions during the summer period, and the candidates earn a combined total PPSE score. The first requirement for continuing the appointment process is a higher PPSE score than the minimum score, which is announced for candidates annually. In the following stage, candidates who satisfy the minimum PPSE scores are interviewed by a group of "experts" selected by the MNE. It is not unusual that even the national champions of the PPSE get very low scores from the interviews, which brings questions about the validity of these interviews (Berk, 2025). With the addition of interview scores, final appointment scores are calculated. Based primarily according to their total PPSE scores and the number of open positions and secondarily on candidate

personal preferences, candidates prepare a preference list for the announced positions in different sites throughout the country (mostly in the poorer eastern regions and rural areas). Teacher appointments are completed centrally by the CHE and MNE. The score superiority for each position is the criterion, and candidates with sufficient scores are appointed to state schools (MNE, 2021, 2022, 2023, 2024).

The Turkish teacher-appointment system has been transformed in recent years, but serious problems are still present, mostly due to imbalance between the high number of graduates from teacher education programs and very-limited available teaching positions. Table 1 shows the number of pre-service teachers (all education majors and science education majors) who applied to the PPSE between 2020 and 2023, as well as the officially announced state quotas in these years, and the percentages of quota values to the total numbers in the relevant years (MNE, 2021, 2022, 2023, 2024).

Table 1

The Distribution of PPSE Applicants and Appointment Quota for Turkish State Schools between 2020 and 2023

Year	# of Applicants (All Majors)	Appoint. Quota (All Majors)	%	# of Applicants (Science)	Appoint. Quota (Science)	%
2020	471 506	19 940	4.2%	19 410	996	5.1%
2021	400 842	19 969	5.0%	17 941	480	2.7%
2022	476 974	44 890	9.4%	18 412	2064	11.2%
2023	572 019	20 000	3.5%	18 345	305	1.7%

As seen in Table 1, the appointment percentages of Turkish pre-service teachers change between 3.5% and 9.4% overall and 1.7% and 11.2% for science education majors. Since this supply-demand imbalance has been continuing for many years, more than 90% of Turkish science teacher candidates cannot be appointed upon graduation. Compared to the growing number of candidates awaiting appointment, the limited quotas for recruitment causes prospective teachers to experience intense anxiety regarding the appointment process (Atav & Sönmez, 2013; Berk, 2025). It is inevitable that experiencing high anxiety in the very early stages of their career will negatively affect both the motivational levels and the future career expectations of Turkish PSTs.

Significance and Purpose of the Study

It is very likely that negative expectations or concerns about the teaching profession can negatively impact an individual's teaching career. One of these concerns is the expectations of pre-service teachers regarding the reality shock when they begin teaching at schools. The *reality shock expectation*, which is defined as the collapse of the ideals created before starting the profession due to the negativities encountered in real classrooms, negatively affects beginning teachers (Mahmood, 2013; McIntush & Garza, 2023; Veenman, 1984). In order to identify these negative effects, it is important to investigate pre-service teachers' beliefs about their future teaching career and determine their reality shock expectations.

However, the sources of these negative beliefs are not considered a priority educational problem in many countries, including Turkey, due to the lack of research related to the problems associated with teacher education programs (Eren, 2012b). Therefore, the effects of future career expectations on Turkish teachers' careers should be investigated in detail (Çetin & Eren, 2019; Eren, 2012a). Furthermore, in most of the previous studies, the teaching major variable is not held constant as a control variable and the problems of teachers and/or teacher candidates in different majors (elementary, history, mathematics, preschool, science, etc.) are studied together. This type of single-group study inevitably results in distorted results because of the impact of the teaching major variable as an extraneous variable. For example, in a study where 397 Turkish pre-service teachers' future expectations were investigated, the general conclusion was that the participants had positive expectations. However, the between-group comparisons indicated that PSTs had more anxiety about their professional future compared to their other major peers (Şahin, 2009). For this reason, when studying the future career expectations of teacher candidates, it is important to focus on specific majors, to be able to spot the problems that are unique to those majors (Smetana & Kushki, 2021; Torsney et al., 2023).

It is also common in previous studies that pre-service teachers' future expectations have been examined mostly by single snapshot studies. In the majority of these studies, participants' expectations are measured at a single point in time, either at the start or graduation stage of the teacher education program. In many of these studies, it was reported that pre-service teachers' pre-college expectations towards the teaching career significantly affected their attitudes towards teaching (Eren, 2012b; Malmberg, 2006; Thomson & McIntyre, 2013). Thus, studies carried out at graduation stage also reveal that limiting the study perspective to merely the program entrance stage does not provide adequate information (Eren, 2012b). It has been reported in several studies that pre-service teachers with unrealistic pre-college expectations, even if these expectations were positive, may experience significant problems during the teacher education program and their future career expectations may change in the negative direction (Lysaght et al., 2018; Rots et al., 2012; Sinclair, 2008). Like all other time-dependent variables, future expectations can change over time as a result of the experiences of an individual (Wall, 2016; Yavuz Tabak et al., 2021). In most countries, multiple-year university-level education is required for a teaching license, so similar to other time-dependent variables, future career expectations may change during teacher education programs. Ideally, it is expected for all teacher candidates to enter teacher education programs with positive expectations and improve those expectations leading up to graduation. This improvement can be considered as an indicator of the quality of the teacher education programs (Lysaght et al., 2018; Plecki et al., 2012; van Rooij et al., 2019; Wake & Bunn, 2016). However, in the relevant literature compared to the single snapshot studies, there is a lack of research on the change of the motivational states of teacher candidates during their university years (Eren, 2012b; Rots et al., 2012; van Rooij et al., 2019). Therefore, it becomes crucial to investigate how pre-service teachers' future career expectations change during their teacher education programs (Çetin & Eren, 2019; van Rijswijk et al., 2018; Wall, 2016).

Based on the research gaps in the related literature, this study aimed to contribute to the literature by focusing on a group of Turkish pre-service science teachers (PSTs), a major that has not been studied in the previous literature as a special group in the area of future career expectations, and also by longitudinally investigating the changes in future expectations during a four-year teacher education program.

This study has been designed to investigate the following research questions:

1. Do Turkish pre-service science teachers' (PSTs') career expectations change during their teacher education program according to their (i) stage (beginning or graduation) in the program, (ii) gender, and (iii) being teaching or other career-oriented?

2. What are the views of Turkish pre-service science teachers (PSTs) about their future teaching career?

Methods

Research Design

This study was designed as an explanatory-sequential mixed-method study, which uses quantitative data to identify situations and then explain the causes of the situations by using qualitative data (Creswell & Plano-Clark, 2011). In the quantitative data collection phase, a panel study, a longitudinal design investigating the time-dependent changes on the same sample, was used. Despite the threat of participant attrition due to the long time it requires, panel studies have the highest validity among other longitudinal research designs because the data is collected from the same participants (Fraenkel & Wallen, 2003).

As part of the panel study, data from the same participants were collected in the first and final semesters of a four-year science teacher education program. In both data collection phases, participation in the study was voluntary through written and verbal consents. In the final semester data collection, participants were asked whether they volunteered for interviews to be held in the continuation of the study. Semi-structured interviews were conducted with a purposively selected group from consenting participants. The qualitative data obtained from the interviews and quantitative data were analyzed comparatively.

Participants

The participants of the study were 86 PSTs enrolled in a four-year undergraduate science teacher education program at a state university in Turkey. As a requirement of the panel design employed, the selection criterion for the participants was participating in both first and final semester data administrations. All participants in both data collection occasions were informed that participation in the study was voluntary and provided a written consent. Initially, there were 105 participants in the first-semester study, whereas 98 PSTs participated in the final-semester data administration.

Among these participants, 86 participated in both administrations due to student mobility during the four-years period of the study. 79% (n=68) of the participants were females and 21% (n=18) were males. Interestingly, mostly due to long-standing problems in Turkish university entrance and teacher appointment systems as well as limited teacher appointment quotas in Turkey, only 37% (n=32) of participants indicated teaching as their ideal pre-college profession, while 63% (n=54) of participants' ideal careers were other than teaching. The distributions of the participants by gender and pre-college career orientations are summarized in Table 2.

Table 2

The Distribution of the Participants by Gender and Pre-College Career Orientation

	Pre-College Career Orientation		**Total**
Gender	**Teaching**	**Other**	
Female	25	43	68
Male	7	11	18
Total	32	54	86

Participants for interviews were selected via the maximum-variation sampling technique (Patton, 2002) using participants' pre- and post-Future Expectations Scale (FES) scores. To satisfy maximum-variation criteria, participants with maximum FES score changes (increments/ decrements) and participants with minimal or no FES score changes were identified. Using these criteria, a total of 14 interview participants were selected. The FES score changes of the interview participants are summarized in Table 3.

Table 3

FES Score Changes of Interview Participants

Change Type	Pre-FES	Post-FES	Id
Positive Change	3.1	3.9	P_{34}
	2.4***	3.0	P_{09}
Negative Change	4.0*	2.6	P_{79}
	4.0*	3.1	P_{05}
	3.5	2.9	P_{39}
No Change/Minimal Change (Positive-Positive)	4.0*	4.0*	P_{28}
	3.9	3.9	P_{29}
	3.7	4.0*	P_{66}
No Change/Minimal Change (Moderate-Moderate)	3.3	3.4	P_{13}
	3.1	3.5	P_{71}
	3.3	3.1	P_{84}
No Change/Minimal Change (Negative-Negative)	2.2**	2.2	P_{43}
	3.0	2.8	P_{58}
	2.4***	2.7	P_{69}

*The maximum score that can be obtained from the FES
** The minimum score obtained among all participants in the pre-FES
*** The second-lowest score among all participants in the pre-FES

Data Collection Tools

In this study, the Future Expectations Scale (FES) developed by Bursal and Buldur (2013) was used in both data-collection administrations, at the beginning (as pre-test) and end of the four-year science teacher education program (as post-test) to investigate the longitudinal change of participants' future career expectations. The FES has a single-factor structure and consists of 10 (6 positive/4 negative) items. FES items can be responded to using a four-point Likert scale (1*: Strongly Disagree, 2: Disagree, 3: Agree, 4: Strongly Agree*). The raw data from the negative FES items were reverse coded and mean FES scores for each participant were calculated by dividing their total scores by the number of items. Thus, FES scores were standardized to vary between 1-4, where a high FES score (close to 4) indicates positive expectations. Bursal and Buldur (2013) reported the Cronbach coefficient for FES as α=.82. In this study, Cronbach α=.80 for the pre-FES data and α=.87 for the post-FES data were calculated. According to the reliability data, it was concluded that both the pre- and post-FES data of the participants were reliable.

Demographic data were collected with a personal information form designed by the researchers. In the second stage of the study, audio-recorded semi-structured interviews, focused on the participants' opinions and expectations about their future teaching career, were conducted by the two authors with 14 volunteer participants.

Data Analysis

The first research question, focused on the longitudinal change of the participants' future expectations in different sub-groups, was investigated using quantitative data analysis techniques. While investigating the first research question, since both between-subject effects (gender, teaching career orientation) and within-subject effects (pre-FES to post-FES score change) should be taken into account, a 2*2*2 Mixed-Effects Repeated-Measures ANOVA model was used. In addition to the main effects of each variable, the second- and third-level interaction-effects of the inter-group factors (gender, teaching career orientation) and the within-subject factor (time) were also included in the mixed-effects model. The statistical significance level was selected as .05, and when a statistical significance was determined, partial eta-square effect size values were also reported to interpret the practical significance of the results.

The data collected through semi-structured interviews for the second research question, the participants' views about their future teaching career, was analyzed using categorical content-analysis (Bilgin, 2006; Patton, 2002). During the analysis process, data was firstly coded and themes and categories were created based on these codes. Secondly, the themes were arranged according to weighted-frequency values and findings were defined. The detailed-description method was used to ensure the credibility of the analysis process and the findings obtained from the interviews were explained with direct quotations from participants. To clarify the original meanings, when needed in the translation of quotes from Turkish to English, explanations by authors are provided in brackets.

Results

Within the scope of the first research question, the pre-, post-, and overall-FES (the mean score of the pre- and post-FES) scores of the participants are given in Table 4. Due to the missing response data of four participants to any FES items in either pre- or post-FES applications, the longitudinal model was analyzed with the data from 82 participants.

Table 4

Participants' Pre-FES and Post-FES Scores

Variable	Category		Pre-FES		Post-FES		Overall-FES	
		n	$\bar{X}$	s	$\bar{X}$	s	$\bar{X}$	s
Gender	Female	65	3.4	0.4	3.4	0.5	3.4	0.4
	Male	17	3.4	0.3	3.1	0.7	3.2	0.4
Career Orientation	Teaching	30	3.5	0.3	3.5	0.4	3.5	0.3
	Other	52	3.3	0.5	3.2	0.6	3.3	0.4
	General	82	3.4	0.4	3.3	0.5	3.3	0.4

As seen in Table 4, compared to possible maximum FES score of 4.00, the mean FES scores of the participants are generally high. Thus, it can be concluded that future expectations of participants in all sub-groups are positive, both at the beginning and at the end of the science teacher education

program. As for the between-group differences, the mean pre-FES scores of the sub-groups are quite close to each other; however, post-FES scores indicated a larger gap between the sub-groups. Post-FES scores of females were slightly higher than males; and similarly, post-FES scores of teaching-oriented participants are found to be slightly higher than those with other career orientation. Longitudinal analysis of the pre- to post-FES scores indicates that the mean FES scores did not increase in any of the sub-groups during the four-year period, and even a slight decrease was observed in some sub-groups. For example, while the agreement rate for the FES item *"Even if I start teaching, I don't think I will stay as a teacher for a long time " (Item 3)* was 92% in the pre-test, the agreement rate decreased to 81% in the post-test. Similarly, compared to the 95% pre-test agreement rate for the FES item of *"I believe, I will love teaching (Item 2)*", the agreement rate for the same item was 91% in the post-test.

The findings from the 2*2*2 Repeated-Measurements ANOVA for Mixed-Measures model, which tests both the longitudinal variation of the participants' FES scores in the overall group and the sub-groups during the four-year period (within-subject effects), as well as compares whether overall-FES scores differ by participants' gender and career orientation (between-subject effects), are shown in Table 5.

Table 5

Test Statistics for the Effects Examined in the Repeated-Measures ANOVA for Mixed-Measures Model

Effect Type	Effect	df	*F*	*p*
Within-subject	Time	1	2.09	.152
	Time*Gender	1	2.24	.139
	Time*Teaching Career Orientation	1	3.54	.064
	Time*Gender*Teaching Career Orientation	1	3.85	.053
Between-subject	Gender	1	2.03	.159
	Teaching Career Orientation	1	7.66	<.01
	Gender*Teaching Career Orientation	1	0.90	.346

Table 5 data indicates that none of the within-subject effects examined in the repeated-measures model were statistically significant. In other words, there was no significant change in participants' FES scores (for all sub-groups) during the four-year science teacher education program. However, it is noteworthy that the "time*gender*teaching career orientation" interaction effect (p=.053) has a borderline trend, which indicates that there may be complex interactions between gender, career orientation, and time in shaping participants' career expectations. Among the investigated between-subject effects, while the main-effect of the gender variable and the interaction-effect of the "gender* teaching career orientation" were not significant, the teaching career orientation variable was found to have a significant main effect on the overall FES scores. Based on this finding, it can be concluded that teaching-oriented participants have significantly higher FES scores than those with other career orientations. The partial eta-square value calculated for this main effect ($\eta^2_{Partial}$=.08) shows that teaching career orientation has a moderate effect on the future career expectations of PSTs.

To investigate the second research question, semi-structured interviews were conducted with 14 participants at the graduation stage. During interviews, participants were asked about their future expectations after graduation from the science teacher education program and their views on their

future teaching life. The interview data were analyzed via categorical content analysis (Ely et al., 1998), where transcripts were read independently by the researchers and meaningful parts of the data were coded according to predetermined concepts as well as new concepts derived from the data. After the coding process, data themes were determined by the consensus of the two researchers and meaning units were placed under the themes. The frequency of each unit was calculated, and direct quotations were used to reflect the findings more convincingly.

Responses of the participants were analyzed and coded under the themes of "Opinions Regarding the Appointment Process" (see Table 6) and "Concerns Regarding the Future Teaching Career" (see Table 7). The categories and sub-categories, related to the opinions of the participants about the science teacher appointment process after graduation are shown in Table 6.

Table 6

Opinions of the Participants about the Appointment Process after Graduation

	f	%	Participant
Hopeful for Appointment in the first year	4	29%	P_{13}, P_{39}, P_{66}, P_{71}
Hopeful for Appointment in the next years	4	29%	P_{29}, P_{43}, P_{79}, P_{84}
Pessimistic for Appointment	6	42%	P_{05}, P_{09}, P_{28}, P_{34}, P_{58}, P_{69}

As can be seen in Table 6, participants' opinions on the science teacher appointment process in Turkey are grouped under the categories of "hope of appointment". When interview participants' statements were examined, nearly 60% (8 of the 14) of them were hopeful for the appointment, while nearly half of them (6 of the 14) stated that they were pessimistic about being appointed as a teacher. It is interesting that among the hopeful participants, only half of them are hopeful for being appointed in the following year after graduation. On the contrary, the other half of those hopeful participants postponed their appointment hope to the next years. Some sample responses for each sub-category are provided below.

> *I want to be hopeful. I don't think anything will change when you become pessimistic. Will the result be with an interview [for being appointed as a teacher] or whatever… (P_{13})*
> *My only dream is to work in state schools. If it doesn't happen this year, I believe it will happen next year. Because I think I have created a good background this year. (P_{29})*
> *I am very pessimistic. The education we receive here isn't enough for the PPSE. (P_{58})*

Based on these findings, the optimism of the majority of the participants for being assigned as science teachers can be considered a positive finding, in terms of their motivation toward teaching. However, it is alarming that almost half (n=6) of the 13 PSTs who are willing to be appointed are pessimistic about being appointed. Moreover, it is noteworthy that half of the participants feel obliged to postpone their hopes to the following years.

During the interviews, 12 of 14 participants explicitly expressed their concerns about their future careers. Thus, the categories and sub-categories within the "Concerns Regarding the Future Teaching Career", which is defined as the second theme regarding the future expectations of the participants, are given in Table 7.

Table 7

Concerns of the Participants about Their Future Teaching Career

		f	%	Participants
Concerns Regarding the Appointment Process	Central exam (PPSE)	3	21%	P_{28}, P_{29}, P_{58}
	Appointment interview	2	14%	P_{28}, P_{29}
	Lack of preparation for the central exam (PPSE)	4	29%	P_{09}, P_{43}, P_{79}, P_{84}
	Inadequacy of teacher education program	2	14%	P_{43}, P_{58}
	Concerns of not being appointed	1	7%	P_{34}
	Uncertainties in the process	2	14%	P_{69}, P_{84}
Concerns Regarding the Teaching Career	Possibility of boredom/disappointment	3	21%	P_{13}, P_{69}, P_{84}
	Generation gap after a while	2	14%	P_{58}, P_{71}
	Failure in the profession	2	14%	P_{29}, P_{43}
	Inability to communicate with students	1	7%	P_{05}
	Experiencing burnout	1	7%	P_{34}

As seen in Table 7, participants' concerns regarding their future are grouped under two categories as "Concerns Regarding the Appointment Process" and "Concerns Regarding the Teaching Career". Participant responses under the "Concerns Regarding the Appointment Process" category indicate that while they hold hopes and they are willing to be appointed as science teachers, the majority of the interview participants have several concerns regarding their future. Some of these concerns are related to the insufficiency of the education they received at the university but many more of them stem from the Turkish state procedures about the teacher-appointment process. For example, compared to the high number of qualified teacher candidates, the limited quotas allocated for teacher appointments, as well as the written exam (PPSE) and the interview requirements, were found to cause many of these concerns. Some sample participant statements clearly explain the sources of Turkish PSTs concerns about their future.

> *I am afraid! Because we didn't receive information about the PPSE for four years. Because the PPSE also includes questions out of our major. We can do the questions from our major, we are not at a sufficient level. (P_{28})*
> *The PPSE and then interview. I think the interview is ridiculous. Because interview means injustice. The questions they ask in the interviews include politics. If you find someone [in charge], you can be appointed that way. Because I would work for four years, for the PPSE day and night. I would get 80; then, they will lower my score in the interview. (P_{29})*
> *The PPSE is a big problem, so I'm very afraid. I don't know what will happen because they also require an interview. I think there will be different things [being asked in the interviews], other than our knowledge. (P_{09})*
> *The education we received here isn't enough for the PPSE. There has to be extra support. (P_{58})*

I work hard and I believe that I will get rewarded for it. But it is possible that appointment process may be long. (P_{34})
There are problems in terms of the appointment and recruitment of teachers in our country. In my last year, I couldn't follow up the teaching practicum, university courses, and the PPSE preparation together. When the PPSE will be my only focus, I think I will succeed. About the appointment, why not when you work with devotion. (P_{84})

As seen in Table 7, other than their concerns about the teacher-appointment process, some participants have some concerns about their future teaching life. The sub-categories under the "Concerns Regarding the Teaching Career" reveal that some of the participants have concerns about being bored or being disappointed with teaching in the future. Some participants were concerned about facing a generation gap between them and their students after a certain time. Another concern was feeling anxious about failing in the profession and/or being unable to communicate with their students. One participant was worried about experiencing professional burnout, a situation she had observed in her teaching practicum teacher. The following interview quotes clarify participants' concerns.

If I get bored too much, I can do other jobs. (P_{13})
People have different interests in the future when there is a marriage or something... I think I won't lose my excitement in the first 5, 10 years. Human nature is suitable for easily getting bored of things. 10 years is a very sufficient time for me. (P_{84})
… after I get older, there will be quite a generation gap between us and the new generation. So we have to do something to fix it. When the retirement age comes, I think we should retire. (P_{58})
[During the teaching practicum] I thought for a moment that I couldn't be very patient with students. I guess it will settle down with time but I suddenly became like this. I became anxious because students don't understand from saying "stop or be quiet". (P_{29})
In terms of student relations, I can communicate easier with someone who is close to my culture. I have difficulty communicating with a person who is distant from my culture. (P_{05})
There were teachers who were in their 10^{th} and 20^{th} years in the job. They got tired of it. They didn't even communicate with the students anymore. They stopped greeting [students]. If I am going to be such a teacher, I definitely don't want to be appointed at all. I think that I will be always excited and like my job. (P_{34})

Based on the Table 7 data and participant quotes, it is clear that almost all of the interview participants have concerns about the appointment process and/or their future teaching career. Among the sources of concerns, it is vastly apparent that the central written exam (PPSE) that is required as the first step of the appointment process and the compulsory interview after the PPSE worry Turkish PSTs. Moreover, many of the participants also experienced concerns about their future teaching career, most of which are about failure in teaching and staying in the job only for a limited period.

Discussion

In the first research question of this study, the longitudinal change during a four-year science teacher education program of a group of Turkish PSTs future career expectations toward the teaching profession was investigated. The research model also included sub-groups formed by gender and participants' career orientation. From the analysis, future career expectations of Turkish PSTs were found to be positive both at the beginning and graduation stages of the teacher education program. No significant change in these expectations was determined in the four-year period. These results are consistent with similar studies conducted in Turkey, where Turkish PSTs were reported to hold positive future career expectations (Aydin & İşlek, 2021; Buldur & Bursal, 2015; Bursal & Buldur,

2016) and positive attitudes towards teaching (Akıllı & Seven, 2010). Having positive expectations both at the beginning and at the end of a teacher education program is desirable since a significant number of teacher candidates with low career expectations are reported to leave the teacher education programs or the teaching profession after appointment (Purcell et al., 2005; Wilhelm et al., 2000). Therefore, having high future career expectations causes the participants of this study to expect that they would enjoy the teaching profession (Ekinci, 2017; Lysaght et al., 2018).

Between-subject comparisons on FES scores indicated that there was no significant difference in future career expectations of Turkish male and female PSTs. On the other hand, compared to their peers, teaching-oriented Turkish PSTs were found to hold more positive future career expectations. Also, while the "time*gender*teaching career orientation" interaction effect was not found as statistically significant, the near-significance result (p=.053) points to a nuanced relationship that might warrant further exploration of these variables in a larger or more diverse sample.

The conclusions about the statistical effect of the career-orientation variable are in line with the results of the majority of related studies since it is normally expected that teacher candidates, who consider teaching as their ideal profession will develop more positive attitudes towards the profession. Consistent with this expectation, researchers from both Turkey (Buldur & Bursal, 2015; Ekinci, 2017) and other countries (Gallant & Riley, 2014; Malmberg, 2006; Thomson & McIntyre, 2013) repeatedly verified that pre-service teachers, who had chosen the teaching profession intrinsically, have more positive attitudes towards their future teaching career than those who choose the teaching profession for extrinsic reasons.

The finding that female and male Turkish PSTs have similar expectations is also consistent with results from relevant studies, reporting that Turkish pre-service teachers' future career expectations (Buldur & Bursal, 2015; Bursal & Buldur, 2013) and attitudes towards the profession (Akıllı & Seven, 2010) do not significantly differ in terms of gender. Accordingly, it can be concluded that Turkish female and male PSTs' future career expectations are at similar levels.

The second research question of the study investigated the future career expectations of the participants after graduation, through semi-structured interviews. Based on the interview data, the majority of interview participants are found to be willing and hopeful to be appointed as a teacher to Turkish state schools after graduation but nearly half of them were pessimistic about being appointed. It is striking that many of the hopeful participants stated they postponed their hopes of appointment (against their own will) to the next years. The possible reason for this unwilling postponement is the employment problem across the Turkish teacher community. Due to the ever-growing supply-demand imbalance between the number of licensed teacher candidates and limited quotas for teacher appointment, there are serious problems with teacher appointment at state schools. Some of the governmental practices (e.g. increasing number of education faculties and certificate programs, insufficient number of state schools) enhance this problem every year. This unwilling postponement of participants is also compatible with formerly-announced data (Table 1). Therefore, it is clear that more than 90% of Turkish PSTs will not have chance to be appointed to state schools in the year after their graduation.

The detailed investigation of the findings of this study reveals that negative future expectations of participants stem from various concerns. These concerns are mostly related to the teacher-appointment process in Turkey (e.g. PPSE central exam, compulsory interview, etc.). Compared to the number of teacher candidates waiting for an appointment, the very limited number of teacher quotas allocated for state schools result in teacher candidates' postponement of their appointment hopes, which is also a major anxiety source for many Turkish teacher candidates.

In many other studies conducted in Turkey, it has been underlined that PSTs have intense concerns about the teacher-appointment process (Atav & Sönmez, 2013; Berk, 2025; Deliveli & Ar, 2021). These concerns can create problems in two ways. Firstly, concerns about the appointment process negatively impact PSTs' motivation during the teacher education program. If they are not

likely to be appointed after graduation, PSTs' commitment to their program and teaching career may decrease, even though they had previously idealized teaching profession. It would not be realistic to expect teacher candidates to be fully committed to a teacher education program when they are aware that the probability of being appointed after graduation is very low. Based on these findings, it can be concluded that these types of anxieties experienced by Turkish PSTs are likely to hurt their commitment to teaching. The findings of Deliveli and Ar (2021), who studied a group of Turkish pre-service teachers, support this conclusion since nearly half of their participants stated that they would do "any job" if they were not appointed after graduation. The findings of this study join others (Atav & Sönmez, 2013; Deliveli & Ar, 2021) that showed Turkish teacher candidates experience high anxiety and several external factors may lead them lose their motivation toward the teaching profession.

The second source of anxiety for the participants of this study was their concerns about their future teaching careers. Participants were found to be worried about experiencing disappointment, not being successful, and not being able to effectively communicate with their future students. Some of them had concerns about experiencing burnout over time and facing generational differences with students. In the related literature, many studies agree that pre-service teachers both in Turkey (Akıllı & Seven, 2010; Şahin, 2009) and in different countries (Bruinsma & Jansen, 2010; Kyriacou & Kunc, 2007; Lunenburg, 2011) have such future concerns. By a detailed investigation of the concerns of the participants of this study, it can be argued that Turkish PSTs anxieties are mostly related to *reality shock*. Veenman (1984) described reality shock for novice teachers as *"*the collapse of the missionary ideals formed during teacher training by the harsh and rude reality of everyday classroom life*"* (p. 143). The findings of this study fit Veenman's definition in that some participants' concerns about their teaching career were related to experiencing reality shock. Reality shock should be taken seriously, and pre-service teachers should be more prepared for it because even the qualified teachers, who experience reality shock in their early careers, are reported to end up leaving the profession (Lunenburg, 2011; Lysaght et al., 2018; McIntush & Garza, 2023).

Conclusion

Based on the findings related to the two research questions of this study, it can be concluded that the future career expectations of Turkish PSTs were generally positive and that these positive expectations did not differ according to PSTs' gender and their stage (first and/or final semester) in the science teacher education program. The pre-college career-orientation variable was found to have a significant impact on participants' expectations, and teaching-oriented Turkish PSTs were found to have more positive future career expectations than their peers. Finally, based on the qualitative data of the study, most of the Turkish PSTs were found willing to be appointed as science teachers at state schools but due to their numerous concerns about the Turkish teacher-appointment system, as well as their concerns about their future teaching career, a significant amount of them were pessimistic about the future.

The results of this study are limited to 86 PSTs from a Turkish state university. As a limitation, this study group does not represent all Turkish PSTs; however, it should also be noted that the participants of this study are very similar to the general PST population in Turkey. Since university entrance in Turkey is conducted by a centralized written exam organized by the CHE, the entrance scores for the majority of Turkish science teacher education programs are very close across the country. Furthermore, the major coursework, excluding the electives, of science teacher education programs in Turkey are centrally determined by CHE. Thus, it can be argued that the participants in this study share similar academic backgrounds with the overall Turkish PST population.

This study contributes to the relevant literature by examining the longitudinal change of Turkish PSTs' future expectations; however, since this study is limited to a Turkish sample, similar studies in different countries are needed to develop a global perspective on the longitudinal change of

PSTs' expectations. Studies from various contexts will provide a deeper perspective to understand the impact of different cultural, regional, and socioeconomic factors on teacher candidates' expectations.

This study was started with 105 PSTs at the pre-test but 19 of them did not take the post-test due to quitting or transferring out of the teacher education program during the four-year period of the study. Therefore, the attrition threat, which is among the most common threats to the validity and reliability of longitudinal studies (Fraenkel & Wallen, 2003), has become another limitation of this study. To overcome this threat, the sample size was kept as large as possible at the planning stage of the study and completed with 86 participants, which is a satisfactory sample-size for a four-year panel study. Based on this experience, it can be suggested for future researchers to start their longitudinal studies with large samples to tolerate the attrition threat.

This study joins many others in showing that teaching career oriented PST's have more positive future expectations than their peers. This would seem a very straightforward finding; however, it indicates some major implications about university entrance and teacher-appointment systems. Also, while the findings of this study are limited to Turkish pre-service science teachers, based on the similarities of university entrance and the teacher appointment processes, the findings could interest the international teacher educator audience too. In countries that use high-stakes centralized exams in university entrance and/or teacher appointment systems, pre-service teachers could experience similar problems as the participants of this study. For example, researchers mostly from the East Asian countries, such as Bangladesh (Mamun et al., 2022), China (Davey et al., 2007; Huang, 2025), India (Srivastava & Dhamija, 2022), Japan (Zeng, 1995), and South Korea (Weidman & Park, 2000) point out that high-stakes testing in national university entrance systems causes serious problems during the selection of students to the appropriate college programs and would result in placing students to college programs that do not fit their ideal career choices. Moreover, it has been reported that harsh university entrance examination systems lead to many psychological problems for students, such as extreme anxiety, learned helplessness, and even suicidal thoughts (Davey et al., 2007, Mamun et al., 2022).

On the other hand, the negative impact of reality shock on beginning teachers seems to be a global problem. Researchers from various countries, such as China (Sun et al., 2024), Germany (Voss & Kunter, 2020), New Zealand (Mahmood, 2013), and United States (McIntush & Garza, 2023) report that present teacher education systems do not efficiently prepare pre-service teachers to handle reality shock when they start teaching in real life contexts.

In light of the findings of this study and the related literature, it is clear that PSTs in Turkey and in many other countries face reality shock even before graduating from the university and appointments systems solely based on high-stakes testing that is not effective (Huang, 2025). Thus, student selection system for Turkish science teacher education programs, as well as countries employing similar national university entrance exams, should utilize entrance criteria other than central exam scores to attract those who choose the teaching profession with realistic intrinsic motivations. For example, besides the central exam scores, additional requirements such as prior involvement in educational settings (e.g. volunteer services as teacher assistants, tutoring at schools or after-school programs, etc.), letters of recommendation indicating the focus of motivation toward teaching career, and structured interviews with educational value-based questions can be used to achieve this goal. Also, since the reality shock problem seems to be an inevitable fact for PSTs all over the world, arrangements should be made in science teacher education programs to provide gaining more experiences (e.g. increasing the number and credit of applied courses, planning school visits to enhance PSTs-student interaction, organizing seminars with supervising teachers, etc.) for PSTs to be able to prepare for the reality shock they may experience during their transition to the professional life.

Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

Ethical Declaration

In this study, scientific, ethical and citation rules were followed, and no falsification was made on the collected data.

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Appendix

Future Expectations Scale

The following items contain propositions regarding your teaching career. Please mark one of the options given for each proposition to indicate to what extent you agree/disagree with the situations described in the propositions.

	Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**
1. I am not sure that teaching would be a suitable profession for me.	☐	☐	☐	☐
2. I believe that I will enjoy teaching.	☐	☐	☐	☐
3. Even if I start working, I don't think I will stay as a teacher for a long time.	☐	☐	☐	☐
4. I believe that I will be a good teacher in the future.	☐	☐	☐	☐
5. I believe that I will communicate very well with my students as a teacher.	☐	☐	☐	☐
6. Even if it is not financially satisfying, I always want to work as a teacher in the future.	☐	☐	☐	☐
7. I am sure that contributing to the development of the society as a teacher will make me happy in the future.	☐	☐	☐	☐
8. If I have the opportunity to switch to another profession with better financial conditions in the future, I will quit teaching.	☐	☐	☐	☐
9. I think I will get bored while teaching.	☐	☐	☐	☐
10. I believe that the longer I teach, the more I will love my job.	☐	☐	☐	☐