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# Learning Analytics Applications in the Framework of Technological Leadership in Public and Private Schools\*

Serap Öz\*

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## Abstract

In an era where educational institutions are increasingly integrating technology to enhance teaching and learning, the effective use of learning analytics has emerged as a key strategy for informed decision-making. Technological leadership plays a critical role in fostering a culture that supports the adoption and implementation of these tools. The purpose of this study is to examine how learning analytics applications are integrated and utilized within the framework of technological leadership in public and private schools. Utilizing a phenomenological design and qualitative research approach, semi-structured interviews were conducted with 18 school administrators from diverse schools and educational levels in Istanbul over a period of six months. Data analysis was conducted using MAXQDA software. The findings indicate that the application of technological competencies and learning analytics remains limited, particularly in public schools, due to various factors. Notably, learning analytics tools are not fully understood, and there is a lack of effective software infrastructure to support their use, both of which emerge as significant barriers to their successful implementation. This study underscores the importance of enhancing technological leadership and infrastructure to facilitate the widespread adoption and effective use of learning analytics in schools.

**Keywords:** Technological leadership, learning analytics, school administrators

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## Introduction

The current era has ushered in a series of transformative shifts in educational technology practices. With the global job market increasingly poised to be shaped by the digital economy, alongside advancements in robotics, artificial intelligence, and automation, the education system worldwide faces the imperative to prepare for the Fourth Industrial Revolution. This evolving landscape necessitates that school leaders, including principals and teachers, remain agile and receptive to the rapid technological advancements reshaping the educational environment (Raman & Thannimalai, 2018). As posited by Chang (2012), school leaders who are proactive in adopting and integrating new roles as technology leaders will be best positioned to guide their institutions through the challenges of the future.

The global epidemic that emerged in 2020 has caused all activities, even in schools where education is provided in the most traditional ways, to be moved to digital environments such as Zoom, WebEx, MS Teams, and learning management systems (LMSs) such as Moodle, Blackboard, and Google Classroom have been adopted. This radical change marked the beginning of a period in which digital educational content was used more after the pandemic. Today, in many schools, online platforms are preferred in both education and management processes and much data is processed there. However, since such environments only provide platforms for e-interaction, effective methods that can be used to predict student behavior through online learning environments have accelerated the emergence and use of supportive tools for educators and metacognitive triggers for students (Siemens & Baker, 2019). The process that begins with obtaining the necessary evidence to make decisions by meaningfully analyzing the relationship between students and learning environments has emerged as learning analytics (Elias, 2011).

Learning analytics is broadly defined as the collection, analysis, and interpretation of data related to learners' activities and behaviors, with the aim of improving learning outcomes and optimizing the educational experience (Siemens & Long, 2022). The purpose of learning analytics is to apply the results of analyzing the data collected by monitoring and measuring the learning process. The feedback given as a result plays a very important role in organizing the learning process. Learning analytics applications enable students to find the most appropriate learning paths and provide important learning feedback in this context (Mittelmeier, Tempelaar, Rienties, & Nguyen, 2016). Analytical technologies, which are expected to become an indispensable element at all levels of education in the coming years (Alexander, Ashford-Rowe, Barajas-Murph et al., 2019), bring about the need for qualified personnel trained in this field. As a result of the technological transformation in education, school administrators need to develop their digital competencies in addition to traditional leadership skills for institutions to achieve their goals (Öz, 2020). Pardo and Teasley (2014) noted that with the transfer of learning activities to the electronic environment, how much time students spend in these environments, how effectively they use this time, where they can reach and how far they can progress, and which resources they access and benefit from being recorded.

In this way, learning analytics is gaining importance as a new field, as the relevant records can be accessed and analyzed very easily.

In recent years, there has been a growing disparity in educational opportunities and resources between private and public schools. These differences can directly affect students' learning processes and achievements. Learning analytics offers different approaches in terms of monitoring student performance, identifying individual needs, and customizing teaching methods in both types of schools. However, private schools generally have more resources and flexibility, which can make it difficult to implement equally effective solutions for students in public schools. Understanding the differences in learning analytics applications between private and public schools, which is aimed at this study, is an important step that will contribute to eliminating inequalities in education and ensuring social justice.

The purpose of this study is to examine the learning analytics applications in the framework of technological leadership in public and private schools. The research questions that arise in this context are as follows:

1. What are the opinions of school administrators working in public and private schools regarding technological leadership?
2. What are the opinions of school administrators working in public and private schools regarding the technology use in school administration?
3. What are the opinions of school administrators working in public and private schools regarding learning analytics applications in measurement and evaluation?
4. What are the opinions of school administrators about the obstacles that arise in the process of creating a learning analytics culture in public and private schools?
5. What are the suggestions of school administrators in public and private schools regarding the establishment of a culture of learning analytics in schools?

## Method

### Research Design

This qualitative study is firmly grounded in the interpretive paradigm in which each participant was observed. In a unique, independent situation. Qualitative research draws attention with its in-depth investigation of "how" and "why" issues and questions (Myers, 2009) fit the descriptive and exploratory nature of this study. In this study, the phenomenology pattern, one of the qualitative research methods that is thought to reflect the nature of the research most accurately, was used. Phenomenology is based on phenomena that we encounter in various ways in our daily lives but do not have an in-depth understanding of (Yıldırım & Şimşek, 2016). The philosophy of phenomenology focuses on the experience itself and how the experience resulting from this experience turns into consciousness (Merriam & Tisdell, 2016). Phenomenological research focuses

on how people experience these experiences by limiting their experiences to a phenomenon (Creswell, 2017). For the qualitative part of the research, case sampling (Patton, 2015), one of the purposeful sampling methods, was used among the participants with whom the quantitative research was conducted. Case sampling envisages the study of a limited number of but equally information-rich situations to be subjected to in-depth examination (Yıldırım & Şimşek, 2016).

This research aims to deeply examine the learning analytics practices in private and public schools by adopting a qualitative approach. The research design is based on semi-structured interviews with 18 school administrators working in Istanbul, Türkiye and content analysis methods to obtain rich data from the participants' experiences, so that differences between practices in education can be better understood.

### **Participants**

The participants of the research are 18 school administrators working in public and private schools in Türkiye. While 39% of the participants (7 participants) were women, 61% (11 participants) were men. While 28% of the participants are between the ages of 26-35, 66% are between the ages of 36-45. One participant is over 55 years old. 50% of the participants (9 participants) have undergraduate degrees and 50% (9 participants) have graduate degrees. 56% of the interviewed participants (10 participants) work in public schools, and 44% (8 participants) work in private schools. 11% (2 participants) of the participants are administrators at the preschool level, 17% (3 participants) at the primary school level, 33% (6 participants) at the secondary school level and 39% (7 participants) at the high school level.

### **Data Collection Tools**

According to Patton (2015), the main goal of interviewing in scientific research is to reveal the facts that lie in the minds of the participants. Merriam (1998) states that it is not possible to observe people's feelings and thoughts and the meaning they attach to their experiences, and the only way to reveal these is to ask them questions.

In this study, a semi-structured interview form was employed for data collection, which included 6 main questions and a total of 9 questions, incorporating sub-questions. This approach was chosen to allow participants to provide in-depth responses on their experiences, perceptions and opinions regarding technological leadership and learning analytics. Pilot interview questions prepared using quantitative research results and relevant literature were presented to three experts with experience in qualitative research and technological leadership, and two pilot interviews were held within this scope. As a result of the feedback received from the pilot interviews, the interview form took its final form.

### **Researcher Role**

In this study, the role of the researcher goes beyond just collecting data. The researcher has a constructivist perspective and has tried to discover how the participants construct their own experiences and meanings. The epistemological and ontological stance is

based on a subjective and dynamic meaning production process; in this context, the researcher has acted as a meaning co-constructor in the interactions with the participants. The care the researcher has shown to understand the experiences of the participants has also been supported by an intellectual analysis and shaped by being aware of their biases in the research process. In terms of ethics, the confidentiality of the participants has been protected, and a safe research environment has been provided by obtaining informed consent. The data obtained through semi-structured interviews reflects a role in which the researcher not only collects data but also interprets the meanings of the participants and contributes to the knowledge production process, in line with the qualitative methodology of the study.

### **Data Analysis**

During the analysis process of qualitative research, researchers need to work with a large amount of data (Miles & Huberman, 1994). In this research, interview notes with 18 participants (108 pages in total) were obtained. The data collected through content analysis attempts to describe and reveal the facts hidden within. Thus, the obtained and similar data are brought together within the framework of certain themes and concepts and interpreted in a way that the readers can understand (Yıldırım & Şimşek, 2016).

The data analysis process was carried out through content analysis using MAXQDA software. First, all interview records were converted to digital text, and then these texts were transferred to the MAXQDA program. This software facilitated the systematic coding and thematic analysis of the data, allowing the researcher to see common connections among the data more clearly. The MAXQDA program was preferred because it provides ease of use to the researcher and also helps the researcher in organizing the data and viewing the data with a common code in a holistic manner (Işık, 2010). The total duration of the research process was 6 months. The interview durations with participants ranged from 40 minutes to 70 minutes. In some cases, additional interviews were conducted with participants when the desired results were not achieved in the first session.

### **Credibility and Ethics**

Before this research, research questions were sent to the relevant official institutions and permissions were obtained. Additionally, the questions were presented to the relevant committee and ethics committee approval was obtained. "Long-term interaction, depth-oriented data collection, detailed description and negative situation analysis", which are among the strategies used to increase the validity and reliability of the research, were used extensively throughout the research (Strauss and Corbin, 1998). In this study, in order to ensure validity, the data obtained from the participants were diversified to provide different perspectives and an in-depth analysis was conducted on the themes generated during the data collection process (Creswell & Poth, 2022). In addition, in order to increase the variability of the study, data were collected from different schools and student groups, considering the diversity among the participants (Patton, 2015). In addition, the researcher confirmed objectively how applicable the points expressed

during the interviews were in real life by asking the participants to give examples of how they practiced them in their professional lives.

## Findings

In this section, the main findings will be presented in light of the data obtained during the research process, in line with the experiences and opinions of the participants. The findings will be analyzed within the framework of the research questions and discussed in detail.

Analysis results of opinions of school administrators working in public and private schools regarding technological leadership

**Table 1**

<i>Public School Code</i>	<i>Private School Code</i>
Ability to use technological devices	Being open to change and innovation
Being open to change and innovation	Ability to use technological devices
Data analysis skills	Vision

According to Table 1, most of the participants stated that the school administrator, as a technological leader, should use the technological devices in the school very well. One of the participants, K5, expressed his views on the subject as follows: *"Starting with computers, phones, mobile applications, some websites on the computer, such as YouTube, Zoom, Google meet-style programs, and Microsoft Teams are among them."* While K1 said, *"I think being able to use information technology networks actively, that is, Web 2 tools, the EBA system, the E-school system, being able to follow the students in these, and being able to develop new studies are the characteristics of a technological leader."*

The private school administrator on the other hand primarily emphasized the point of being open to change and innovation and also touched upon the concept of being able to use technological devices and vision. Most of the participants stated that the school administrator, as a technological leader, should closely follow the changes and innovations brought by the age. P14 expressed his views on the subject as follows: *"I think it should be dynamic. I think that someone who researches, questions and wonders should also be extremely open to innovations."* K16 expressed his views as *"he/she is the one who can follow educational models all over the world, who can apply personalized teaching models, who makes educational programs that make it easier for every child."*

Analysis results of opinions of school administrators working in public and private schools regarding their technology use in school administration.

**Table 2**

<i>Public School Code</i>	<i>Private School Code</i>
E-school system	Whatsapp groups
EBA (education information network)	Parent information system
Smartboard	Paid platforms other than the e-school system
Google forms	Language education

According to Table 2, in response to the question, they frequently used the concepts seen in the codes. One of the school administrators working in public schools P5 claimed: "When we look at the reporting system in e-School, it is very serious and there are such beautiful analyzes and graphs available." P6, who also works at a public school, said the same issue: "The Ministry of National Education has some sites and infrastructures in this sense. There are some educational sites such as EBA or some private ones. Our teachers and students use these sites intensively and provide information to their students."

Private school administrators, on the other hand, expressed their opinions as follows. In this regard, P12 said, "We have used WhatsApp extensively for parent and student groups." and P11 stated, "We use an application similar to Instagram, but you can take attendance from there and these attendances are sent to the parents. Here, you can instantly rate the student's performance in the course, and it reaches the parents at the same time." P18 said "In the paid platform we can advantageously see the student's development at home, at school, relationships with friends, exam scores, academic progress at work, and guidance service meeting records extensively." P12 said, "There is a system that is used very intensively in our English branch. Therefore, our students can actually think of it as a kind of thing, this virtual book in English, a virtual library. Our English teachers use it very intensively."

Analysis results of opinions on digital tools used in assessment and evaluation in public and private schools

**Table 3**

<i>Public School Code</i>	<i>Private School Code</i>
E-school platform	Paid platforms
Web2 tools	Trial exam analysis
Trial exam analysis	Online assignment/study
There is no effective measurement and evaluation system	Keeping inventory records

According to table 3, P4 claimed that *"E-School is already in the works, in fact, we do not use it very effectively, but it can give us many statistics at school, including student absences and grade entries, but does not present us many detailed graphs"*. P1 stated the following about other measurement and evaluation tools they use at school *"using Web2 tools, we use game programs and quiz programs such as Quizlet out. And here in our school, we organized quiz competitions in accordance with the inter-class level."* K3 explains his experiences about trial exams: *"Our students can see their results online on the trial exams we hold regularly every month. We can prepare an Excel spreadsheet and see the child's scores in detail."*

Some administrators working in public schools complain about the lack of an effective measurement and evaluation system. P4 and P7 respectively explained their opinions on this topic: *"The e-School system, but is it enough? Of course not. In the e-School system, there should be many sections and tabs related to social-emotional skills for children, as well as social activities and guidance initiatives and career studies. For example, parent-teacher meetings, etc., could be accessed there."*

*"Unfortunately, sir, there was no effective measurement and evaluation system. This bothered me quite a bit. You know, I want to have data. In which grade do I start at the beginning, and at what position in the mathematics course, such as pre-test and post-test? What did it look like after the first exams? Then, I wanted to have data such as what the situation was in the second exam."*

Private school administrators expressed their opinions as follows. In this regard, P13 said, *"In addition, of course, there is a student-parent information system used in many private schools and even in some public schools. From their daily meal lists and their attendance to the assignment of homework, which day it will be followed, from which book, and from which page it will be given. After they were checked, we gave feedback to the parents. P18 emphasized the advantages of using a paid platform: "Within the scope of guidance services, we can apply many tests and inventories and evaluate them quickly. This takes a serious workload off of us, and in general, I can say that the success rate increases slightly as the task of creating something special for the child accelerates"*.

P12, one of the private school administrators who constantly monitors the students' levels with regular trial exams, emphasized the situation as follows *"For example, if sixty to seventy percent of that class have not done something about a topic in the class, we put forward such analyzes to the whole class regarding that learning outcome with the inferences we get from the measurement and evaluation system and direct the teacher accordingly. Thus, we create a dynamic structure."*

The other private school administrators have given examples of the digital infrastructure used in assessment and evaluation as follows:

*"For example, today was very good. You have a notification that all questions were accompanied. When you click, the parent can see his child's performance in mathematics class. You can check your homework from here and deliver it to the parents."* (P11)

*“Let me check the K12 level of the student. Have I been given homework? You can look at it from there, download it, solve it and check your homework. Homework is given using technology. It is checked there and recorded in the system. (P 15)*

Analysis results in the opinions about the obstacles that arise in the process of creating a learning analytics culture in public and private schools.

**Table 4**

<i>Public School Code</i>	<i>Private School Code</i>
Organizational resistance	Dysfunctionality of existing platforms
Insufficient budget	Organizational resistance
Lack of technological infrastructure	Workload
Inequality of opportunity	Bureaucratic obstacles

According to Table 4, the administrators' statements on this subject are as follows: P2 *“We must eliminate inequality among teachers, especially our older colleagues. If necessary, everyone will receive in-service training programs again and again....”* P4 *“Our organization resists innovations. There is such a mass, there is a problem of incompetence of the authorized people, there are many such problems in our country.*

Administrators' opinions regarding the insufficiency of budget and technological infrastructure are as follows. *“I think funds should be provided for this useful software... These should be provided to schools free of charge (K1), “As long as we have administrators who value learning analytics and bring technology into our lives, I think that we can use it very well within educational institutions, with their contributions, in terms of budget, organization and coordination.” (P9)*

P1 and P4 respectively emphasized the inequality of opportunity in schools. *“... Fighting this inequality takes us away from the point of how we can improve education. We are trying to provide normality right now.” (P1). “In our country, there are incredibly disadvantaged schools in terms of achievement differences between schools, application differences, equality of opportunity... (P4).*

Private school administrators expressed their opinions as follows. P3 explains the opinions as *“I'm not very obvious on this issue right now, especially in public schools. The current systems, methods and platforms used are far behind this issue. We have to keep up with time and develop applications accordingly.”* P14 mentions the dysfunctionality of the existing platform as *“Normally, in an e-school platform there is a record of what grade the student received, but I know that we do not have the chance to see the details of which subject in terms of achievement. After that, while the attendance was taking*

place, the students just came to the sections and did not come. But on the platform we use, a message is sent to his family about the reason he is on leave, whether his family knows about it or not.

P15 and P17 express their views on organizational resistance as follows “Now robot people, perhaps artificial intelligence needs to get in schools somehow. It needs to be integrated somehow. We insist on ignoring this, perhaps we are resisting as a community”. “I think the important thing here is how much importance people characteristically attach to this work. Because some people can use everything as an excuse to make it seem like this is not my job. So, unfortunately, let me say that it is a bit of a plague on our teaching profession.”

Opinions about workload, which is among the most complained about obstacles in private institutions, are as follows.

“And apart from that, of course, working hours need to be reduced. In other words, it would be difficult to expect such learning from a teacher who teaches thirty-five hours a week... Frankly, it is difficult to expect an outcome such as learning analytics and data analysis” (P17)

P12 explained private school administrators' opinions about bureaucratic obstacles as follows, respectively. “Now, I think there is a problem in our country, even though I don't know much about National Education, I have no idea whether the system changes every year or not based on data. You know, there is data out there. There is a learning problem. And does it change at the point where we have developed a solution to that learning problem or does it change to a different logic”.

Analysis results in the opinions of school administrators regarding the establishment of a culture of learning analytics in schools.

**Table 5**

<i>Public School</i>	<i>Private School</i>
Increasing teacher qualifications	Using a more functional platform
Using a more functional platform	Adopting a data-driven system
Budget support	Changing the national policies
Changing the national policies	

The results of content analysis on the opinions of school administrators regarding the establishment of a culture of learning analytics vary in public and private schools. P7 expresses his opinions on teacher qualifications as “Teachers say, 'I go to class and leave', this is not enough, teaching is hard work. It is to develop, transform, change.

*That's why, first of all, I think the teacher training part should be reconsidered." P5 explained the same topic as "So, there is nothing stopping learning analytics. Just not knowing this, we call it in-service training. So, for example, I may know more or less about learning analytics, but a teacher friend, for example, may not know this. If he has not improved himself in this regard..."*

School administrators generally expressed their suggestions regarding using a more functional platform and budget support. P1 and P2 express their opinions on this issue as follows, respectively. *"Apart from that, as I said before, for example, in my opinion, these are useful software that can be used in a school. I think extra funding should be provided. (P1)*

*"The Ministry does not have a very clear policy on this issue, there is no software or program developed, we only have e-school. E-School is something that I cannot see all the data about anyway. Therefore, we cannot even use it very effectively, so I think we need to go much further in this regard first" (P2)*

Finally, the issue that administrators frequently mention is the need to introduce changes to existing policies. P2 expressed his opinions on this issue as follows, respectively: *"Of course, these are very natural in a community of one million people, but if the ministry develops a serious policy, why not? Of course, it should be more systematic, overcoming all obstacles, and of course, technology should be invested in technological infrastructure in schools".*

Private school administrators expressed their opinions as follows. P11 explains his opinions as *"I think that in the future, the child should be provided with a new learning environment based on this previously processed data. Data is important to us. I think this article is very valuable in terms of giving importance to data entry and then providing an environment that every student can understand."* Moreover, the administrators emphasize the importance of adopting data-based systems in schools as follows: P11 *"All teachers believe that this is important, and everyone needs to contribute to this process in terms of creating data at the data point."* On the same subject, P12 expresses the situation as follows: *"Now, I think there is a problem in our country, even though I don't know much about national education, the change of the system every year is based on data or what. You know, there is data out there."*

## Results and Discussion

The research findings suggest that school administrators working in public schools evaluate technological leadership more in terms of "being able to use technological devices". When these findings obtained from the interviews are associated with the detailed definitions of technological leadership made by Sahlberg and Sahlberg (2021), in the literature and the characteristics of the technological leader. It is seen that school administrators do not mention many dimensions when defining technological leadership. Particularly the features such as the fair use of equipment and resources,

which are frequently mentioned in the definition of technological leadership, policies based on information and communication technologies, and creating easily accessible technological environments that can be created throughout the school. It indicates that school administrators have a very superficial knowledge of technological leadership and try to explain technological leadership with concepts related to their own lives and experiences. This highlights a gap between the expected and actual understanding of technological leadership, a finding that is consistent with the findings of recent studies by Friesen et al. (2020), which emphasize the underdeveloped awareness of technological leadership in educational settings.

Accordingly, as mentioned in the literature, learning analytics, which has a wide range of applications and components, is only partially understood by school administrators and its application areas are still very limited in Türkiye. As Chatti et al. emphasized (2012), the fact that learning analytics applications do not yet have a solid pedagogical foundation, and the problems experienced in the technological, financial and human resources required for their widespread use in learning environments (Tsai et al., 2020) support this situation. The fact that school administrators working in public schools evaluated this situation only in terms of the practices notified to them by the state and that they were obliged to use shows that they did not do any separate research or reading on this subject. As stated in the literature, learning analytics applications, which include a wide variety of learning management systems and variables, are perceived as a very new field that has not been fully understood by school administrators in Türkiye. In addition, administrators often emphasize that there are many systemic obstacles to learning analytics applications. This situation is similar to the findings obtained in King's (2017) study conducted in England. It is seen that school administrators working in Türkiye, like their British counterparts, face problems such as a lack of time to learn and apply learning analytics, a culture of resistance, problems related to change, and inadequate professional development, training and incentives.

The title of technology use regarding learning analytics is where the difference between private and public schools is most outstanding. In the interviews with education administrators, it is clearly seen that the culture of learning analytics in private schools is established both at the administrative level and in the context of teachers and students. Thanks to the software used in private schools, it is seen that all kinds of personal data of the student (social activities, guidance meeting records, parent information tab, course/subject success analysis and report cards, language level) can be recorded. Evaluating and recording data regarding students' social and emotional development, together with variables such as attendance and grade information, provides serious advantages for individualizing education. Furthermore, it can be seen that private schools are one step ahead in predicting future problems and taking precautions, which is one of the important stages of learning analytics platforms.

In the interviews with school administrators, most of the administrators in public schools emphasize that measurement and evaluation activities in the school are carried out with the classical method and the data is processed into the e-school system and all follow-

up is done in this way. Reducing the measurement activities to a superficial result based only on the exam grade results in the feedback process, which is one of the most important outcomes of learning analytics applications, being inadequate. This finding supports the findings of the study conducted by Aktaş (2019), which noted similar challenges in the implementation of learning analytics, particularly in public schools.

Another obstacle mentioned in public schools is the inadequacy of budget and technological infrastructure, which results in inequality of opportunities. This finding was also highlighted by K.G. and Kurni (2021), who identified infrastructure and funding as significant barriers to the effective use of educational technologies, including learning analytics.

During the interviews with school administrators of public schools, the most frequently mentioned obstacle to learning analytics was organizational resistance. Many practices that are quite new for public schools are practices that most teachers have not received training in the faculty of education and claim that they are very new to them. For this reason, placing learning analytics applications on a pedagogical basis is quite challenging for both school administrators and teachers. This finding is supported by the studies of Tsai and Gašević (2017), who touched upon the inadequacy of pedagogy-based approaches in learning analytics applications and the lack of equipment of users in this field. Dollinger et al. (2019) emphasizes that the inadequacy of teachers' technical knowledge is among the greatest obstacles in this regard. Another obstacle mentioned in public schools is the inadequacy of budget and technological infrastructure and the resulting inequality of opportunities. This finding was reported by K.G. and Kurni (2021), the issues revealed in the research show similar characteristics to the obstacles to learning analytics. Kis's research (2022) similarly shows that administrative support in the digitalization processes of schools is inadequate, and teachers' digital literacy is limited, making the integration of advanced technologies such as learning analytics difficult. When the same topic is analyzed in terms of private schools, it is seen that the issue of organizational resistance, although less frequent, is also perceived as an obstacle by the administrators.

The most frequently expressed suggestion by the administrators is to increase teacher qualifications. Especially teachers working in public schools are not very proficient in the use of technology and digital applications, which creates a serious workload for school administrators and reduces their motivation to do more qualified work. The most basic conclusion that emerges here is this: In order for a culture of learning analytics to be established in an institution, sufficient data must be collected at that school and this data must be sorted in a more organized manner on a single platform. The result obtained from the observations is that the investment in professional development has a very positive effect on student success.

Finally, observations show that teachers are actually open to innovations in different applications and digital software, but their work life balance does not allow personal development due to different reasons. It is outstanding that factors such as the number of students in public schools, the reflection of students' problems outside of education

on schools, limited parent-teacher cooperation and high bureaucratic workload, significantly reduce the motivation of school administrators. Similar problems, which have been frequently mentioned in the literature in recent years, Bozkurt, (2023), Keman, (2019), Usta and Boğa (2021) show similar characteristics with the findings of this study. In this context, school administrators generally make suggestions such as improving teachers' incomes, providing space for school administrators to deal only with education by employing separate personnel for technical issues.

The strength of this study is that the dataset, which was analyzed in depth using qualitative research methods and MAXQDA software, provides a comprehensive and detailed understanding of learning analytics practices in private and public schools over a long period of time. However, the limited number of participants in the study may limit generalizability. In addition, the limited nature of the interviews with the participants limited the opportunity to observe educational practices that may change over time.

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## Genişletilmiş Türkçe Özet

Eğitim alanındaki verilerin her saniye, hızlı bir şekilde arttığı günümüzde bu veriyi yönetebilmek, ayıklamak ve eğitim niteliğinin geliştirilmesi amacıyla kullanabilmek okul yöneticileri için gerekli olan temel bir beceri haline gelmiştir. Bu bağlamda öğrenme sürecini dijital olarak takip ederek öğrenci davranışlarının analizi ve kişiselleştirilmiş geribildirimlere imkan sağlayan öğrenme analitiği ülkemizde yeni bir alan olarak ortaya çıkmıştır. Öğrenme analitiği uygulamalarının okullardaki uygulayıcıları olan okul yöneticilerinin verimli olabilmeleri için teknolojik liderliğe ilişkin yeterliklere sahip olması beklenmektedir. Ancak ülkemizde bu alandaki yeterlikler konusunda kurumsal bir politika olmamasından dolayı eğitim yöneticilerinin teknolojik liderlik düzeyleri ve okullarda öğrenme analitiği uygulamaları konusunda kurumlar arasında farklılıklar görülmektedir. 21. Yüzyılda ülkemizin ihtiyaç duyduğu insan gücünün nitelikleri düşünüldüğünde bu farklılıkların bu kurumlardan mezun olan öğrenciler arasında ciddi bir farklılık oluşturacağı öngörülmektedir. Bu bağlamda okullarda eğitim yöneticilerinin liderliğinde standart bir öğrenme analitiği kültürü oluşturulmasına yönelik uygulamaları incelemek, olası farklılıkları ve çatışmaları azaltmak ve eğitim verilerini daha nitelikli takip edebilmek açısından önem arz etmektedir.

Bu çalışmada araştırmanın doğasını en doğru şekilde yansıttığı düşünülen nitel araştırma yöntemlerinden biri olan fenomenoloji deseni kullanılmıştır. Fenomenoloji, günlük yaşamımızda çeşitli şekillerde karşılaştığımız ancak derinlemesine bir anlayışa sahip olmadığımız olguları temel alır (Yıldırım ve Şimşek, 2016). Fenomenoloji felsefesi deneyimin kendisine ve bu deneyimin sonucunda ortaya çıkan deneyimin nasıl bilince dönüştüğüne odaklanır (Merriam ve Tisdell, 2016). Fenomenolojik araştırma, insanların deneyimlerini bir olguyla sınırlandırarak bu deneyimleri nasıl deneyimlediğine odaklanmaktadır (Creswell, 2017). Araştırmanın nitel kısmında nicel araştırmanın yapıldığı katılımcılar arasında amaçlı örnekleme yöntemlerinden durum örnekleme (Patton, 2015) kullanılmıştır. Durum örnekleme, sınırlı sayıda ancak aynı derecede bilgi açısından zengin durumların derinlemesine incelemeye tabi tutularak çalışmasını öngörmektedir (Yıldırım ve Şimşek, 2016). Araştırma kapsamında 18 eğitim yöneticisi ile derinlemesine görüşmeler yapılmıştır.

Araştırmanın katılımcıları Türkiye'deki kamu ve özel okullarda görev yapan 18 eğitim yöneticisidir. Katılımcıların %39'u (7 katılımcı) kadın, %61'i (11 katılımcı) erkektir. Katılımcıların %28'i 26-35 yaş aralığındayken, %66'sı 36-45 yaş aralığındadır. Bir katılımcı 55 yaşın üzerindedir. Katılımcıların %50'si (9 katılımcı) lisans, %50'si (9 katılımcı) ise yüksek lisans mezunudur. Görüşülen katılımcıların %56'sı (10 katılımcı) devlet okullarında, %44'ü (8 katılımcı) ise özel okullarda çalışmaktadır. Katılımcıların %11'i (2 katılımcı) okul öncesi düzeyde, %17'si (3 katılımcı) ilköğretim düzeyinde, %33'ü (6 katılımcı) ortaokul düzeyinde ve %39'u (7 katılımcı) lise düzeyinde yönetici bulunmaktadır. seviye.

Bu çalışmada katılımcıların teknolojik liderlik ve öğrenme analitiğine ilişkin deneyimleri, algıları ve görüşleri hakkında derinlemesine bilgi edinmek amacıyla yarı

yapılandırılmış görüşme formu kullanılmıştır. Literatür incelemesi yapılarak hazırlanan pilot görüşme soruları, nitel araştırma ve teknolojik liderlik konusunda deneyimli üç uzmana sunulmuş ve bu kapsamda iki pilot görüşme gerçekleştirilmiştir. Pilot görüşmelerden alınan geri bildirimler sonucunda görüşme formuna son şekli verilmiştir.

Nitel araştırmalarda analiz sürecinde araştırmacıların büyük miktarda veriyle çalışması gerekmektedir (Miles ve Huberman, 1994). Bu araştırmada 18 katılımcıyla (toplam 108 sayfa) görüşme notları elde edilmiştir. İçerik analizi yoluyla toplanan verileri betimlemeye ve içlerinde saklı gerçekleri ortaya çıkarmaya çalışır. Böylece elde edilen ve birbirine benzeyen veriler belirli tema ve kavramlar çerçevesinde bir araya getirilerek okuyucunun anlayabileceği şekilde yorumlanır (Yıldırım ve Şimşek, 2016).

Öncelikle görüşme ve gözlemlerden elde edilen verilerin daha sistematik bir şekilde analiz edilebilmesi amacıyla tüm kayıtlar bilgisayarda yazılı metne dönüştürülmüştür. Daha sonra yazılı metinler MAXQDA programına aktarılmıştır. MAXQDA programı araştırmacıya kullanım kolaylığı sağlamanın yanı sıra araştırmacının verileri düzenlemesine ve verileri ortak bir kodla bütünsel bir şekilde görüntülemesine yardımcı olması nedeniyle tercih edilmiştir (Friese, 2019).

Araştırma kapsamında yapılan görüşmeler sonucunda özellikle devlet okullarında teknolojik yeterliklerin kullanımının ve öğrenme analitiği uygulamalarının birçok nedene bağlı olarak kısıtlı düzeyde kaldığı görülmektedir. Okullarda öğrenme analitiği uygulamalarının tam anlaşılammış olması ve bu uygulamalara zemin hazırlayacak etkili bir yazılım sisteminin kullanılmaması, öğrenme analitiğinin önündeki en önemli engeller olarak ön plana çıkmaktadır.

Araştırmadan elde edilen bir diğer bulgu ise ülkemizde bu konuda uygulanan standart bir bakanlık politikası olmamasından dolayı her okulda farklı uygulamaların yapılmasıdır. Araştırma bulguları devlet okulları ve özel okullar arasında ortaya çıkan uygulama farklılıklarına ek olarak aynı kurumda görev yapmakta olan okul yöneticilerinin dahi kişisel faktörlere bağlı olarak farklı uygulamalar yaptıklarını göstermektedir. Elde edilen bu bulgular çerçevesinde okul yöneticilerinin bu konuda daha nitelikli uygulamalar yapması için öğrenme analitiği kavramının daha iyi anlaşılması adına bakanlık düzeyinde eylem planları oluşturulması önem arz etmektedir.

**Anahtar Kelimeler:** Teknolojik liderlik, öğrenme analitiği, okul yöneticileri

**Ethics Committee Approval:** The ethics committee approval for this study/research was obtained from Marmara University (137002).

**Informed Consent:** Informed consent was obtained from (18) of participants.

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# Opinions of Office Managers and Assistant Office Managers on Career Adaptability and Office Technology Competency Distance Learning Program\*

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## Abstract

Career adaptability prepares employees for the uncertainties of changing work environments and unforeseen changes, making it easier to get the process right. Because technology is constantly changing, office workers in technology-intensive offices should continually update their office technology skills. This study sought to answer the question, "What are the opinions of office managers and assistant office managers on career adaptability and office technology competency distance in-service training programs? The research was designed as a case study using qualitative research methods. In the study, data were collected electronically with semi-structured questions from volunteer participants (84) who received distance education on career adaptability and office technology competency, and content analysis was conducted. The participants were office managers and assistant office managers working in Anadolu University Open Education System. The findings of the study demonstrated that the distance in-service programme had a substantial impact on the professional development and ongoing learning of the participants. The programme facilitated the acquisition of new knowledge and skills, enhanced the utilisation of office technologies, and addressed the challenges encountered during the execution of duties. Additionally, it fostered a sense of self-assurance among the participants, offered novel perspectives, and provided guidance in career progression. However, some participants emphasised the negative aspects of the distance in-service training programme, such as the inability to fully meet the need for socialisation, and suggested the development of more interactive and practice-based programmes. These results are expected to help institution managers to develop and/or improve effective in-service training programmes in the relevant field.

**Keywords:** Career Adaptability, Office Technology, Distance In-Service Training, Office Manager

## About the Article

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## Introduction

Career defines the mobility of employees between positions and the metaphorical journey of the individual in business life (Bingöl, 2013). The positions, progression or advancement of a person throughout his/her life are explained by the concept of career. Career necessarily includes phases such as learning, self-development and specialization and provides psycho-social satisfaction to employees. The concept of career management defines the management of a career for individual and organizational purposes. Through successful career management, organizations can have human resources with the skills and abilities of the future. Career adaptability refers to the ability of individuals to overcome challenging situations in their professions (Hartung, 2013). Career adaptability is effective in individuals finding new jobs and transitioning between different jobs (Maggiori et al., 2013). In today's flexible employment environment, career transitions are common and career paths are less predictable (Ginevra & Nota, 2017). Individuals with high career adaptability are successful in new areas of responsibility in the work environment and can easily overcome unexpected changes (Savickas, 2013; Dönmezoğulları & Yeşilyaprak, 2019).

In recent office designs, the focus of office technologies and design ideas is on a flexible, reliable and smart layout that provides easy access to information for staff (Karakurumer & Benli, 2022). Cloud-based platforms facilitate communication and remote working between organizations and employees. For these reasons, organizations want their employees to be familiar with different software programs and office technology. This requires employees to continuously learn new skills (Workplace Technology). As a matter of fact, through various in-service trainings, organizations try to improve their employees' keyboarding, word processing, spreadsheet and presentation programs such as PowerPoint, web surfing and networking, database management, website design, graphic creation, use of electronic document management systems and file management skills and increase their technological competencies. This situation has made it imperative for office managers and assistant office managers to continuously update their skills and become technologically savvy individuals in order to meet increasing expectations. Organizational support in the process of career adaptability can help employees to be more successful in career adaptation by improving their sense of importance and value (İrge & Okay, 2021). In fact, in informal communication, some of the clerical employees say that they feel inadequate in dealing with office technologies and need more support. One of the factors causing this inadequacy is the limited in-service training provided. It is very important to improve the career adaptability and technology competency of clerical staff through in-service training. For this to happen, it is necessary to accept that career development is a two-way relational process that should be integrated (Hall & Moss, 1998).

## Distance In-Service Training

Education is the process of providing people with knowledge, skills and attitudes. Human beings and societies are subject to constant change; as such, education is imperative in ensuring the continuity and contemporary relevance of both (Balay, 2004). In a world of intense competition and rapidly developing information technology, the information learned by employees becomes obsolete and insufficient in a short time. Therefore, the need for training to adapt to the conditions is increasing day by day. This situation has led to the emergence of the concept of lifelong education. Lifelong education is a combination of continuous and multidimensional education (Görmüş & Kahya, 2014). In-service training is a sub-process of lifelong education and is an essential activity for organizations (Kulaz, 2013). Training is one of the most effective ways of enabling employees to update their skills. In both the private and public sectors, training is an integral part of business life (Karbuş & Aydın, 2024). In-service training is conducted to provide employees with the knowledge, skills, and attitudes they need to perform their jobs (Altun Bogoçlu & Gündüz, 2022). In-service training can be delivered face-to-face or through distance learning. Distance learning has been shown to offer several advantages, especially when working with a large and geographically dispersed target group (Bakır, 2022). The use of distance learning methods can promote standardization (Halvurt, 2010).

In the face of globalization, evolving technology, and changing expectations, public institutions are under pressure to be flexible, transparent, and adaptable in order to maintain their activities and competitive advantage (Özdemir et al., 2017). In response to this need, there have been changes in the traditional structure of public administration, including digitalization and an emphasis on raising the educational level of civil servants. Article 214 of the Civil Service Law No. 657 emphasizes the importance of in-service training to improve the skills and productivity of civil servants and prepare them for their future roles. These initiatives aim to ensure that public institutions can effectively navigate the changing world order and effectively serve the evolving needs of society.

The literature on distance training focuses mainly on teachers in public institutions. A study by Avcı and Güven (2021) identified the subjects that teachers need to be trained in the context of distance education. Another study by Tekin (2020) found that teachers have both positive and negative opinions about distance education programs, attributing the different perspectives to individual differences and the characteristics of distance education. Other studies examine the service sector and the field in general. Kelsey and Mincemoyer (2001) found that local government employees have a positive view of distance education, especially because of the flexibility it offers in terms of time constraints. On the other hand, Öztürk and Sancak (2007) found that barriers to in-service training include inadequate training infrastructure, insufficient basic training for human resources, and high costs. Selimoğlu and Biçen Yılmaz (2009) found that in-house training programs improve the adaptation to work, commitment and self-confidence of human resources and enable them to stay up-to-date.

Anadolu University Open Education System Office Managers and Office Staff have received in-service training in the past years. The scope of these trainings can be listed as Higher Education Regulations, Rules of Behavior in Public Relations, Training for Candidate Officers, Effective Communication and Public Relations, Vocational Training, Legislation. In this study, the main question, what are the opinions of office managers and assistant office managers about the distance training program on career adaptability and office technology competency, was evaluated with the views of the participants. Based on this main problem, the answers to the following sub-questions were sought based on the opinions of the participants:

1. What are the feelings and thoughts of office managers and assistant office managers about career adaptability and office technologies distance in-service training methods?
2. How does the provided distance in-service training meet the needs of office managers and assistant office managers in the effective use of office technologies?
3. How does the provided distance in-service training help office managers and assistant office managers to learn new knowledge and skills?
4. What is the role of the provided distance in-service training in solving the problems faced by office managers and assistant office managers in performing their duties?
5. What are the advantages of distance in-service training for office managers and assistant office managers in the realization of their personal career plans?
6. What is the effect of the distance in-service training on the perspective of the office managers and assistant office managers in the field of office technologies?

## Method

### Research Design

In this study, one of the qualitative research methods, namely case study design, in which a single group (office managers and assistant office managers) was analysed, was utilised. The reason for conducting qualitative research is to focus on the phenomena in the flow of social life and to examine these phenomena without any transformation. Because with a case study, a limited, single or collective situation, event, process, program, or individual can be studied and generalizations can be made (Çapar & Ceylan, 2022).

### Study Group

The study group is determined according to the subject and purpose of the study. In this study, convenience sampling, one of the purposive sampling methods, was selected. This approach provides practicality and convenience for the research process (Haşiloğlu et al., 2015). The study group consisted of office managers and assistant office managers who work in the offices of the open education system at Anadolu University

Open Education Faculty where the researcher(s) work and who preferred to participate in the study. The researchers met with the faculty administrators, lecturers and office staff before the study started and briefed them, thus ensuring accessibility and ease of operation during the study. Table 1 presents the demographic information of the participants.

**Table 1.** *Distribution of Demographic Information of Participants*

Variables	Group	Frequency	Percentage
Gender	Male	48	57,1
	Female	36	42,9
Age	24-43	21	25
	44-63	63	75
Marital Status	Single	7	8,3
	Married	77	91,7
Level of Education	Secondary Education	2	2,4
	Bachelor's degree	65	77,4
	Postgraduate	17	20,2
Whether their education is in the field of "Office Management"	Yes	13	15,5
	No	71	84,5
Whether they receive their education in formal or distance education	Formal	37	44
	Distance	47	56
How long they have been working	6-10 years	4	4,8
	11-15 years	21	25
	16 years and more	59	70,2

Analysis of Table 1 shows that 48 of the 84 participants were male (57.1%) and the remainder (42.9%) were female. The majority of the participants (75%) were between 44-63 years old. Most of the participants (75%) are married. When analyzed by educational level, 77.4% of the participants have an undergraduate degree and 20.2% have a graduate degree. Only 15.5% of the participants received their education in the field of office management. 56% of the participants received their secondary or higher education through distance learning. When analyzing their working period, 70.2% of

them have a working period of 10 years or more. While 7 of the participants are from Istanbul, the other participants are from different cities as shown in Table 2.

**Table 2.** *Distribution of Participants by Province*

Number of participants	Provinces	Total
Provinces with one participant	Adana, Adıyaman, Ankara, Ardahan, Balıkesir, Bilecik, Bursa, Çanakkale, Elazığ, Erzincan, Erzurum, Hakkâri, Iğdır, Isparta, Kırıkkale, Kırklareli, Kilis, Kocaeli, Manisa, Mersin, Nevşehir, Ordu, Osmaniye, Sivas, Tekirdağ, Tunceli, Uşak, Van, Yozgat, Zonguldak	30
Provinces with two participants	Aksaray, Amasya, Antalya, Aydın, Bartın, Bingöl, Bolu, Burdur, Gümüşhane, İzmir, Kastamonu, Kayseri, Kırşehir, Kütahya, Muğla, Niğde, Rize, Sakarya, Şanlıurfa	38
Three provinces with participants	Edirne, Samsun, Trabzon	9
Total		77*

\*Including Istanbul, it is 84.

### Data Collection Tools

In this study, first of all, participants were provided with 5 days of distance in-service training on 5 different topics, namely (1) career adaptability, (2) EDMS applications, (3) use of electronic mail and electronic calendars, (4) cyber security, (5) information, search and selection, by 6 trainers. While creating the content of the in-service training program, the opinions of institution managers, participants, trainers and other stakeholders were consulted. Thus, it was aimed to evaluate the impact of the participants' career adaptability and office technology competency of the distance in-service training program on office managers and assistant office managers with the views of the participants. In the process of devising the questions, meticulous attention was paid to the comprehensibility of the questions for the respondents, with a view to facilitating their capacity to discern the intricacies of the subject matter and to further their understanding of it (Bektaş& Kablan, 2023).

### Role of the Researcher(s)

In the case study, the researcher participates in the research process as a part of the situation as he spends a long time in the environment where the situation takes place (Çapar & Ceylan, 2022). Therefore, the role of the researcher should be made clear in order to demonstrate the overall credibility of the research (Şahin, 2013). In this context, it can be stated that the researcher(s) increased their experience and knowledge about quantitative and qualitative methods through the courses they took and the studies they

conducted during their master's and doctoral education. In addition, the researcher(s) previously worked as office staff in the same institution, actively participated in and experienced many processes, including distance learning programs as a student and instructor in the open education system and worked as an administrator in the same system.

### **Data Collection Process**

In a case study, the researcher observes the current environment or person, obtains information from various sources (documents, people, etc.) and investigates the development process of the phenomenon causing the situation. A case study is to describe the events that occur in their own environmental conditions from different perspectives by limiting time and space and using various data collection tools (Creswell & Poth, 2017). In this study, the draft questionnaire, which was created by reviewing the literature, was presented to a language expert and two field experts before the application and their opinions were taken to increase the validity and reliability of the study. In this particular context, and in accordance with the opinions of experts in the field, superfluous details were excised from the questions, while concomitantly certain additions and deletions were made, resulting in the development of the questions. Then, the necessary legal permissions were obtained for the realization of distance in-service training and data collection. A test application was made with 4 participants and the form consisting of 6 questions was finalized.

### **Data Analysis**

The data obtained in the study were analyzed by the content analysis method. The utilisation of the inductive method in content analysis facilitates the classification of events or phenomena, thereby enabling more efficacious analysis and interpretation (Harwood & Garry, 2003). In data analysis, a systematic process including steps such as collecting information, organizing the collected information, interpreting and reaching research findings was followed (Vural & Cenkseven, 2005). Finally, the research data were interpreted, compared with the literature and reported with a non-arbitrary analysis plan appropriate to the purpose of the research.

### **Reliability**

Content analysis systematically describes the content of participants' opinions (Altunışık et al., 2010). Therefore, the raw data obtained were first read several times to give the researcher an idea. Then, according to the questions in the semi-structured interview form and the order of the questions, all the answers given to each question were collected and this process was repeated for all the questions. In each section, the responses to the questions were carefully read and codes were created by grouping similar opinions together, and themes were derived from the common aspects of these codes. These stages of analysis were carried out independently by two researchers and then the researchers came together to compare the codes and themes. The existing inconsistencies were discussed and a consensus was reached by eliminating the differences. Then the frequency of repetition of the codes by the participants was

determined as the frequency. Codes, themes, and frequencies were attempted to be explained, presented in tables, and interpreted as findings. The researcher(s) participated in the process as an active actor with the objective of comprehending the ongoing events. However, this engagement was undertaken within the confines of a controlled subjectivity framework. At each stage of the research process, the researcher(s) took care to utilise the roles of observer, questioner and interpreter within the framework of scientific ethics (Tutar, 2022). In this context, the confirmability of the study was increased by including direct quotations from the participants' own statements in the process (Tekir, 2021).

### Ethical Issues

Anadolu University Social Sciences and Humanities Scientific Research and Publication Ethics Committee decided that the study was ethically appropriate with protocol number 472459 dated 24.01.2023.

## Findings

### Participants' views on Question 1

Participants' responses to the question "What are your feelings and thoughts about the distance learning method you received? Explain" are shown in Table 3.

**Table 3.** Feelings and Thoughts on the Methodology of the Training Provided

Themes	Sub Themes	Codes	Sample Opinions
Professional Development and Continuous Learning (N=75)	Effectiveness and Efficiency of Training (N=55)	Efficiency (N=21)	P64: <i>I think that the in-service training program will make us effective and efficient in our business life.</i>
		Usefulness of the training (N=34)	P43: <i>The training was very relevant and very useful in terms of information. It was even better that the training topics were related to our work.</i> P78: <i>Very useful training. It should be given to all office staff, not just managers and assistant office managers.</i>
	Personal Development and Professional Development (N=12)	Increase in knowledge and skills (N=10)	P15: <i>Distance in-service training had a positive effect on increasing my knowledge and skills.</i> P65: <i>The information we received within the scope of the adaptability in-service training program helped us to perform our duties more effectively and efficiently.</i>
		Personal development (N=2)	P44: <i>It was invaluable for my personal development.</i>
	Training Content and Topics (N=8)	Training Content and Topics (N=8)	P22: <i>The in-service training program on Electronic Document Management System (EDMS), Applications, Use of e-Mail and e-Calendar, Cyber Security, Information Search, Finding and Selecting Information, and Career Adaptability was highly productive in enabling</i>

		Training materials and links (N=2)	<p>us to maintain our services in the office and provide better service to students.</p> <p>P13: The training provided by expert lecturers was invaluable. It is crucial to complete the deficiencies from the link provided in cases where we cannot attend live.</p>
Technology and Distance Training Integration (N=18)		Time and cost savings (N = 4)	<p>P3: Saving time and money. Possibility to watch the parts we do not understand again.</p> <p>P80: The distance of the training saved time and was more efficient.</p>
	Management of the Training Process (N=11)	Request for continuation of trainings (N=4) Training in areas of need (N=2)	<p>P5: It was a useful training and I look forward to the continuation.</p> <p>P16: We wish the trainings to continue.</p> <p>P21: I find this training on the areas that we constantly need in the organization we work in very positive.</p>
		Ease of transportation and accommodation (N=1)	P14: Saving time compared to face-to-face trainings and eliminating problems such as transportation and accommodation increase efficiency.
	Training Satisfaction (N=7)	Dissatisfaction/Low productivity (N=3) Lack of interaction and implementation (N=4)	<p>P8: Verbal expressions were incomplete in meeting our needs.</p> <p>P71: I think there is little interaction.</p> <p>P77: The in-service training provided by the esteemed academics at our university was beneficial as it encompassed a substantial amount of information in a relatively brief period of time. The training typically consisted of detailed technical information and explanations. Nevertheless, repetition and practice of the subjects are essential for the retention of the information imparted.</p>
Role and Impact of Distance Training (N=13)	Comparison of Training Methods (N=10)	Comparison with face-to-face training (N=10)	<p>P4: Distance training can never replace face-to-face training.</p> <p>P33: Although it is not as useful as face-to-face training, I think it is useful in terms of professional and computer use.</p>
	Use and Impact of Technology (N=3)	Use of Technology (N=3)	P23: It was useful, it improved our ability to use technology more effectively during research and information gathering.

As evidenced by the statements, the participants indicated that the distance in-service training program played a pivotal role in their professional development and continuous learning. The participants found the training to be both effective and efficient and indicated that their knowledge and skills had been enhanced. Furthermore, they also indicated that their proficiency in utilizing technology has enhanced. The training content and materials were perceived as accessible, and the training on technical and current issues enhanced their ability to perform their jobs effectively. They perceived the training to result in savings in both time and costs and requested the continuity of the training

program. Nevertheless, they indicated that distance in-service training may be constrained in terms of interaction and application opportunities, and that enhancements are necessary in these areas.

### Participants' views on Question 2

The participants' answers to the question "Did the distance in-service training you received meet your needs in terms of using office technologies effectively? Can you give concrete examples?" are presented in Table 4.

**Table 4.** The Status of the Training Provided to Meet the Needs of the Participants in Using Office Technologies Effectively

Themes	Sub Themes	Codes	Sample Opinions
Comprehensiveness and Applicability of the Training Program (N=37)	Training Content and Presentation (N=37)	Comprehensiveness of training content (N=17)	P22: In order to use EDMS better, useful presentations were made on creating shortcuts, adding documents, outgoing documents, preparing incoming documents, archiving and using e-mail. P71: It was definitely useful. In addition to the opportunity to refresh our knowledge about EDMS, which we have been using for years, we also learned many things we did not know. We have learned the points we need to pay attention about e-mail usage and cyber security.
		Practical applications and examples (N=20)	P2: Calendar creation options and sending e-mails to multiple people in different ways. P7: Folders and computerized archiving of incoming documents when using EDMS.
Updating Technological Competence and Knowledge (N=25)	Technological Development (N=25)	Technological competence and up-to-date knowledge (N=25)	P63: It has been very accurate in terms of better understanding the issues that we do not know / know incompletely. P37: The classification and sorting of the documents we created in EDMS has been very useful in terms of time, convenience, and access to the right information in a short time.

Participant Satisfaction and Meeting Needs (N=19)

Participant Experience (N=19)

User satisfaction and fulfillment (N=19)

P23: I think it meets my needs. For example, my use of EDMS has become easier.

Office managers and assistant office managers indicated that the training they received was efficacious in enhancing their abilities to utilize office technologies. Training on topics such as electronic document management systems (EDMS) usage, email management, calendaring, and cybersecurity was found to be particularly useful. They indicated that the practical applications emphasized in the training program assisted them in overcoming technical difficulties encountered in their work processes and in updating their knowledge, thereby facilitating their use of EDMS.

### Participants' views on Question 3

The participants' answers to the question "How helpful is the distance in-service training you received in learning new knowledge and skills? Can you give concrete examples?" are presented in Table 5.

**Table 5.** *The Role of the Training in Learning New Knowledge and Skills*

Themes	Sub Themes	Codes	Sample Opinions
Contribution of the Training Program (N=101)	Learning and Development (N=37)	Learning new knowledge (N=17)	P15: <i>It enabled us to increase our knowledge and skills in some subjects we know superficially. For example, it raised awareness of cyber security. The use of EDMS has become more practical.</i> P21: <i>With this training, we can learn up-to-date information and use it in our daily work. From EDMS to e-mail, we started to be more careful about where and how we can safely and accurately find information that interests us or that we are curious about on the internet.</i>
		Practical application and technical skills (N=20)	P7: <i>In-service training is important for us office workers to reach new information. It helps us in our work.</i> P42: <i>It has been helpful. It has been more useful in subjects such as EDMS, e-mail, cyber security, etc.</i>

Training Experience (N=64)	Effectiveness of the training (N=39)	P3: Correcting our mistakes, learning innovations. P24: It enabled us to look at things from a broader perspective from the manager's point of view. We had the opportunity to review our behaviors such as due diligence, problem solving, assuming responsibility and acting collectively.
	Technological innovations and updates (N=25)	P22: We obtained detailed information about electronic signatures and their use provided by the Public Certification Center.

Office managers and assistant office managers reported that the distance in-service trainings they received greatly helped them gain new knowledge and skills. Participants stated that their awareness of cyber security increased and they started to access the right information in a secure manner. They emphasized that the training they received on topics such as EDMS usage and e-mail management increased their efficiency in business processes. They stated that the training enabled them to look at the events from a broader perspective and gave them the opportunity to identify the situation, solve problems, take responsibility, see and correct their mistakes.

#### Participants' views on Question 4

The participants' answers to the question "What is the role of the distance in-service training you received in solving the problems you encounter while carrying out your duty? Can you give concrete examples?" are presented in Table 6.

**Table 6.** The Role of the Training in Solving the Problems Faced by the Participants While Performing Their Duties

Themes	Sub Themes	Codes	Sample Opinions
Contribution of Training to Business Processes (N=57)	Implementation and Improvement in Business Processes (N=57)	Increased problem solving capacity (N=51)	P6: We gained knowledge about what we should pay attention to in the area of cybersecurity. P22: The seminar on using EDMS was very useful in order to write the articles we write on EDMS completely and correctly. P21: Thanks to this training, we learned the information that we could not find or hesitated to find in EDMS correspondence. We benefit from this information in internal correspondence.

Limitations of the Training (N=26)	Knowledge and skills development (N=6)	P24: <i>It enabled us to look at things from a broader perspective from the manager's point of view. We had the opportunity to review our behaviors such as due diligence, problem solving, assuming responsibility and acting collectively.</i>
	Limitation (N=26) Limited role of training (N=26)	P4: <i>It did not play much of a role.</i> P14: <i>I cannot say that it made an extra contribution to my existing knowledge.</i>

Office managers and assistant office managers stated that the distance learning they received improved their problem-solving skills, especially their ability to write complete and accurate correspondence in EDMS, and gave positive feedback on the applicability of the training to their business processes. However, some participants indicated that the training did not play a sufficient role in their job performance.

### Participants' views on Question 5

The participants' answers to the question "What are the benefits of the training you received in realizing your personal career plan? Explain." are presented in Table 7.

**Table 7. Benefits of the Training in Realizing Personal Career Plan**

Themes	Sub Themes	Codes	Sample Opinions
Development and Learning (N=83)	Contribution (N=32)	Completion of missing information (N=4)	P2: <i>It helps to complete missing information.</i> P5: <i>We overcome our shortcomings in the area of technology.</i> P9: <i>I think that the training I received will enable me to go further in my job.</i>
		Contribution to career planning (N=28)	P22: <i>While realizing our career plan, it has revealed positive results in terms of the meaning of career, the benefits it adds to the person, harmony in the working environment, our development, and knowing our strengths and weaknesses.</i>
	Technological Competence (N=51)	Technological skills and awareness (N=27)	P8: <i>It was useful about cyber-attacks and the use of EDMS.</i> P19: <i>It enables us to keep up with technology in office management.</i>
		Personal development and self-confidence (N=24)	P3: <i>Being guiding and encouraging.</i> P24: <i>In my possible career plan, this training has increased my feelings of self-confidence such as expressing myself much better in terms of communication and thinking that I am competent in new technologies.</i>

Experience (N=19)	Limitations of the Training (N=19)	Limitations of the effectiveness of the training (N=19)	P13: <i>As an employee of thirty years, I do not have a personal career plan.</i> P29: <i>It can be useful in terms of personal development, but I don't think it is at a level to make a career plan.</i>
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Office managers and assistant office managers stated that the distance training they received had positive outcomes such as career adaptability, meaning of career, adapting to the work environment, and discovering individual strengths and weaknesses, and it had positive effects on their personal career planning. They emphasized that the trainings filled the existing knowledge gaps and made them better equipped. They also stated that the trainings contributed to their self-confidence, provided new perspectives and guided them on their career paths. However, some participants stated that they still did not have a career plan and that the training did not contribute to their career planning.

### Participants' views on Question 6

The participants' answers to the question "Did the training you received change your perspective on office technologies? How can you give an example?" are presented in Table 8.

**Table 8.** *The Effect of the Training on the Participants' Perspective on Office Technologies*

Themes	Sub Themes	Codes	Sample Opinions
Increased Competence and Awareness of Office Technologies (N=57)	Technological Competence and Awareness (N=57)	Positive Change (N=57)	P6: <i>It made my perspective on office technologies more enjoyable. Learning the tricks and shortcuts of the applications makes things simpler. Such as organizing or canceling meetings via e-mail calendar.</i> P22: <i>Information such as cyber security, security of digital data, operating system, threats to data security positively affected our perspective on the use of office technology.</i>
Lack of Change (N=25)	Constancy (N=25)	Neutral/No change (N=25)	P10: <i>It did not change.</i> P13: <i>Nothing has changed.</i>

Participants stated that some of the trainings they received made a positive difference. Specifically, they said that they became more aware of how to use technology tools more effectively and efficiently, and learned tricks and shortcuts that facilitate business processes such as organizing or canceling meetings using the e-mail calendar. They stated that the training made them more aware of how to use current technologies in business life. However, some participants reported that the training did not change their perceptions of office technologies.

## Results and Discussion

In this study, which was conducted to investigate the opinions of office managers and assistant office managers about the distance training program on "Career Adaptability and Office Technology Competency", 84 people participated. The participants stated that the distance learning program played an important role in their professional development and continuous learning and had positive outcomes such as career adaptability, the meaning of career, adapting to the work environment, discovering individual strengths and weaknesses, and positive effects on their personal career planning. They stated that this training increased their knowledge and skills and their competence in using office technologies. The research results of Koen et al. (2012) also demonstrated that providing career adaptation training can increase the chances of finding a qualitatively good job. The study found that those who found employment after six months reported higher levels of employment quality. They stated that the training in question increased their knowledge and skills, as well as their competence in using office technologies. Özkara et al. (2018) also found that distance in-service training contributed to participants' professional and personal development, as well as positive affective traits related to the use of technology.

Participants found the training effective and efficient, emphasizing that it filled existing knowledge gaps and made them better equipped. They stated that the training increased their ability to perform their jobs effectively, helped them overcome technical difficulties in their business processes, and made them more aware of how to use current technologies in business. They found the training on using EDMS, email management, calendaring, and cybersecurity particularly useful. They stated that their ability to write complete and accurate correspondence in EDMS has improved, that their awareness of cyber security has increased and that they can access information securely, that they have learned tricks and shortcuts that facilitate business processes such as organizing or canceling meetings using the email calendar, and that the distance learning they received provided them with new knowledge and skills. They stated that the training contributed to their self-confidence, enabled them to see things from a broader perspective, and gave them the opportunity to do due diligence, solve problems, take responsibility, and recognize and correct their mistakes. They also stated that the training provided both time and cost savings and requested continuity of training. The flexibility that distance education provides in terms of time and space is also emphasized in other studies (Gökbulut, 2021; Canpolat & Yıldırım, 2021; Bektaş & Kablan, 2023). In Tekin's (2020) study, participants viewed distance education as advantageous in terms of economy, time, and space, but disadvantageous in terms of limited communication and interaction.

Participants perceived the training content as effective and the materials as accessible. This is consistent with the findings of Gürer et al. (2016) and Özgöl et al. (2017): Participants view distance learning as beneficial in terms of easy access to content and flexibility. Most participants gave positive feedback about the applicability of the training to business processes. However, some participants stated that distance education did

not play a sufficient role in their job performance and that there were limitations in terms of interaction and application opportunities. In the study of Parmaksız and Sıcak (2015), some participants stated that distance in-service training did not provide the effectiveness of face-to-face in-service training. However, research by Suwannaphisit et al. (2021) suggests that even if the online learning curriculum is designed based on a framework that focuses on effective pedagogical principles, some staff members still demonstrate resistance to distance in-service training, yet recognise its advantages after using it. Gebel and Bozkurt (2022) came to a similar conclusion. Although the training is live and designed for participants to ask questions and express their opinions, it is normal for some participants to not express such opinions because it does not fully meet the socialization needs of the participants and is different from the in-service training they are used to. There are findings in the literature that the use of mixed methods is more effective than the use of distance education or face-to-face training alone (Sırakaya, 2017; Tekin, 2019). Research by Bluestone et al. (2013) also suggests the use of multiple techniques that facilitate interaction and enable students to process and apply information. The findings of the same research indicate that effective techniques for distance learning can be equally or more effective than face-to-face training, leading to improvements in knowledge and skill outcomes and practice behaviours.

The other factor that accounts for the fact that some participants indicated that the training did not contribute to their career planning and that the training did not change their perceptions about office technology is individual differences. The efficacy of distance-based in-service training programmes may be contingent on the characteristics of the student population (Yu et al. 2022). (Yu et al. 2022). Individual differences are considered an important variable in learning, motivation to learn, and the success of teaching methods and techniques. Distance education has advantages such as flexibility, support for individual learning, independence from time and place, and disadvantages such as limited communication and interaction (İşman, 2008). Therefore, it is normal that some participants emphasized the positive aspects of the distance education they received, while others emphasized the negative aspects and expressed negative opinions. This result is consistent with the findings of the studies conducted by Cabı and Erhan (2016) and Tekin (2020).

In addition, participants indicated the importance of increasing the frequency of training and developing content that meets personal needs. In addition to the positive results, the participants' responses revealed the need to make distance learning programs more interactive and practical, to continually improve the training, and to make it more relevant to the specific development needs of the participants.

### **Recommendations**

The results of this study show that new distance in-service training programmes should include comprehensive and various subjects in the areas that office workers need. It is important that the new distance in-service activities to be organised should be planned

in line with the views of the participants, and for this purpose, it is important to apply a questionnaire for possible interests, needs and expectations. Thus, up-to-date options can be offered for different areas of interest. In addition, suggestions such as increasing the number of trainings, making an evaluation at the end of the distance in-service training, giving feedback to the participants according to the results of this evaluation and rewarding those who successfully complete the training with certificates can also be presented. In this way, the level of overlapping of individual and organisational career planning can be increased, employees can be prevented from wanting to leave the organisation or silent resignation by displaying a versatile or unlimited career attitude, and their productivity and performance can be increased. In this framework, some concrete and applicable policy recommendations can be developed to increase the effectiveness of distance in-service trainings:

- *Increasing interactivity:* Active participation of participants should be encouraged by adding live discussions, group work and case studies to training programmes.
- *Practice-based training:* Practical applications and virtual simulations should be offered in addition to theoretical knowledge, especially in skill-oriented subjects such as office technologies.
- *Personalising the learning process:* Modular training contents should be offered, taking into account the potential for participants to possess varying levels of knowledge and skills.
- *The provision of more feedback mechanisms:* At the conclusion of the training programme, surveys and individual feedback sessions should be organised to evaluate the satisfaction and suggestions of the participants, and the content should be updated accordingly.
- *The implementation of a hybrid model:* Face-to-face workshops or mixed (hybrid) training models should be used in certain periods instead of distance education.
- *The strengthening of social connection:* Virtual networks, forums or online working groups should be created to meet the socialisation needs of the participants.

In addition to these contributions, the study also has some limitations. As a case study, the limitations of the research are determined by the time, the place where the situation is analysed and some characteristics. The study is limited to the distance learning that took place between certain dates and the data collection process. In addition, the fact that the group of the study consists only of the office managers and assistants of Anadolu University Open Education System is also a limitation. Therefore, it is suggested that future studies should be designed to include larger groups of participants.

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## Genişletilmiş Türkçe Özet

Kariyer, çalışanların pozisyonlar arasındaki hareketliliğini ve bireyin iş hayatındaki metaforik yolculuğunu tanımlamaktadır (Bingöl, 2013). Kişinin hayatı boyunca bulunduğu pozisyonlar, ilerlemesi ya da yükselmesi kariyer kavramı ile açıklanmaktadır. Kariyer mutlaka öğrenme, kendini geliştirme ve uzmanlaşma gibi aşamaları içerir ve çalışanlara psiko-sosyal tatmin sağlar. Kariyer yönetimi kavramı, kariyerin bireysel ve örgütsel amaçlarla yönetilmesini tanımlar. Başarılı bir kariyer yönetimi sayesinde kurumlar geleceğin beceri ve yeteneklerine sahip insan kaynağına sahip olabilirler. Kariyer uyum yeteneği, bireylerin mesleklerindeki zorlu durumların üstesinden gelebilme becerisini ifade etmektedir (Hartung, 2013). Kariyer uyum yeteneği, bireylerin yeni işler bulmasında ve farklı işler arasında geçiş yapmasında etkilidir (Maggiori vd., 2013). Günümüzün esnek istihdam ortamında kariyer geçişleri yaygındır ve kariyer yolları daha az öngörülebilirdir (Ginevra ve Nota, 2017). Kariyer uyum yeteneği yüksek bireyler, iş ortamındaki yeni sorumluluk alanlarında başarılı olmakta ve beklenmedik değişikliklerin üstesinden kolaylıkla gelebilmektedir (Savickas, 2013; Dönmezoğulları ve Yeşilyaprak, 2019).

Kariyer uyum sürecinde kurumsal destek, çalışanların önem ve değer duygularını geliştirerek kariyer uyumunda daha başarılı olmalarına yardımcı olabilir (İrge ve Okay, 2021). Nitekim informal iletişimde, bazı çalışanlar büro teknolojileriyle başa çıkma konusunda kendilerini yetersiz hissettiklerini ve daha fazla desteğe ihtiyaç duyduklarını belirtmektedir. Bu yetersizliğe neden olan faktörlerden biri de verilen hizmet içi eğitimin sınırlı olmasıdır. Hizmet içi eğitim yoluyla büro personelinin kariyer uyumlarını ve teknoloji yeterliklerini geliştirmek çok önemlidir. Bunun gerçekleşmesi için kariyer gelişiminin iki yönlü ilişkisel bir süreç olduğunun kabul edilmesi gerekmektedir (Hall & Moss, 1998).

Hizmet içi eğitim, yaşam boyu eğitimin bir alt sürecidir ve örgütler için vazgeçilmez bir faaliyettir (Kulaz, 2013). Hizmet içi eğitim, çalışanlara işlerini yapabilmeleri için ihtiyaç duydukları bilgi, beceri ve tutumları kazandırmak amacıyla gerçekleştirilir (Altun Bogoçlu ve Gündüz, 2022). Hizmet içi eğitim yüz yüze veya uzaktan eğitim yoluyla verilebilir. Uzaktan eğitim, özellikle büyük ve coğrafi olarak dağınık bir hedef grupla çalışırken çeşitli avantajlar sunar (Noe, 2009). Ayrıca uzaktan eğitim yöntemlerinin kullanılması standardizasyonu teşvik edebilir (Halvurt, 2010).

Küreselleşme, gelişen teknoloji ve değişen beklentiler karşısında kamu kurumları, faaliyetlerini ve rekabet avantajlarını sürdürebilmek için esnek, şeffaf ve uyarlanabilir olma baskısı altındadır (Özdemir vd., 2017). Bu ihtiyaca yanıt olarak, kamu yönetiminin geleneksel yapısında dijitalleşme ve memurların eğitim seviyesinin yükseltilmesine vurgu yapılması gibi değişiklikler olmuştur. 657 sayılı Devlet Memurları Kanunu'nun 214. Maddesi, devlet memurlarının becerilerini ve üretkenliklerini geliştirmek ve onları gelecekteki rollerine hazırlamak için hizmet içi eğitimin önemini vurgulamaktadır. Bu girişimler, kamu kurumlarının değişen dünya düzeninde etkin bir şekilde yol

alabilmelerini ve toplumun gelişen ihtiyaçlarına etkin bir şekilde hizmet edebilmelerini sağlamayı amaçlamaktadır.

Bu çalışmada, "Büro yöneticileri ve büro yönetici yardımcılarının kariyer uyumu ve büro teknolojisi yeterlikleri uzaktan hizmet içi eğitim programına ilişkin görüşleri nelerdir?" sorusuna yanıt aranmıştır. Ana problemden hareketle katılımcıların görüşlerine dayalı olarak alt sorulara da yanıt aranmıştır. Araştırma nitel araştırma yöntemleri kullanılarak bir durum çalışması olarak tasarlanmıştır. Araştırmada, kariyer uyum yeteneği ve büro teknolojisi yeterliği konusunda uzaktan eğitim alan gönüllü katılımcılardan (84) yarı yapılandırılmış sorularla elektronik ortamda veri toplanmış ve içerik analizi gerçekleştirilmiştir. Katılımcılar Anadolu Üniversitesi Açıköğretim Sisteminde çalışan büro yöneticileri ve büro yönetici yardımcılarında oluşmaktadır.

Durum çalışmasında araştırmacı mevcut ortamı ya da kişiyi gözlemler, çeşitli kaynaklardan (belgeler, kişiler vb.) bilgi edinir ve duruma neden olan olgunun gelişim sürecini araştırır. Bu çalışmada literatür taranarak oluşturulan taslak anket, uygulama öncesinde bir dil uzmanı ve iki alan uzmanının görüşüne sunulmuş çalışmanın geçerlilik ve güvenilirliğini artırmak için görüşleri alınarak ortaya çıkarılmıştır. Ardından uzaktan hizmet içi eğitimin gerçekleştirilmesi ve veri toplanması için gerekli yasal izinler alınmıştır. Dört katılımcı ile bir test uygulaması yapılmış ve 6 sorudan oluşan forma son şekli verilmiştir.

Büro yöneticisi ve büro yönetici yardımcılarının katıldıkları "kariyer uyum yeteneği ve büro teknolojisi yeterlikleri" konulu uzaktan hizmet içi eğitim programı hakkındaki görüşlerini incelemeye yönelik bu araştırmaya 84 kişi katılım göstermiştir. İfadelerinden anlaşıldığı üzere katılımcılar aldıkları uzaktan hizmet içi eğitim programının mesleki gelişimlerinde ve sürekli öğrenmelerinde önemli bir rol oynadığını kariyer uyum yeteneği, kariyerin anlamı, iş ortamına uyum sağlama, bireysel güçlü ve zayıf yönleri keşfetme gibi olumlu sonuçları olduğunu ve kişisel kariyer planlamalarına olumlu etkileri olduğunu belirtmişlerdir. Söz konusu eğitimin bilgi ve becerilerini ve ofis teknolojilerini kullanma yeterliliklerini artırdığını belirtmişlerdir.

Katılımcılar eğitimi etkili ve verimli bulmuşlar, mevcut bilgi boşluklarını doldurduğunu ve kendilerini daha donanımlı hale getirdiğini vurgulamışlardır. Eğitimin işlerini etkin bir şekilde yerine getirme becerilerini artırdığını ve iş süreçlerinde karşılaştıkları teknik zorluklarından üstesinden gelmelerine yardımcı olduğunu ve güncel teknolojileri iş hayatında nasıl kullanacakları konusunda daha bilinçli hale getirdiğini belirtmişlerdir. EBYS kullanımı, e-posta yönetimi, takvim oluşturma ve siber güvenlik eğitimlerini özellikle faydalı bulmuşlardır.

Katılımcılar uzaktan eğitimi içeriklere erişim kolaylığı ve esneklik bakımından avantajlı görmektedir. Katılımcıların çoğu eğitimin iş süreçlerine uygulanabilirliği konusunda olumlu geri bildirimde bulunmuşlardır. Bununla birlikte bazı katılımcılar uzaktan hizmet içi eğitimin iş performanslarında yeterli bir rol oynamadığını, etkileşim ve uygulama olanakları açısından kısıtlar olduğunu belirtmişlerdir.

Bazı katılımcıların eğitimin kariyer planlamalarına katkı sağlamadığını belirtmesinde ve eğitimin büro teknolojilerine ilişkin algılarını değiştirmedini bildirmesinde etkili olan diğer faktör bireysel farklılıklardır. Bireysel farklılıklar, öğrenmede, öğrenmeye motive olmadıkça, öğretim yöntem ve tekniğinin başarılı olmasında önemli bir değişken olarak görülmektedir. Katılımcıların verdikleri yanıtlar; olumlu sonuçların yanında uzaktan hizmet içi eğitim programlarının daha etkileşimli ve uygulamaya dayalı hale getirilmesi, eğitimlerin sürekli geliştirilmesi ve katılımcıların özel gelişim ihtiyaçlarına daha uygun hale getirilmesi gerekliliğini ortaya çıkarmıştır.

**Anahtar Kelimeler:** Kariyer Uyumu, Büro Teknolojisi, Uzaktan Hizmet İçi Eğitim, Büro Yöneticisi

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# The Impact of School Culture on the Transformation of Teachers' Professional Skills: The Case of Ankara Science High School

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**Abstract:** This study aims to understand how school culture influences the transformation of teachers' professional skills in the context of Ankara Science High School. The school culture that is owned leads schoolteachers to experience professional satisfaction, increases their sense of belonging and enhances professional productivity. At the same time, it has been determined that under the influence of school culture, teachers do not have difficulty in applying general professional practices such as classroom management and managing undesirable student behavior, but they feel the need to significantly enhance their general knowledge and subject-specific knowledge and skills significantly, and as a result, their professional skills are transformed. Furthermore, teachers reported a noticeable shift in their approaches to both students and parents as a result of the school culture. The findings of the research such as including creating and maintaining a strong school culture to improve teachers' professional skills, increasing the image of the school in society, the educational demands of students, and ensuring the support of alumni to their schools, provide concrete recommendations for education administrators, teachers, and Ministry staff.

**Keywords:** School culture, teacher, professional skills, Ankara Science High School.

## About the Article

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## Introduction

Education is not merely a sum of technical processes but also a process of humanization (Kant, 2013). Schools, where education is planned and programmed, are institutions where human relations are experienced intensely (Taymaz, 2009). This characteristic of schools leads to the formation of natural structures that spontaneously emerge among school stakeholders significantly affecting the success of the school's formal structure (Bursalioğlu, 2000). Although there are different approaches, it seems that school culture is one of the most important factors affecting the formal structure of the school and the professional skills of teachers, who are the main carriers of this structure.

Schools where educational activities are carried out are also a part of the organizational life in society. Schools, as educational organizations like other social structures, are institutions in which individuals live and work professionally. In these institutions, the ways in which individuals perceive the world, interpret their experiences, and interact with society are internalized as a whole, creating the social structure and values of the institution. The behaviors of individuals in schools are not merely reflections of their own individual worlds, but are behaviors shaped by the values, social norms and expectations of the culture that exists in that organization.

Culture is a field of human actions (Bauman, 2021) and consists of the phenomena that humans reveal in spatial and temporal planes. The centrality of humans in culture shows that culture is modifiable, dynamic, and adaptable (Eagleton, 2016). The interaction between culture and the individual occurs on a cognitive level (Alvesson & Sveningsson, 2008), and this relationship is mutually nourishing, shaping one another, and sometimes unfolds in a dialectical structure. School culture is shaped during the school's historical development by its stakeholders and material assets, consisting of the meaning patterns that stakeholders assign to these assets and the realities revealed through their relationships. This process both makes the school's culture its unique characteristic and distinguishes the school from other schools.

The temporal and spatial structure of culture leads each school to create its own identity and culture, shaped by the stakeholders and dynamics of the school (Atmaca & Dağ, 2023). School culture is the organizational symbol and meaning patterns formed by the transformation of the assumptions, values, norms, beliefs, rituals, stories, ideologies, and symbols carried by the school stakeholders into school-specific emotion, thought, and behavior patterns as a result of internalization and adoption by the school stakeholders (Ayık & Ada, 2009; Güçlü, Yıldırım & Daşçı, 2016). What makes culture strong and enables it to direct behavior within the organization is the notion of "sharedness" in its definition (Robbins & Judge, 2013). Therefore, what makes a school develop and become strong is the quality of its culture and the level of adoption of the culture among stakeholders (Balci, 2002).

The most important duty of the school is to ensure that students are successful by making them capable of doing what is desired. It is an important feature in the culture of a successful school to provide opportunities for each student to develop their potential in

line with their interests and abilities (Ajaheb-Jahangeer & Jahangeer, 2004). Studies have demonstrated that school culture serves as an intermediary variable influencing student success (Demirtaş, 2010; Karayel & Er, 2022). The main actors in ensuring student success within school culture are teachers. The change, transformation and development of teachers in the educational processes become possible by developing the school culture, ensuring cooperation and solidarity between colleagues, and by constantly being in professional and intellectual learning (Thoonen, Slegers, Oort & Peetsma, 2012).

The teacher is the fundamental element that shapes both the present and future of students through the education they provide. It acts as an intermediary in the change of emotions, thoughts and behaviors experienced by students. According to the *Law on the Teaching Profession* (2022), teaching is a specialized profession that undertakes education and training as well as related management duties, and preparation for the profession is provided by general knowledge, specialized field education and pedagogical formation/teaching professional teaching knowledge. Teaching is a profession that focuses on human subjectivity within the realm of human activity. Therefore, to develop a qualified teacher identity, teachers must be aware of the knowledge and skills required by the profession both before and after starting their careers and maintain this awareness throughout their lives (Forte & Flores, 2014). Teachers must have a high level of commitment and motivation toward their profession. It is a known fact that institutions with strong school cultures motivate teachers better (Cheng, 1993) and increase their organizational commitment (Sezgin, 2010). School culture is a strong variable influencing teachers' professional behavior (Kılınc, 2014), and teachers in strong school cultures are able to enhance their professional knowledge and skills during their educational processes (Rizvi & Elliott, 2005). According to the 2019-2023 and 2024-2028 Strategic Plans of the Ministry of National Education (MNE), MNE sees the low motivation and commitment of employees to the organization as a challenge in the development of the organization. Moreover, in the *Secondary Education Institutions Regulation* (2016), emphasis was placed on school culture, and it was requested that school culture studies be included in teachers' board meetings, measures should be taken to increase school efficiency through the school culture of school administrators and teachers, to create team spirit, and to integrate the school with the environment.

School is a social institution that has its own unique dynamics. The formative and directive feature of school culture stems from the social structure of the school. Because it is important that people who must be together and take joint actions in the school environment share some common social realities (Şişman and Turan, 2005). Social realities, on the other hand, are the result of the social learning process. According to Wenger (2000), social learning emerges as a result of the interaction of people with their environment, as a result of the mutual influence of social competence and personal experience based on social participation. In the school environment, teachers' involvement in a participatory school society, their participation in certain activities, their

formation of their own identities and their efforts to make sense of the school life around them occur through the social learning process. In this regard, teachers develop professional skills specific to the school culture by learning the basic values, beliefs, norms and symbols of the school culture through the social learning process.

School culture draws its foundations mostly from sociology and anthropology (Lunenburg and Ornstein, 2013), and provides continuity in the actions of school employees and harmony in their behavior (Hoy and Miskel, 2012). Without developing school culture, it is not possible to enhance other aspects of the school (Şimşek, 2003). Teachers' professional practices can develop in school cultures that support positive relationships and effective communication among school staff and are oriented towards increasing student success and improving the school (Tschannen-Moran, 2004). One of the main determinants in the development of teachers' professional knowledge and skills and in-class and out-of-class educational activities is school culture, and a supportive school culture has a critical role in helping teachers act with a focus on professional development (Hopkins, 2007). Therefore, it seems that school culture has a significant impact on shaping and transforming teachers' professional skills and practices. With this research, it aims to understand how school culture affects the transformation of teachers' professional skills based on general knowledge, specialized field knowledge and pedagogical formation/teaching professional teaching knowledge in the context of Ankara Science High School.

Ankara Science High School (ASHS), established in 1964 to contribute to Turkey's scientific and technological development at the secondary education level, is the first science high school in Turkey. ASHS was built on the land of the Middle East Technical University as a large campus of 123 acres, with buildings featuring a special architectural design. The ASHS campus area consists of 11 different buildings and also includes teacher lodgings. Since the day it was founded, ASHS has admitted its students through a selection exam, and as a result of the 2023 LGS exams, students who were among the top thousand in Türkiye were enrolled in the school.

ASHS, which produced its first graduates in 1967, has produced 5203 graduates by 2023 and its graduates are organized under the names of Ankara Science High School Graduates Foundation and Ankara Science High School Graduates Association. As of 2023, 4 administrators and 39 teachers are working at ASHS, and a total of 481 students, 352 of whom are boarding students, are continuing their education. The school's motto is "We are Exemplary, We are Leaders, We are All One". ASHS has placed itself in a privileged position through these features and has established a strong school culture and ensured its continuity. This culture, which is adopted by school teachers, students, parents and graduates, is seen to have a transformative and formative effect thanks to its features.

In the literature, research on school culture is generally found to be quantitative studies aimed at revealing the perceptions of school staff toward school culture and its components, or exploring the relationship between school culture and various variables (Özoğlu, 2015). However, recent years have seen an increase in qualitative studies as

well (Karayel & Er, 2022; Kozikoğlu & Senemoğlu, 2018; Meşeci-Giorgetti, Karataş & Karabacak, 2023; Nergiş-Işık, 2010; Özoğlu, 2015), aiming to explore the depth and nuances of school culture. Nevertheless, many of these studies focus on the views of school administrators, teachers, and students regarding school culture. Given the multifaceted and complex nature of culture and the subjectivity of individuals, there are limited studies focusing on the relationship between school culture and the transformation of teachers' professional skills. This study aims to fill this gap in the field by addressing teachers' perspectives through qualitative methods. In this context, within the scope of the current study, examining the opinions of teachers about the transformative and formative effect of school culture, which affects the professional skills of teachers, one of the main actors of the school, in the theoretical and practical context, is important in terms of filling the gap in the literature. Depending on this problem situation, answers to the following sub-problems were sought:

- How do teachers perceive the historical legacy of the school in shaping its culture?
- How do teachers describe the influence of school culture on their professional experiences?
- How do teachers perceive the ways in which school culture contributes to changes in their professional identity or practices?
- How do teachers describe the role of school culture in shaping their interactions with students, colleagues, and parents?

## Method

### Research Design

In this research, a qualitative research method was used, adopting a case study design (holistic and single case study). Case studies investigate one or more real-life situations. The case is limited by specific parameters, such as location, time, and variables (Creswell, 2013). Case studies primarily address the "how" and "why" questions and allow for an in-depth examination (Yıldırım & Şimşek, 2006). Case studies have become increasingly common, especially in social sciences and more specifically in educational sciences, for detailed descriptions and deep investigations of specific instances.

In the case study design, the researcher does not have control over the situations, and events or cases are analyzed in their natural flow. Case studies examine social phenomena in their everyday context, but since these studies are specific to particular situations, generalizations cannot be made from their findings (Yin, 2017). Case studies immerse the reader into the situation and experience, offering insights into the life of a group (Patton, 2014). Ankara Science High School has a strong culture, which is the first science high school in Turkey and a boarding school, its own unique architectural design, the successes achieved, that students have the opportunity to behave freely in a wide campus area, and that the school creates its own functional symbols was chosen as a case study in the research. In this regard, a holistic single-case study was preferred

because it was desired to examine in depth the impact of the school culture of Ankara Science High School on the professional practices of teachers working at the school and to describe the school-specific situation in detail.

### **Ethics Committee Approval**

Ethical approval for this research was obtained through the decision of Gazi University's Ethics Committee, numbered 2023/1251, dated 23/10/2023, after which the data collection process was carried out.

### **Selection of Participants**

Participants were selected using criterion sampling and maximum variation sampling methods to meet the predetermined criteria for the research. The criterion of being employed at Ankara Science High School has been selected as the benchmark. For maximum diversity, factors such as gender, age, branch, educational background, professional seniority, and tenure at the school were taken as a basis. The demographic information of the participants is presented in Table 1.

**Table 1:**

*Participant Characteristics*

Participant	Gender	Age	Branch	Professional seniority	Experience at ASHS	Degree
P1	Female	62	Turkish Language and Literature	40 years	30 years	Bachelor's
P2	Male	60	Chemistry	37 years	18 years	Master's
P3	Male	60	Physics	36 years	11 years	PhD
P4	Female	53	English	27 years	7 years	Bachelor's
P5	Male	42	Mathematics	20 years	7 years	Master's
P6	Male	47	Biology	25 years	6 years	PhD
P7	Male	40	Computer Science	17 years	3 years	Bachelor's
P8	Female	42	English	10 years	1 year	Master's
P9	Female	47	Physics	21 years	2 years	PhD

As shown in Table 1, among the teachers participating in the study, 5 are male and 4 are female. The ages of the participants range between 40 and 62 years (average age:

50.3). The distribution based on subject areas shows that teachers from seven different subjects were included in the study. The professional experience of the teachers varies between 10 and 40 years (average: 25.8 years). Their tenure at the school ranges from 1 to 30 years (average: 9.4 years). Three of the teachers hold bachelor's degrees, three hold master's degrees, and three hold doctorates. As of the 2023-2024 academic year, the total number of teachers at Ankara Science High School is 39. Thus, the study group represents 23.07% of the target population.

### **Data Collection Tool**

The research data were collected using a semi-structured interview form created by the researcher. The form contains a total of four main questions and nine probe questions. The questions posed to the interviewees are listed below:

RQ1. How would you describe the culture and distinctive aspects of Ankara Science High School?

RQ2. How have the cultural values of Ankara Science High School affected you as a teacher?

RQ3. After starting to work at Ankara Science High School, did you feel any personal change or transformation? If so, how?

RQ4. How would you describe stakeholder relationships at Ankara Science High School?

### **Data Collection and Analysis**

The data were collected by the researcher both face-to-face and via online platforms during the period of 11-25 November 2023. Following Lincoln and Guba's (1986) approach, data collection continued until similar information began to emerge, concluding the process once data saturation was reached. As a result, 9 teachers participated in the study, and the analysis was conducted based on the data provided by all participants. The interviews lasted between 30 and 45 minutes.

For data analysis, descriptive analysis was used based on the Strauss and Corbin approach (Özdemir, 2018). Descriptive analysis involves summarizing the data according to predetermined themes. In this study, four themes were identified in advance: "Culture and Distinctive Aspects of Ankara Science High School", "The Impact of Ankara Science High School's Culture on Teachers", "The Transformative Aspect of Ankara Science High School's Culture", and "The Influence of Culture on Stakeholder Relationships at Ankara Science High School". The data were analyzed using the MAXQDA 2020 software.

### **Validity and Reliability**

It is necessary to meet the criteria of credibility and transferability to ensure validity in qualitative research and to collect evidence of reliability to ensure that the conclusions

drawn from the findings are reliable. To enhance the validity of the research, the interviews were transcribed, and the participants' confirmations were obtained. To strengthen the credibility and reliability of the study, direct quotations were used. Care was taken to ensure that the interview questions and findings were consistent with the relevant literature.

## Findings

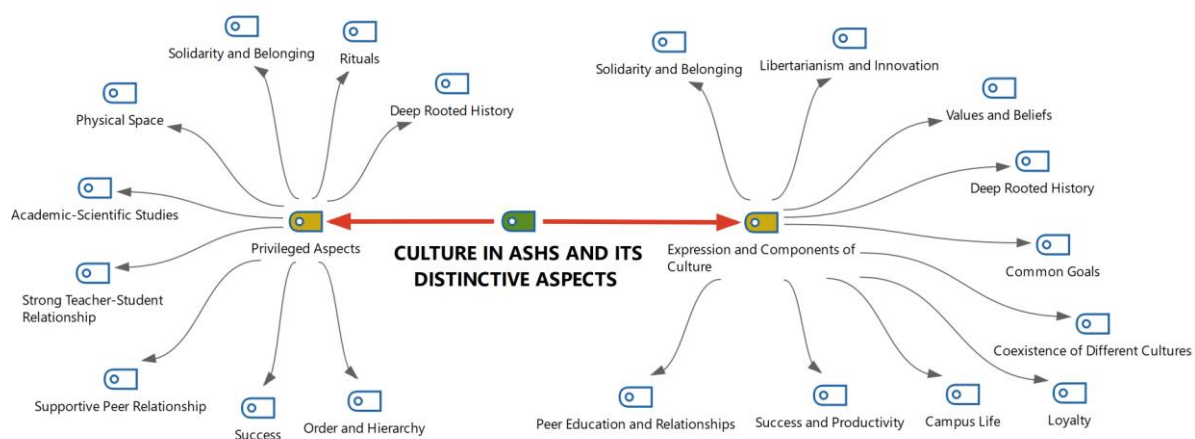
Within the scope of the research, four key themes were identified. The opinions and comments related to these themes are presented sequentially.

### Culture and Distinctive Aspects of Ankara Science High School

The culture of Ankara Science High School prominently features several recurring elements, including students' desire for success and productivity, the school's deep-rooted history, the coexistence of diverse cultures, the shared objectives of the school's stakeholders, the sense of solidarity and belonging among students, teachers, parents, and alumni, the transmission of school culture from upper classes and alumni to younger generations, peer education, a liberal and innovative environment, campus life, and a strong sense of loyalty. These cultural characteristics are seen as factors influencing both the quality and quantity of education at Ankara Science High School. The stakeholders' unified effort toward common goals, their commitment to the school, and their desire for success contribute significantly to the school achieving its objectives. Figure 1 illustrates the culture and distinctive features of Ankara Science High School.

Figure 1.

Culture and Distinctive Aspects of Ankara Science High School



In terms of school culture, the fact that the school is the first science high school and has a long-standing history is regarded as a significant factor. At the same time, the school has distinguished itself from other schools over time with the material and intangible opportunities it has. P2, with "From the very beginning, the fact that it is called a Science High School, being Turkey's first Science High School, has fostered a strong sense of

ownership, especially among alumni. Over the years, this beautiful spirit has been built, and it still continues. The spirit here is not the spirit of Ankara Science High School but the spirit of Science High School", he expresses this idea and emphasizes the privileged position of the school. Another factor that makes the school privileged is that the school has a large campus area like a university, which allows students to experience campus life at the secondary level. For this reason, the P4 thinks that the students are very lucky. Campus life transforms and shapes school culture through the transformation it creates in the daily life of the school. Supporting this idea with the words "It was liberal, dynamic and it really wasn't something that would form in 1 or 2 years. You can see the accumulation of years" states that P5, the cultural structure of the school is liberal and dynamic, it was not formed in a short time and it is not temporary. The main reason for this situation can be shown as the solidarity and sense of belonging that develops among the school stakeholders and the loyalty felt towards the school. P7, who stated that another factor that affects teachers' sense of belonging and solidarity to the school is school lodgings, said: "Staying in a lodging is also very beneficial for teachers, students, the school and the school culture. I wish it would be different if every teacher stayed in the lodging. The nice thing about lodging is that you don't lose touch with the school, it increases your belonging to the school." expresses with his words.

The fact that the school accepts students from every region of Turkey through examination and creates a common culture by reflecting the cultural values of each student to the school brings about cultural diversity in the school. P2 refers to this as the "Anatolian mosaic". The places where students' cultural diversity is intensely integrated are school boarding houses. Boarding houses also cause the formation of a boarding culture and the transfer of existing values and beliefs with the understanding of periodism. P6 supports this by stating: "Since the school is a boarding school and the majority of our students are boarding students, the relationships between the lower classes, upper classes and even the graduates play a very important role in the transfer of school culture". Another phenomenon that boarding brings to the culture is peer education and the intense relationships that students establish with each other and with their teachers. P1 expresses the strong relationship shaped by boarding school with the statement, "I can still establish a dialogue with the students I graduated 30 years ago".

School culture refers to an intersection area created by school stakeholders. This situation demonstrates that the culture is created and adopted by all stakeholders of the school. P1 puts forward this idea with the view that "When Ankara Science High School culture is mentioned, our students' classmates, the teachers they nicknamed, the cafeteria staff, the hostel, the studies, the canteen, the academic success, especially the projects and Olympic studies, and the awards they received should all be considered together". Therefore, it is seen that success and productivity are at the center of the intersection of school culture, and students, graduates, parents, school administration and teachers spend all their efforts on the success of the students. P4 explains this component of school culture with the concept of "quality that has become a habit".

P3 highlights the active relationship between the school and its alumni: *"We have an alumni foundation, for instance. They work to make the school better"*. The existence of such active alumni relationships is a hallmark of culturally advanced schools. The fact that alumnis organize themselves under the name of non-governmental organizations such as Foundations or Associations that they establish and continue their relations with the school after graduation, and also contribute to the school, is an indicator of the sense of belonging to the school.

The elements that distinguish Ankara Science High School from other schools include its deep-rooted history, the students' focus on success, the solidarity among stakeholders, the strong sense of belonging, the organization of alumni under foundations and associations, the continuation of relationships between students and alumni, the rituals performed at the school, its unique architectural design, the campus life, the project and olympiad work conducted at the school, the relationships between teachers and students shaped by the boarding school culture, and the peer education and collaboration among students.

School culture is a lifestyle formed in the temporal and spatial context of the school. The foundation of the school, the experiences of its employees, and their mutual interactions over time have created a unique culture at Ankara Science High School. The school being the first science high school in Turkey and holding this distinction for 18 years, attracting the top-performing students from across the country, and the success of alumni in university entrance exams, project work, and olympiad competitions have fostered a success-oriented culture at the school. P2 supports this situation with the statement: *"This school is one that is constantly working, producing, and striving for success"*. P1 adds, *"If I had been at another school, I would have drawn the line somewhere, but I can't do that here because when you touch these students, they take it and run with it"*. P9 further supports the existence of a success-driven culture with the comment: *"The individuality, the freedom provided by the school, peer education, the mentor-apprentice relationship, and the desire of students to prove themselves are the distinguishing features of Ankara Science High School's culture"*. P7 emphasizes that this culture is not just shaped by the students but by the participation of all stakeholders, stating: *"You don't see students, teachers, administration, parents, or alumni like this at many other schools. If a task needs to be done, these surrounding factors keep each other dynamic and push each other forward"*. This situation is also an indication of the solidarity and belonging among the school's stakeholders.

The school's architectural structure is one of the primary mechanisms producing and transmitting its culture. The school building's distinctive character unique to the school can create a sense of belonging to the school for stakeholders. The fact that the school has a large campus area also creates a cultural perception in teachers. P6 expresses this with the following reflection: *"When I first came to the school, I wondered, 'Where have I come to?' The school has a unique atmosphere, partly due to its architecture. You know how you feel different when you go into a large place of worship; it's like that"*. Considering the views of the participating teachers, it is seen that the buildings and

campus of Ankara Science High School shape the students' worlds of meaning, offer a lifestyle, and, in a sense, act as a second teacher. P1 emphasizes that he learned at Ankara Science High School that physical structure is very important in school culture and gives the following example: *"The demolition of the dormitories and the gym made the graduates very sad. Why are you sad about the graduates, you say it has been renovated. The graduates say, "Teacher, I had memories there, the objects evoke memories, when I went to that dormitory, my room was gone now." There are no spaces that would reflect that memory. They said, "I wish they had been."*

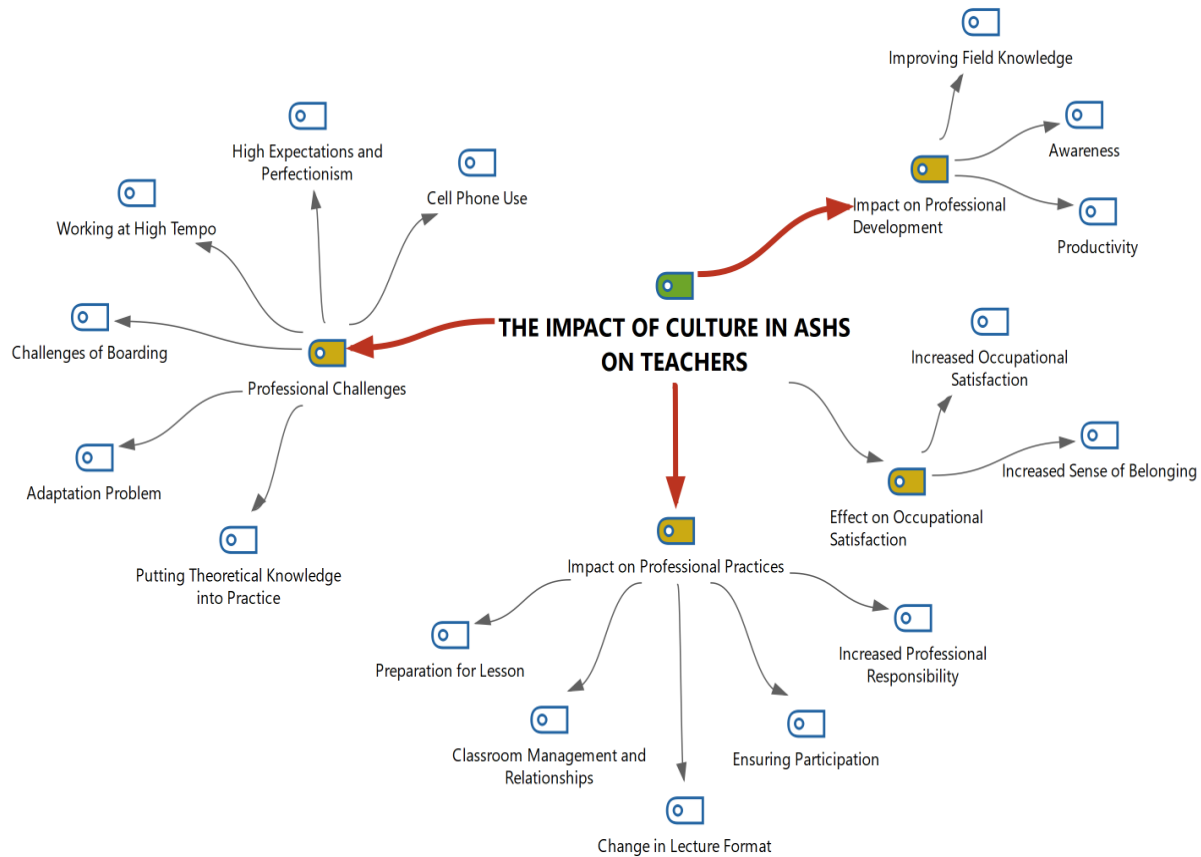
P1's statement, *"We can say that project and Olympic studies are among the most important features that add difference to the culture"*. The expression shows that project and Olympic studies are an important phenomenon of school culture. The national and international achievements of students in project and Olympiad competitions not only foster a sense of pride and increase their sense of belonging to the school but also serve as role models and sources of motivation for students from lower classes. Peer education plays a significant role in these academic and scientific activities. P9 notes, *"This is a school where peer education is very well-executed, based on my observations. It's a place where a master-apprentice relationship can be nurtured, something we don't often see in other schools,"* thereby emphasizing the impact of supportive peer education within the school culture.

In the everyday life of the school, functional symbols that ensure the continuity of school culture are also evident. For example, (K5) states that there is an order and hierarchy among students, that each class level has a separate seating section in the cafeteria or conference halls, and that no one can sit anywhere other than the designated place. P4 similarly emphasizes that these practices are also observed in the dormitories. In addition, P1 states that the Alumni Day organized by the alumni association is held every year on the last Sunday of May, that the first and last courses of the academic year are given by the graduates, and that representative diplomas are given to the students who graduated forty years ago at the school graduation ceremony. P2 stated that for the last three years, a ceremony has been held on October 12, referring to the date of the start of education and the first lesson of the school, 12.10.1964, and that especially the first graduates came to this ceremony.

### **The Impact of Ankara Science High School's Culture on Teachers**

The impact of Ankara Science High School's culture on teachers can be evaluated in four dimensions: impact on professional development, impact on professional satisfaction, impact on professional practices, and challenges it creates in the profession. Figure 2 illustrates the impact of the school culture on teachers.

**Figure 2:**  
*The Impact of Ankara Science High School's Culture on Teachers*



The culture of Ankara Science High School is a phenomenon in which teachers contribute to the development of their field knowledge in terms of professional development. P6 "Students who are not content with what is given, but also students who want more, students who are inquisitive and questioning. Therefore, you need to catch up with them. In fact, you need to be one step ahead of them so that your communication with the students does not deteriorate." He states that highlights the need for teachers to constantly improve their subject knowledge to keep up with the demands of the students. In a success-oriented school culture, students' demands for learning and development have resulted in teachers being productive. P1 "After all, Ankara Science High School taught me to expand and improve a definition. It improved my creativity and differentiated my perspective." expresses the productivity and creativity he experienced in his class. Another phenomenon that school culture contributes to the professional development of teachers is the awareness they experience when they are first appointed to the school. For example, P9 states that he worked as a team in the school he worked in before, but learned to act individually after coming to the science high school. P9 reflects on this realization by stating: "I learned to make independent decisions, conduct more individualized work, and deliver more differentiated education. This school definitely taught me this".

The most important thing that teachers look for in professional satisfaction is that something they give to students in terms of teaching can be easily received by the student and that this returns to the teacher as feedback in the best possible way. It is seen that teachers working at the school have achieved professional satisfaction in this sense. P9 states: *"Physics is a course that even the best students have difficulty in. Okay, the course is still difficult for students here, but I can get what I give. This makes me happy."* Similarly, P7 notes: *"Here, the student makes you feel like you are a teacher. The students we touch are getting Türkiye degrees and achieving success. This makes you happy."* They express the professional satisfaction they experience with their words. The professional satisfaction that teachers experience as a result of students' success also causes teachers' sense of belonging to the school to develop. Participant (P4) describes this growing sense of belonging by saying: *"It increased my sense of belonging. Being with the students, taking shifts in the dormitory, wearing a t-shirt with the school logo. It all makes it very meaningful"*. And P5 shares a similar sentiment: *"Ankara Science High School is like a black hole; once you get in, you don't want to leave. It has that kind of environment"*.

The homogeneity of academically successful students at the school necessitates that teachers come to class well-prepared. P1 recounts their experience: *"Since I first started Ankara Science High School, I would study for 2-3 hours every evening like a student, I would scan a lot of resources. I would wonder what the student would ask, where they would ask, what they would ask questions about"*. This need for preparedness also instills a sense of professional responsibility among teachers. P2 reflects on this sense of responsibility, saying: *"When I first came to the school, I found it strange how quiet the school was. The students were always working on projects, preparing for olympiads or university entrance exams. This quiet atmosphere was actually one of intense study. Being part of this family requires a serious sense of responsibility"*. Students' awareness of their responsibilities, their desire to actively participate in lessons and to be successful have caused the conclusion that teachers do not have difficulties in classroom management and maintaining classroom discipline against undesirable student behavior. P8 states: *"Classroom management and teaching methods have become easier"*, while P6 adds: *"We've fully adopted and implemented inquiry-based science education"*, highlighting how teachers have adapted their teaching methods and are now able to implement techniques that they may not have had the opportunity to use at other schools.

In addition to the positive effects of school culture on teachers, it is seen that there are also some negative effects specific to the school, apart from the use of mobile phones in classrooms, which occurs in all schools, and this causes teachers to experience difficulties. In particular, the fact that students come to school with high success in high school entrance exams, the desire of students and their parents to graduate with the same level of success, and the existence of a success-oriented culture in the school have led to the emergence of high expectations and a feeling of perfectionism in students and teachers. This situation, which also causes adaptation problems for teachers, on the one hand as is expressed by P7 in the statement: *"We enlighten the student, but since the*

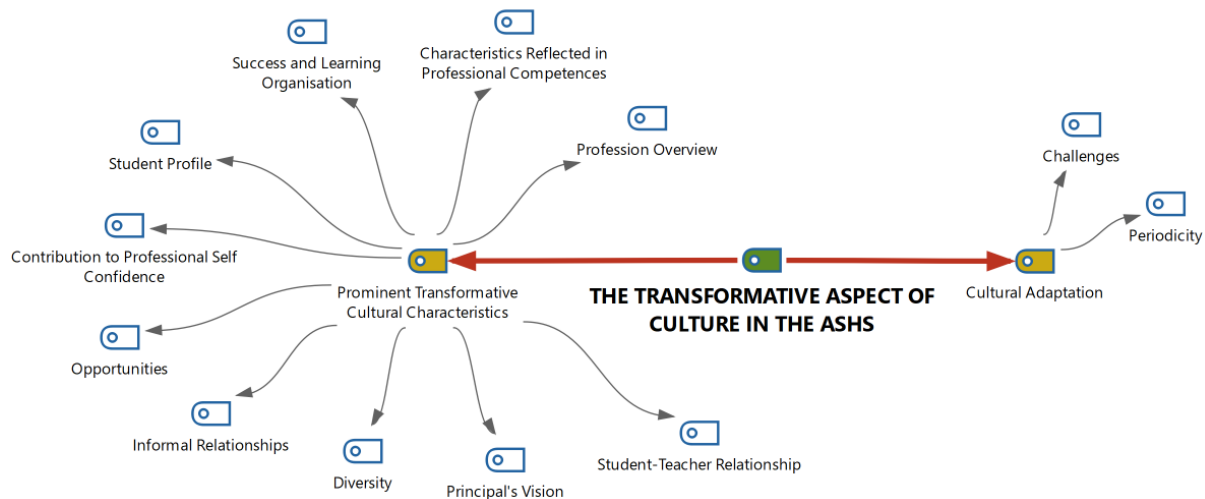
*student already comes with his own light, my teacher may say that your enlightenment is not enough for me". While it causes teachers to work at a high tempo, on the other hand as emphasized by P2 in the statement, "Expectations related to dorms, meals, and we can add parental expectations to this as well. Our school largely meets these demands, but the high expectations still pose a challenge. There are no limits to these expectations", these are also emerging as non-academic expectations. The difficulty that expectations create on teachers becomes concrete in the context of course notes. P3 expressed this difficulty with the thought, "The student got 95 and can ask you for the account. When the student gets a low grade, he/she can look for the fault not in himself/herself but in the teacher. He/she can create a perception by holding the teacher responsible". Another issue teachers face is that while students are academically successful and excel in theoretical knowledge, they sometimes struggle to apply this knowledge in project or workshop activities, participant P7 identifies this as another challenge.*

The fact that the school has a boarding school and the majority of the students are boarding, and that the teachers are on duty in the dorms house at night while teaching at the school during the day, causes teachers to experience role confusion. P1 states that the most difficult part of Ankara Science High School is the hostel phase, because dorms are the students' homes, so they are the students' mothers, sisters and teachers. The difficulty they experience is expressed by P5 as follows: *"It is also difficult to satisfy children spiritually in dormitory conditions. Because they are far from their families and they experience some traumas".* P6 states that the fact that students have high-level thinking skills means that their needs are also at a high level, and that the difficulties they experience differ from other schools by stating that students are fragile because they are held in high regard by their families.

### **The Transformative Aspect of Ankara Science High School's Culture**

The transformative aspect of Ankara Science High School's culture can be assessed in two dimensions: cultural adaptation and prominent transformative cultural characteristics. Figure 3 presents the transformative aspect of the Ankara Science High School's Culture.

**Figure 3:**  
*The Transformative Aspect of Ankara Science High School's Culture*



The success-oriented cultural structure of the school and the demanding nature of the students are the primary cultural elements that compel teachers to change. P2 expresses this transformation by stating: *“At Ankara Science High School, what forced me to change was primarily the students’ desire for success. This desire is not only limited to academic success; the students also aim to succeed in an educational sense”*. Similarly, P9 adds: *“The fact that students are different from one another, that they are individualistic, open to discussion, curious, and engaged, and that they demand something from me based on their interests and curiosities. These factors forced me to change”*. These comments suggest that the student profile, which drives the success-oriented culture, is the main factor compelling teachers to transform. The students desire to carry past achievements into the future leads students to seek learning opportunities beyond the formal curriculum, thereby prompting teachers to continuously update their knowledge on both subject matter and current issues. This also necessitates that teachers follow educational innovations and transform their professional perspectives, ultimately boosting their self-confidence. P1 reflects on this transformation by saying: *“Every year, I added something to my knowledge and experience. For example, in the past two years, I learned how to conduct project work and developed myself in this area. I’ve been a teacher for years, and I used to think, ‘What else could I possibly gain?’ But at this school, I couldn’t afford to think that way”*. P1’s words are an indication that teachers feel the need to constantly renew themselves, and therefore the institution has, in a sense, gained the quality of a learning organization.

The opportunities offered by the school to teachers are, on the one hand, a source of motivation for teachers, and on the other hand, they contribute to the professional transformation of teachers. P3 shares an example of this, stating: *“Thanks to Ankara Science High School, I had the opportunity to visit NASA and CERN. Ankara Science High School provided me with this advantage. When we provide references and say that we*

work at Ankara Science High School, it gives us a certain privilege". Similarly, P7 notes: "In terms of cultural structure, we have relationships with organizations like TUSAŞ or ASELSAN through our alumni. I never had the chance to connect with these organizations before. This opportunity isn't due to me personally, but because I work at Ankara Science High School". These statements demonstrate that the opportunities offered by the school enhance teachers' motivation and contribute to their professional transformation. P4 adds that the vision of the school's principal is also important in creating this culture.

P5 emphasizes the importance of informal relationships among students by saying: "Even very ordinary students can significantly change themselves through these activities. The culture's behaviors experienced in the dormitory, the varying attitudes of different year groups, respect for seniors, love from seniors toward juniors, playing the roles of older siblings—these are beautiful things". P5 states that the diversity that students from different cities bring to the cultural environment, the support students provide to each other through informal relationships, and the contribution of alumni to this cause students to develop themselves in different areas. Informal relationships among students also affect teacher-student relationships. P1 reflects on this transformation, stating: "The communication here is stronger and more sincere, but you also have to maintain boundaries. You feel closer to the students, and in this sense, I've experienced a transformation".

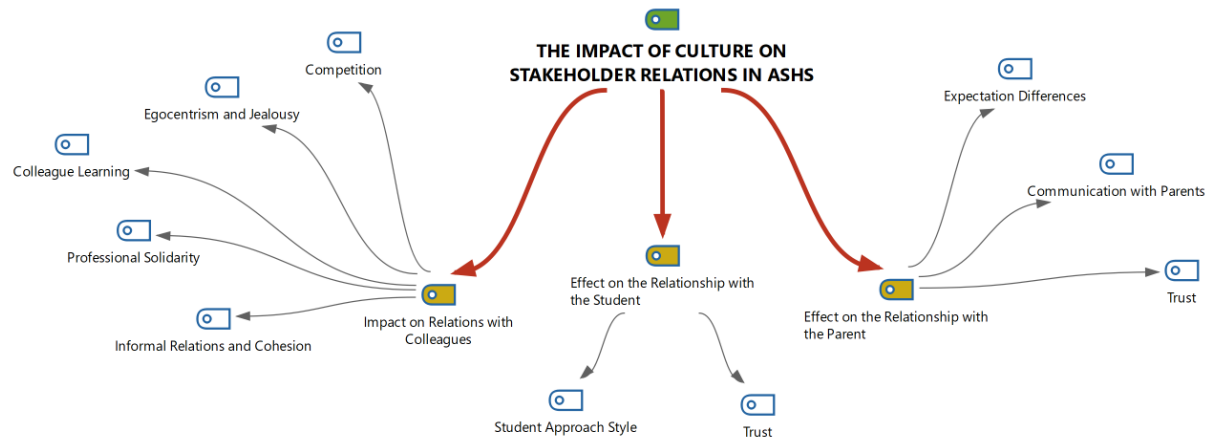
The fact that school culture has a learnable aspect brings with it a process of intellectual and behavioral adaptation. However, the adaptation process may also involve some difficulties. P8 stated that it is difficult to adapt to the culture with the words, "It takes at least 2 years to get used to Ankara Science High School. I think it is difficult to adapt to Ankara Science High School before 2 years. The winds blow hard here.", additionally P5 "There were many teachers who regretted being assigned to the school. It is difficult to get used to this culture, to be with these children, to listen to these children, to somehow survive against the pressures of these children. This is also a culture, the strong ones stayed, they adapted to this culture.", indicating that teachers who could not adapt to the culture had to leave the school. In addition, periodicity among teachers stands out as another phenomenon affecting cultural adaptation. Especially since the school is a project school, changes in teachers have contributed to periodicity among teachers. P4 describes this situation: "This was a project school, and a project school means a place where everything changes at a dizzying pace. Some teachers left when their term ended, and we had the opportunity to work with some of them. We played a sort of hide-and-seek game with them in the corridors".

### **The Influence of Culture on Stakeholder Relationships at Ankara Science High School**

The impact of the culture of Ankara Science High School on stakeholders can be evaluated in three dimensions: the impact on the relationship with colleagues, students and parents. Figure 4 presents the culture at Ankara Science High School and its impact on stakeholder relations.

Figure 4:

The Influence of Culture on Stakeholder Relationships at Ankara Science High School



P6 remarks: *“The relationships among colleagues can be described as both cooperative and competitive; it fits into both categories. There’s definitely a competitive environment, and this stems from the students. Just as there is competition among students, it reflects on the teachers as well”*. This observation highlights that the competitive environment among students has a significant impact on teacher relationships. However, this competitive environment also brings a degree of individualism and jealousy. P9 explains: *“On the surface, all the teachers get along with each other. There is a social relationship among almost all the teachers. But there’s definitely no team spirit. The mentality is more, ‘I’m here’.”* P6 adds: *“I don’t think my colleagues are selfish, but they do tend to prioritize themselves. There’s a desire to claim success for oneself. This could be due to expectations or perhaps the belief that they won’t be able to achieve the same success.”* P1 describes the relationship between teachers as formal and based on interest, and states that it was the same 30 years ago. On the other hand, P2 suggests that professional solidarity exists among teachers: *“Whether within the same department or between departments, we see that everyone supports each other in this regard. I believe we are in a culture of solidarity rather than competition”*. In addition, P4 highlights the importance of professional learning among colleagues: *“My colleagues here are academically well-developed individuals. This is something you don’t find at every school. A teacher who doesn’t continue to develop themselves cannot survive here”*.

It is seen that the presence of lodgings within the school causes informal relationships among the teachers residing in the lodgings, and this situation affects the harmony among the teachers. P7’s thought that: *“Living in the lodging hall is also very beneficial in terms of teachers, students, the school and school culture. I wish all our teachers lived in the lodging hall; it would be different. The good thing about the lodging hall is that you do not break away from the school, it increases your sense of belonging to the school”* reveals the effect of the lodging halls on communication between teachers. P3 and P4 also state that in addition to the lodgings, the low number of school teachers

and keeping shifts in student hostels also have an effect on the harmony between teachers.

It is seen that the fact that the school has a boarding house and the students' high perception levels shape the teachers' approach to students. Participant (P3) expresses the change he experienced in his approach to students after coming to Ankara Science High School with the following sentences: *"The student profile at my previous school was different. There, I could scold a student when necessary. At the science high school, we must be more cautious, and we have to do our jobs better because we're more likely to be criticized"*. P9 emerges that after gaining the trust of the students, her relationships with the students changed positively: *"Here, you feel that having a PhD and being able to engage in discussions with the students earns you more respect. The students show more respect in this way. I've worked at many schools, but I don't remember ever receiving as much appreciation as I do here"*. The participants also note that the sense of trust between teachers and students is further enhanced by the boarding environment, which facilitates stronger teacher-student relationships beyond classroom hours.

The fact that the school is a boarding school and the high expectation of success stand out as the determining factors in the teacher-parent relationship, as in student-teacher relationships. P5 *"Many parents come and say, 'Teacher, we are not here, we are entrusting our students to you. Therefore, we have to pay more attention."* with his statement, he declares that parents entrust their students to them because they live in different provinces, and therefore they are given other responsibilities in addition to academic expectations. P8 also mentions the school's parent profile and emphasizes parent expectations by saying, *"In Ankara Science High School, there are parents who are farmers, doctors, lawyers, conscious, unconscious. In that sense, there is a mixed parent profile. They all want their children to do well"*. P2 also supports the existing phenomenon with the following sentences: *"There is a student with a high carat in your hand. There is a diamond. Naturally, we have to handle them carefully. We must also keep the parents satisfied. The fact that their children are entrusted to us affects our approach; we must always act with care"*.

### Discussion and Conclusion

The findings of the research show that Ankara Science High School has created a deep-rooted culture as a result of being the first and only science high school in Turkey for a long period of 18 years and the privileged position it has achieved within the framework of the opportunities it has. The success-oriented structure that continuously reproduces itself in the school's daily life fosters strong social ties among administrators, teachers, alumni, students, and their families, which is reflected in the professional practices of the teachers. The positive associations between the cultural elements of ASHS and the levels of school performance are similar to the research conducted by Lee and Louis (2019) in which they showed a clear linkage between schools with a strong culture and

their continuous improvement in school-level achievement. In particular, the successes achieved by students in every field and their desire to carry these successes into the future have made students the dominant actor in the school's education processes. Karayel and Er (2022) reached similar findings in their research, indicating that, especially in schools with strong cultural traditions and historical backgrounds, success is not only limited to academic achievements but also culture contributes to the holistic development of students, students play an active role in every field and are the main transmitters of culture. The conclusion revealed by Şahin, Silman and Özenli (2009) in their research that the success of old and new teachers and students is an important factor in school culture and that this motivates teachers and students and serves as a role model for them, supports the findings of this research.

School culture is not a set of written rules that exist among school stakeholders. It consists of thought and action patterns in a dynamic structure, created by stakeholders through common consensus throughout the historical process. One of the most important elements that ensures the continuity of this culture is the presence of functional symbols visible in the daily life of the school. It is seen that Robert College (Kaya, 2022) and Galatasaray High School (Özemre, 2018), which represent two different school structure in Turkey and have strong school cultures, also have many functional symbols to ensure the continuity of their cultures. The findings reveal that ASHS has developed its own unique symbols to maintain the continuity of its culture. Alumni day, graduation ceremonies, first and last lessons, order and hierarchy in school and boarding life can be given as examples of these symbols. These functional symbols also serve to ensure school stakeholders' adaptation to the school culture.

The fact that the school is a boarding school and that Turkey's most successful students according to the LGS exam choose the school results in the formation of an academically homogeneous student structure. Considering the students' desire to show themselves, the success expectations of the students and parents, and the successes achieved by the graduates, it has been concluded that teachers constantly feel the need to keep themselves dynamic and productive, and it is seen that this situation is the beginning of the main elements that transform the professional practices of teachers such as classroom management, lecture style, guidance and counseling services, and communication. It has been determined that teachers who cannot adapt to the success-oriented culture and daily working dynamism of the school are forced to leave the school, while teachers who adapt become a part of the culture, and this increases teachers' professional satisfaction and sense of belonging. The findings of the research conducted by Atmaca (2023) that teachers from different cultures had difficulty adapting to cultural differences in the first years of their profession, but over time they overcame cultural adaptation problems with methods they developed similar to the results of this research, also support the results of the research.

Some conflicts and groupings within the school may arise in the context of subcultures such as student success, groups, and gender. Similarly, the power relations and individual differences that exist between students and teachers at school affect the

relationships between teachers in the school culture (Özoğlu, 2015). The fact that ASHS has students with high academic success has also brought individualism and competition. High expectations of success have also put stress on teachers and students, increasing teachers' anxiety levels. Meşeci-Giorgetti et al. (2023) support this finding in their research. The school's slogan, "We are Exemplary, We are Leaders, We are All One", also emphasizes individualism and success. Considering the role of school slogans in shaping identity (Atmaca & Dağ, 2023), it is understandable that this individualism and focus on success would impact relationships among teachers. The prominence of power relations and egocentrism among teachers, on the one hand, negatively affects group solidarity and group work among teachers, and on the other hand, poses difficulties for new teachers to the school. Teachers who cannot adapt to this interaction between teachers have had to leave the school.

According to Goffman (2016), individuals' placing themselves in a predetermined social role also creates the necessity of continuing certain behavioral patterns. It is understandable that teachers use formal language due to their roles during their formal interactions with families and students at school, but since the school is a boarding school and the majority of students come from out of town, it is extremely important for teachers to exhibit informal interaction behaviors in order to manage the educational processes positively. This situation, although its situation causes teachers to experience role confusion, as emphasized by Goffman (2016), teachers use informal communication methods and can take on different roles for the benefit of students and parents, especially since there is no equivalent in practice outside of school hours. This naturally causes the communication of teachers with students and parents to differ and therefore the communication skills of teachers to change and transform.

The interpretation of school buildings and spaces in the context of school culture affects the world of meaning of school stakeholders (Yılmaz, 2014). For instance, Haydarpaşa High School graduates and teachers describe the loss of the school historical building as the school losing its spirit (Meşeci-Giorgetti et al., 2023). Because the school's spatial environment has the power to organize positive relationships and support activities among its stakeholders and the potential to activate different types of mental, social and emotional learning (Sanoff, Pasalar & Hashas, 2001). Tarçın Turgay (2018), in her study on Istanbul Boys' High School, reveals that the unique building of the school affects people's spatial memories and increases their social connectedness. While ASHS's unique architectural design and campus area develop a sense of belonging in teachers and students, while it also offers the opportunity to think and act freely. Even though architectural design does not directly affect teachers' professional practices, it gives teachers the image of working in a university environment, causing teachers to increase their sense of professional self-confidence. Additionally, ASHS graduates' sadness over the demolition of old hostel buildings reveals the importance of buildings in the context of school culture.

In conclusion, it was observed that the culture of ASHS compelled teachers to change and transform in terms of general knowledge, subject knowledge and pedagogical

formation knowledge. Teachers did not have difficulty managing undesirable behaviors in classroom management, but they had to constantly renew themselves and change their teaching methods in order to meet the demands of students in terms of general culture and field knowledge and skills. This situation has also affected the language used by teachers in their relationships with each other and with students and parents. It is known that culture is a human product and that it is constantly constructed and shaped by its reflection on human life, in short, it is changeable. Research also indicates that school culture can change and transform, even if not in a short time (Litrell & Peterson, 2001). In this context, it is seen that creating a strong school culture and ensuring its continuity, the image of the school in the society, the educational demands of the students, the support of the graduates to their schools, diversifying and increasing the opportunities of the school, and developing the sense of belonging of the students and teachers are important factors in changing and transforming the professional skills of the teachers. Therefore, these outcomes obtained in the research are concrete suggestions for education administrators, teachers and Ministry employees. Similar studies could be conducted in different types of schools and schools with different cultural structures. At the same time, while ASHS's culture positively impacts a homogeneous group of academically successful students, studies could be conducted to examine how the school's culture impacts less academically inclined students. In this respect, it is thought that the results of the research will serve as an example for other researchers.

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## Genişletilmiş Türkçe Özet

Araştırmanın temel amacı, Ankara Fen Lisesi özelinde okul kültürünün öğretmenlerin mesleki becerilerinin dönüşümü üzerine etkisini ortaya çıkarmaktır. Araştırmada nitel araştırma geleneği içerisinde yer alan durum çalışması modeli kullanılmıştır. Araştırmanın çalışma grubu, araştırma konusuna ilişkin belirlenmiş ölçütleri karşılamak amacıyla ölçüt örnekleme ve maksimum çeşitlilik örnekleme yöntemleri kullanılarak seçilmiştir. Ölçüt olarak Ankara Fen Lisesinde görev yapıyor olmak kriteri tercih edilmiştir. Maksimum çeşitlilik için cinsiyet, yaş, branş, mezuniyet düzeyi, mesleki ve okuldaki kıdem baz alınmıştır. Araştırmanın verileri araştırmacı tarafından oluşturulmuş yarı yapılandırılmış görüşme formu ile toplanmıştır. Formda toplamda dört adet ana soru, dokuz adet de sonda soru yer almaktadır. Veriler araştırmacı tarafından hem yüz yüze hem de çevrimiçi platformlar aracılığıyla 11-25 Kasım 2023 periyodunda toplanmıştır. Veri toplama işlemine veriler uygunluk noktasına ulaşıncaya kadar devam edilmiş, sonuç olarak araştırmaya 9 öğretmen katılmış ve tamamının verileri üzerinden analizler gerçekleştirilmiştir.

Görüşmeler 30-45 dakika arasında sürmüştür. Araştırmada Ankara Fen Lisesinin Kültürü ve Ayırt Edici Yönleri, Ankara Fen Lisesi Kültürünün Öğretmenlere Etkileri, Ankara Fen Lisesi Kültürünün Dönüştürücü Yanı ve Ankara Fen Lisesinde Kültür ve Paydaş İlişisine Etkisi olmak üzere dört tema önceden belirlenmiştir. Verilerin analizinde önceden belirlenen temalara göre betimsel analiz kullanılmıştır. Araştırmanın geçerliğini artırmak için görüşmeler yazıya dökülerek görüşmecilerin teyitleri alınmış, inandırıcılığını ve güvenilirliğini artırmak için doğrudan alıntılardan yararlanılmıştır. Görüşme sorularının ve bulguların ilgili alanyazın ile tutarlı olmasına dikkat edilmiştir. Veriler MAXQDA 2020 Programı üzerinden analiz edilmiştir. Yapılan analizler sonucunda, akademik açıdan çok başarılı olan öğrencilerin okul içinde ve dışında yürütülen tüm çalışmaların sorumluluğunu üstlendikleri, bu çalışmaların mezunlar tarafından desteklediği, dolayısıyla mezunların ve öğrencilerin okul kültürünün belirgin taşıyıcısı oldukları tespit edilmiştir.

Okulun Türkiye’de ilk fen lisesi ve yatılı olması, kendisine has mimari tasarımının bulunması, geçmişte elde edilen başarılar, geniş bir kampüs alanı içerisinde öğrencilerin özgürce davranabilme imkânına sahip olması ve okulun kendine özgü işlevsel sembolleri yaratması, okul kültürünü besleyen diğer unsurlar olduğu görülmektedir. Öğrencilerin çok başarılı, aynı zamanda farklı yetenek ve bakış açılarına sahip olması, öğretmenlerin mesleki doyum yaşamalarına, aidiyet duygularının ve mesleki üretkenliklerinin artmasına neden olmaktadır. Öğretmenlerin başka okullara göre sınıf yönetimi, istenilmeyen öğrenci davranışlarını yönetme gibi genel mesleki pratiklerini uygulamada zorlanmadıkları ancak genel kültür ve alana özgü bilgi ve becerilerini önemli ölçüde geliştirme ihtiyacı hissettikleri tespit edilmiştir. Okulun akademik başarısı yüksek homojen bir öğrenci grubuna sahip olması, beraberinde bireyselliği ve rekabeti de getirmiştir. Bu durum öğretmenler arasındaki ilişkiye de yansımış, öğretmenler aralarındaki ilişkide ben merkeziliğin öne çıkmasına neden olmuştur. Okulda var olan başarı odaklı kültüre ve okulun gündelik çalışma

dinamizmine uyum sağlayamayan öğretmenlerin okuldan ayrılmak zorunda kaldıkları, uyum sağlayan öğretmenlerin ise kültürün bir parçası oldukları tespit edilmiştir. Bunun yanı sıra öğretmenler öğrencilere ve velilere yaklaşımlarında da değişim yaşadıklarını beyan etmişlerdir. Öğretmenler özellikle okul ders zamanları dışında ve pansiyonlarda pratikte karşılığı olmadığından öğrenci ve velilerin yararına resmi olmayan iletişim yöntemlerini kullanmış ve farklı rollere bürünmüşlerdir. Güçlü bir okul kültürü yaratılarak devamlılığının sağlanması, okulun toplumdaki imajı, öğrencilerin eğitimsel talepleri, mezunların okullarına desteklerinin sağlanması, okulun imkanlarının çeşitlendirilerek artırılması, öğrencilerin ve öğretmenlerin aidiyet duygularının geliştirilmesi, öğretmenlerin mesleki pratiklerini değiştirip dönüştürmesinde etken olduğu görülmektedir. Dolayısıyla araştırmada elde edilen çıktılar, eğitim yöneticilerine, öğretmenlere ve Bakanlık çalışanlarına yönelik somut öneriler niteliğindedir. Benzer çalışmalar farklı okul türlerinde ve farklı kültürel yapıya sahip okullarda da yapılmalıdır. Bu açıdan da araştırma çıktılarının diğer araştırmacılara örnek teşkil edeceği düşünülmektedir.

**Anahtar Kelimeler:** Okul kültürü, öğretmen, mesleki beceri, Ankara fen lisesi.

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# Examining the Benefits of Using ChatGPT in Preparing Interview Questions

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## Abstract

The number of studies on using ChatGPT in scientific and qualitative research is increasing daily. This study investigates the usability of ChatGPT in the interview question preparation phase of qualitative research by taking into account its features such as text generation, ease of use, and being trained with a large data set. In the study, the researchers prepared interview questions for the research problem they identified and compared them with the questions prepared by ChatGPT. The study results show that ChatGPT can generate the variety and depth of questions that researchers need by using its extensive data set and various features. As a result, we determined that ChatGPT can provide valuable support to researchers in the interview question preparation stages. This support will allow researchers to use their time more effectively, develop their questions more comprehensively and in-depth, and improve the quality of the data obtained from the research.

**Keywords:** Artificial intelligence, ChatGPT, qualitative research, interview question.

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## Introduction

*"I want to do qualitative research, but I hesitate because the process is difficult and tiring. I do not know how to get information from someone on a particular topic. Preparing interview questions and conducting the right interview is very intimidating."*

(Ali, 2024, Needs Analysis Interview)

Although these statements belong to a PhD student, they are pretty close to every qualitative researcher's thought at a particular time. When qualitative researchers want to work on a new topic, they may experience the same thoughts again. In every new research project, researchers apply the processes of learning the theoretical knowledge appropriate to the subject, conducting a literature review, preparing appropriate interview questions, getting expert opinions, and revising the questions according to expert opinion (Creswell & Creswell, 2018; Ezberci-Çevik, 2023; Patton, 2018). For a researcher who does not have the experience and competence to carry out these procedures, it may become difficult to conduct qualitative research. Therefore, artificial intelligence tools, which are increasingly important in science today and are discussed in various subjects, can assist qualitative researchers in solving these problems.

Although artificial intelligence technologies have existed for a long time, their widespread use began with ChatGPT, which OpenAI introduced in November 2022. This technology redefined the use of AI in everyday life (Gill & Kaur, 2023). ChatGPT can generate appropriate responses in near-natural human language by leveraging extensive data stores to understand and interpret user requests. ChatGPT's practical applications and ability to create a human-like language and complete complex tasks make it an essential innovation in artificial intelligence tools (Lund & Wnag, 2023). ChatGPT can access the internet, produce more accurate and detailed responses in text-based dialogs, understand more complex user queries, and utilize an extensive knowledge base (OpenAI, 2024). ChatGPT's possession of these features has led to an intensification of research focusing on its use in qualitative research.

### Qualitative Research and ChatGPT

Artificial Intelligence (AI) Pedagogical Support denotes the application of AI tools to deliver targeted educational help, facilitating persons in completing activities they could not achieve autonomously but can accomplish with supervision (Cai et al., 2024). AI offers several advantages, including the customization of education to accommodate diverse learning styles (Verdú et al., 2017), the delivery of personalized and instantaneous feedback (Chang et al., 2023), the refinement of assessment methodologies, the enhancement of learning experiences (Ouyang et al., 2022), the cultivation of design and creativity skills (Cudzik et al., 2024), and the production of educational materials (Adetayo et al., 2024; Şen et al., 2024). Given these potentials, AI pedagogical help is expected to be an invaluable resource for qualitative researchers.

Since its launch, countless users have used ChatGPT to meet a range of purposes and requirements. Considering the capabilities of ChatGPT, it is possible to find various

studies on its use in qualitative research (Costa, 2023; Dengel et al., 2023; Hamilton et al., 2023; Khlaif et al., 2023; Morgan, 2023; Siiman et al., 2023; Şen et al., 2023; Taylor, 2023). ChatGPT can be a helpful tool for the researcher on large data sets in qualitative research thanks to its text interpretation capability; it can save time for researchers in data analysis, and it is easy to use (Hamilton et al., 2023; Morgan, 2023; Siiman et al., 2023; Şen et al., 2023). It offers advantages in consistency and bias reduction. However, using artificial intelligence in qualitative research brings limitations such as ethical problems, the interpretability of algorithms, and possible biases. For this reason, researchers should carefully evaluate the advantages of artificial intelligence and use it as a supportive tool (Costa, 2023; Şen et al., 2023). Dengel et al. (2023) stated that conducting interviews with artificial intelligence tools such as ChatGPT and BARD can provide researchers with different perspectives and can be used to test their interviews. Taylor (2023) stated that by using ChatGPT to convert the transcripts made by the researcher into analyzable text, he could clean interview transcripts in seconds with a <1%-word error rate and almost 0% syntactic error rate. Khlaif et al. (2023) discussed the role of ChatGPT in improving academic performance in scientific research. Khlaif et al. (2023) stated that the commands used by the researchers using ChatGPT affect the results, the reference list created by ChatGPT is weak, and the texts created should be revised and used from the researcher's perspective. The studies stated that the outputs of artificial intelligence tools such as ChatGPT should be used under the researcher's supervision, regardless of the step of qualitative research; otherwise, the desired results cannot be obtained. As can be understood from the literature, there are studies on ChatGPT's positive and negative uses. However, the authors of this study will deepen the literature in this sense by comparing the interview questions they prepared with the interview questions prepared by ChatGPT and offering a solution to the difficulties experienced by qualitative researchers in the interview question preparation process.

The primary methodological concern in using artificial intelligence for interview question development is ensuring that the generated questions align with qualitative research principles. While AI enhances efficiency and consistency, it may weaken researcher creativity (Hamilton et al., 2023). Over-reliance on AI without critical researcher oversight could compromise the epistemological rigor of qualitative inquiry. Therefore, this study not only explores the potential benefits of ChatGPT but also critically evaluates these methodological challenges, emphasizing its role as a complementary rather than a substitutive tool in qualitative research.

### **Interviews and Challenges in Qualitative Research**

In qualitative research, various data collection tools include observation, interview, document, and phenomenon drama (Şen et al., 2023). Among these data collection tools used in qualitative research, interviews are the most frequently used data collection tool. Interview types can be structured, semi-structured, unstructured, focus group, and online (Ezberci-Çevik, 2023). A semi-structured interview is the most frequently used type in qualitative research (Brinkmann, 2021).

The interview process can be handled in three parts: before, during, and after. Determining the purpose of the interview, preparing the interview questions, selecting the participants, and setting the interview should be done before the interview. The preparation of interview questions after determining the purpose of the interview constitutes an integral part of qualitative research (Ezberci-Çevik, 2023). The interview form is a list of questions or topics to be addressed during the interview. The interview form should include questions and instructions suitable for the purpose, be prepared before the interviews, and ensure consistency in all interviews (Creswell & Creswell, 2018). By focusing on a specific topic, the interview form allows the interviewer to ask questions to elaborate on the subject and create a flexible dialog. Although the quality of the data obtained during the interview depends on the interviewer, the interviewer can direct the questions in a natural flow of conversation within the framework of predetermined topics (Patton, 2018). This study investigates the usability of ChatGPT for structured and semi-structured interview questions, as it involves a process of preparation in advance. Unstructured interviews were not included in the scope of this study, as they were designed more on the spur of the moment.

Numerous books and articles on qualitative interviewing in general and writing interview questions (Brett & Wheeler, 2021; Brinkmann & Kvale, 2014; Staller, 2022; Given, 2021; Patton, 2018). The value of the data collected during qualitative interviews depends on the researcher's competence and the interview questions' strength (Patton, 2018). Therefore, it is essential to ensure that the interview questions used by inexperienced researchers support their efforts to obtain a detailed answer to the research question (Roberts, 2020). No matter how the interview questions are asked, the primary purpose of the questions is to reveal the data to be used in the study. While preparing the interview questions, the researcher should think about the participants to be interviewed. Using theoretical or methodological language in the interview questions, as in academia, will not make sense to the participants. Therefore, the researcher must consider the participants' experiences, culture, and language when preparing the questions. Briefly, research questions can be prepared in three stages. First, the researcher should formulate theoretical and relevant interview questions. Second, the researcher should translate these theoretically informed ideas into a form the participants can understand. Finally, the data extracted from the participants' experiences and opinions should be integrated with theoretical frameworks to contribute to answering a scientific question (Staller, 2022). As mentioned above, the theoretical preparation process and the process of transforming the theory into a question at a level that the participants can understand are essential for preparing interview questions. For this reason, the research will also reveal the theoretical quality of the questions prepared by ChatGPT and their comprehensibility for the participants.

### **Purpose of the Study**

The fact that ChatGPT passes exams with high difficulty levels, such as medicine (Ali et al., 2022; Fleming et al., 2023; Lewandowski et al., 2023) and foreign languages (de Winter, 2023) provides a perspective on the competencies of ChatGPT. Although there

are studies in which ChatGPT's text generation and visual generation (Handa et al., 2023) features are used in subjects such as medicine, literature (Kızıldağ, 2023), computers (Bordt & von Luxburg, 2023), and language learning (Lee et al., 2023), it is seen that studies on the ability to create interview questions for qualitative research have not been addressed. Considering the text generation capability of ChatGPT, it is essential to examine the interview question generation skills in qualitative research. Preparing interview questions in qualitative research has been a challenging process, especially for researchers who do not have enough experience (Hà & Nguyễn, 2023). In particular, studies conducted to overcome the deficiency in interview question writing show this is an ongoing problem (Brett & Wheeler, 2021; Brinkmann & Kvale, 2014; Staller, 2022; Given, 2021; Patton, 2018).

To prepare interview questions, steps such as researching sufficient theoretical knowledge, writing clear and understandable questions, and getting expert opinions should be completed (Ezberci-Çevik, 2023). Questions in interviews should be clear and understandable. When the questions are too general or vague, the responses' quality may decrease and may not provide enough information to answer the research questions (Patton, 2018). When the researcher's own biases or expectations are reflected in the questions, this may affect the participants' responses and reduce the accuracy of the responses (Alshenqeeti, 2014). In addition, questions should not push participants' boundaries and force them to discuss uncomfortable topics. The participants' emotional and psychological well-being should be considered (Brayda & Boyce, 2014). However, the literature has stated that researchers who experience these processes have difficulty conveying their ideas fully and asking appropriate questions (Hà & Nguyễn, 2023). Inexperienced researchers ask long, closed, vague, or leading questions (Ballena, 2021; Roberts, 2020). The prepared questions should be asked in the correct order. When a researcher investigates a topic, thought and emotion questions can be asked first. Then, the researcher can ask information questions. Failure to ask questions in the correct order may affect the interview quality (Patton, 2018). Although this is obvious, new researchers may make the mistake of directing the research questions to the participants when preparing questions. This approach is inconvenient for the participants and reduces efficiency (Staller, 2022). For these reasons, it can be stated that the problem of preparing interview questions in qualitative research remains current. To solve this problem, can researchers improve the quality of interview questions through ChatGPT after preparing interview questions? After preparing the interview questions, can they apply to ChatGPT instead of submitting their questions to expert opinion? How effective can ChatGPT be in the interview question preparation phase? To what extent does ChatGPT include open-ended and closed-ended questions in its questions? The lack of research in the literature to answer these questions was the starting point for conducting this study. All these questions were tried to be answered in this study so that future researchers can use ChatGPT. In the existing literature, various guide studies outline the stages of developing interview questions in qualitative research. However, there is a significant gap in research regarding integrating artificial intelligence tools into this process. The limited number of studies in this area highlights

a methodological gap in understanding how AI can contribute to developing interview questions. This study aims to address this gap by examining how artificial intelligence tools can be utilized in formulating interview questions, thereby offering a novel contribution to the literature. This research seeks to establish a more systematic, efficient, and objective framework for interview question development by providing an alternative perspective to traditional approaches.

In this context, it is necessary to examine the usability of generative artificial intelligence tools trained with an extensive database when preparing interview questions. Determining the differences and similarities between the questions prepared by ChatGPT and the questions prepared by the researchers and examining the prompts written by the researchers to ChatGPT will contribute to the literature. In addition, it is essential to address the differences between researchers who are experienced in using ChatGPT and inexperienced researchers' use of ChatGPT in preparing interview questions. The researchers aim to show that every researcher, whether experienced or inexperienced, can use ChatGPT. Considering the importance of preparing interview questions in the qualitative research process, it is thought that examining the use of ChatGPT to prepare interview questions in qualitative research will contribute to the literature. In this context, the questions of the study were designed as follows:

- 1- How is the content of the questions prepared by the researchers for the research question "What are the opinions of scientists towards the use of ChatGPT?"?
- 2- How is the content of the questions prepared by ChatGPT for the research question "How are scientists' opinions on the use of ChatGPT?"?
- 3- How does the researchers' experience using ChatGPT contribute to preparing questions via ChatGPT?
- 4- What are the similarities and differences between the questions prepared by ChatGPT and the questions prepared by the researchers?
  - a. What are the similarities and differences between the questions prepared by the first researcher?
  - b. What are the similarities and differences between the questions prepared by the second researcher?
  - c. What are the similarities and differences between the questions prepared by the third researcher?
- 5- How do the researchers use ChatGPT as an auxiliary tool in preparing interview questions?

## Method

### Research Design

In this study, in which the researchers questioned their experiences of using ChatGPT (CG) while preparing interview questions, the self-study design of the qualitative

research method was preferred. In self-study, the researcher enters the process of research and inquiry for self-practice (Nacaroğlu & Eroğlu, 2023). This research selected self-study because it emphasizes the researchers' experiences with ChatGPT (CG) for interview question preparation. In contrast to phenomenology, which investigates the collective experiences of several individuals to reveal the essence of a phenomenon, self-study enables researchers to analyze their own experiences critically. Action research generally addresses a practical issue through repetitive cycles of action and reflection, frequently engaging larger participant groups. Conversely, self-study is more introspective, emphasizing individual learning and methodological insights (Nacaroğlu & Eroğlu, 2023). This renders it the most suitable method for examining the researchers' experiences with CG.

## **Study Group**

### **Researchers**

All three researchers specialize in qualitative research. The initial researcher (R1) serves as a research assistant and PhD candidate at a public institution; for the past four years, he has been rigorously engaged in qualitative research and phenomenon theater. He performs research that advocates for artificial intelligence in qualitative investigations and has been utilizing ChatGPT since November 2022. The second researcher (R2) is a faculty member at a public institution, possessing substantial experience in qualitative research and pedagogy, although he has minimal familiarity with ChatGPT. The third researcher (R3) is a research assistant who does studies to facilitate the application of artificial intelligence in qualitative research methodologies. Since November 2022, she has utilized ChatGPT intermittently and possesses limited experience in qualitative research, although she has modest proficiency in employing ChatGPT.

### **Data Collection Tool**

This study utilized documents as instruments for data gathering. The study documents comprise the questions formulated by the researchers and the methodologies employed with CG to develop interview questions. Each researcher autonomously formulated interview questions about the research inquiry "How do scientists perceive the utilization of CG?" and thereafter developed interview questions employing CG. The researchers utilized the ChatGPT-4 model for its functionalities, including document uploading and Internet access. GPT-4 enables users to develop their GPTs (OpenAI, 2024). Nonetheless, a GPT was not explicitly created for this research subject.

### **Data Collection Process**

A needs analysis was conducted with four doctoral and master's students before the research to identify challenges in formulating interview questions. The researchers convened to establish the topic for the interview questions. The researchers' diverse specializations, including science education, art education, and elementary education, influenced the selection of issues addressed. The discussions centered on ChatGPT, a contemporary topic that is the focus of this article. It was concluded that investigating

scientists' perspectives on using ChatGPT is essential, necessitating the preparation of relevant questions for this subject. The researchers conducted interviews to ascertain the research question, "How do scientists think about the use of ChatGPT?" The researchers' diverse disciplinary backgrounds facilitated the formulation of broader questions encompassing multiple perspectives. This ensured that the topic was addressed in a thorough and multifaceted manner. Subsequently, each researcher independently formulated their interview questions using the established steps for interview question preparation. Due to the researchers' native language being Turkish, they utilized CG in that language. Following the preparation of their questions, the first researcher independently formulated interview questions utilizing the CG via their CG account. The researchers finalized the interview questions by revising both their own and those prepared by CG. Each researcher evaluated the questions developed by CG and independently determined which to incorporate into their research.

### **Data Analysis**

The study employed inductive content analysis for data analysis. The data acquired in the study were examined through three distinct methods. The researchers initially formulated the questions. The dialogues between the researchers and the CG, along with the concluding inquiries, were collectively analyzed by both parties. Due to the absence of relevant studies in the literature, the researchers refrained from employing pre-existing themes and categories in their analysis. The researchers individually assessed the prepared questions, and the analysis was finalized by achieving consensus following the refinement of the generated codes.

### **Validity and Reliability**

The strategies employed to enhance the internal validity of the research are thoroughly detailed in the data collection section. The researcher questions and CG outputs, which form the documents utilized in the study, were presented to the reader unaltered. The findings section presents the data obtained from the researcher's questions and the CG, including direct quotations without alterations. The relevant sections thoroughly detailed the research design, study group, data collection tools, implementation process, data analysis, organization of findings, and the researchers' roles to enhance external validity. To enhance the internal reliability of the research, the researchers independently executed the procedures outlined in the data analysis section and completed the analysis following the arrangements. The data were appropriately discussed in the results section to enhance the external reliability of the research. The researchers discussed the consistency of the results and findings sections, ultimately reaching a consensus. An expert in qualitative research verified the consistency between the conclusion discussion section and the findings section.

## **Findings**

The results were organized into three distinct categories based on the findings from the first, second, and third researchers. Each researcher section will include the questions

formulated by the researcher, the methodology for utilizing ChatGPT, the questions generated by ChatGPT, a comparison between the researcher's and ChatGPT's questions, and the conclusions drawn from the final version of the interview questions.

### Findings for the First Researcher

The first researcher (R1) prepared 10 main questions (M1–M10) for the research problem “How do scientists think about the use of ChatGPT?”. The researcher prepared questions for use, advantages, disadvantages, user experience, ethics, solutions to concerns, future vision, auxiliary tools, and the scientific research process. The questions prepared by the first researcher describe the use of ChatGPT by scientists in different fields. [Figure 1](#) shows the questions prepared by R1.

### Figure 1

Questions prepared by the first researcher

	Prepared Questions	Theme
M1	As a scientist, what are your thoughts on the use of ChatGPT in science?	Intended use
M2	What are the advantages of using ChatGPT in science? Explain them.	Disadvantages
M3	What are the disadvantages of using ChatGPT in science? Explain.	Advantages
M4	What kind of suggestions would you make based on your experiences using ChatGPT?	User experience
M5	What are your thoughts about the ethical dimension of using ChatGPT in science?	Ethics
M6	Does the use of ChatGPT in science raise concerns for you?	Anxiety
M7	How do you think concerns about the use of ChatGPT in science can be addressed?	Solution to Anxiety
M8	What are your thoughts on the future of ChatGPT use in science?	Future vision
M9	How can you use ChatGPT as a helpful tool in science?	Auxiliary tool
M10	In what steps can ChatGPT be used in the scientific research process?	Scientific research process

### First Researcher's Interview Question Preparation Process with ChatGPT

After R1 prepared the questions, he had CG prepare the questions. The summary of R1's correspondence with CG is given [in Figure 2](#).

**Figure 2.***R1's correspondence*

**R1:** The research topic is "How do scientists think about the use of ChatGPT?" The question will be answered. Write me interview questions about this topic.

**CG:** I can list some interview questions that you can use for your research on "scientists' opinions on the use of ChatGPT" as follows:  
Questions numbered (1, 2, 3,... 10) were generated.

**R1:** What else?

**CG:** Questions numbered (11, 12,... 20) were produced.

**R1:** (The researcher uploaded a 14-page Turkish-language PDF on preparing qualitative interview questions.) There is qualitative question preparation information here. Prepare it again by considering these.

**CG:** Based on the guidelines for creating qualitative research questions given in your file, some sample questions that could be prepared for the topic "Scientists' opinions on the use of ChatGPT" could be as follows:  
Questions numbered (21, 22,... 29) were generated.

**R1:** I revised the questions you suggested, prepared the questions, and finalized my questions. The research topic was determined to be "How do scientists think about the use of ChatGPT?". Can you check the appropriateness of the questions I prepared? If you have any suggestions, write them down. Specify the places that need to be changed. The questions are given below:  
The final prepared questions were copied (n=12) ...

**CG:** Your questions comprehensively address the topic of "scientists' thoughts on the use of ChatGPT." Most of your questions are open-ended and designed to allow participants to provide broad and detailed answers about their own experiences and opinions. However, we can strengthen your questions with some minor edits and additions:  
Questions 1, 3, 4, 7, 9, and 11 have been edited. One new question has been added.

**R1:** This is the final version of my interview questions. In what order do you think I should ask these questions?

**CG:** An effective order of asking your interview questions would be to make the participants feel comfortable, to help them warm up to the topic, and then move on to more in-depth questions. The following sequence is suggested based on these principles:  
(The questions are ordered.)  
This sequence will guide the flow of the interview naturally and logically, while at the same time increasing the comfort of the participants and the efficiency of the interview.

Analysis of R1's methods revealed the generation of 30 queries using CG to formulate interview questions. Initially, R1 elucidated and formulated inquiries about the study subject. After the initial inquiries, he requested the CG to formulate more questions. Subsequently, he uploaded a PDF delineating the concepts of formulating qualitative interview questions to the CG and requested that the CG utilize this information to generate new questions. Subsequently, upon finishing the interview questions, he sent them to the CG for evaluation of their appropriateness. Upon revising the questions, he inquired with the CG regarding which questions to pose and finalized the process by implementing the requisite modifications. CG proposed several recommendations to R1. CG specified the theme to which her inquiries pertained. The inquiries were formulated as open-ended and articulated in clear and comprehensible language. Furthermore, CG composed an elucidative text after the questions. All questions generated by CG are included in Supplement 1. Figure 3 illustrates examples of the queries generated by CG.

**Figure 3.**

Questions prepared by the first researcher for CG

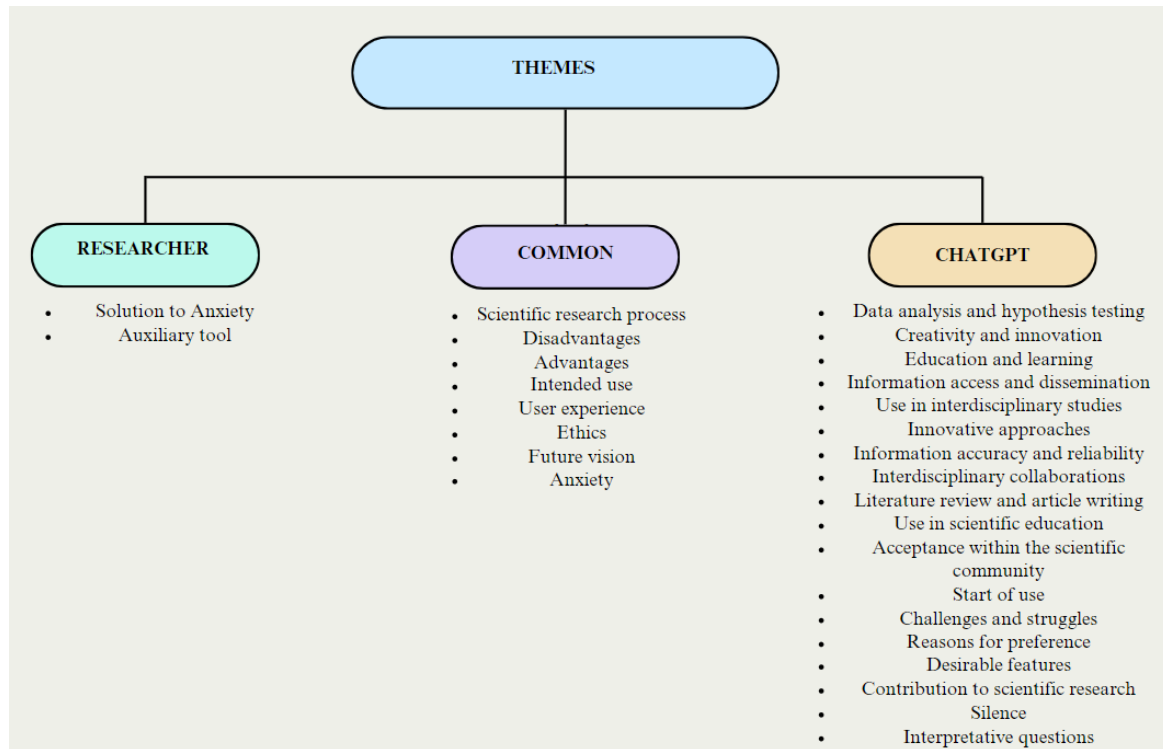
	Prepared Questions	Theme
CG1	How do you evaluate the use of ChatGPT in scientific research? In which areas do you think it is particularly useful?	ChatGPT's role in scientific research
CG2	How do you see the potential of ChatGPT in scientific processes such as data analysis and hypothesis testing?	Data analysis and hypothesis testing
CG3	Do you think ChatGPT can contribute to science in terms of creativity and innovative ideas?	Creativity and innovation
CG7	What are your views on the impact of ChatGPT on research methodologies and processes?	Research Methodology
CG13	What are your concerns about the accuracy and reliability of the information produced by ChatGPT?	Information accuracy and reliability
CG16	What do you think about the contribution of ChatGPT to academic publication processes, especially in the literature review and manuscript writing stages?	Literature review and article writing
CG19	Is there a general acceptance or resistance among your colleagues to the use of ChatGPT and similar AI tools? What are the general trends in this regard?	Acceptance within the scientific community
CG20	Based on your own experience, what are your suggestions on how ChatGPT can be used most efficiently by scientists?	Personal perspective and advice
CG22	When you describe the contribution of ChatGPT to your research, what do you see as the most important advantages of using this technology?	Advantages
CG27	Based on what we have discussed so far, how can we summarize the contribution of ChatGPT to scientific research?	Contribution to scientific research
CG30	What are the biggest challenges or limitations you face when using ChatGPT?	Challenges and limitations

The questions generated by CG demonstrate adequate proficiency in grammar and theoretical understanding. CG explicitly articulated the concept of the questions she formulated and appropriately devised the open-ended inquiries. CG generated inquiries regarding themes including the role in scientific research, data analysis and hypothesis testing, creativity, education and learning, ethics and reliability, access to scientific knowledge, methodology, interdisciplinary collaboration, future predictions, personal experiences, purpose of use, frequency of use, literature review and article composition, innovative approaches, scientific acceptance, as well as advantages and disadvantages. The themes in the questions created by CG are deemed suitable for the research inquiry.

[Figure 4](#) shows the themes of the questions prepared by R1 and the themes of the questions prepared by CG. R1 and CG produced common questions in eight themes. While R2 produced queries in two themes CG did not address, CG produced questions in 18 themes R1 did not address.

**Figure 4.**

Themes addressed in the prepared questions



In the concluding phase of formulating interview questions, R1 utilized the interview questions (Q1–Q13) with the question pool generated by ChatGPT. R1 employed 13 questions in his research to determine the final interview questions (Supplement 2). Analysis of the questions formulated by R1 reveals that he employed his questions, utilized them in conjunction with the CG, and relied solely on the CG's questions. R1 utilized six of his questions, six from CG, and one question each from his own and CG's set, totaling 13 questions prepared. R1 utilized questions Q6, Q9, Q12, and Q13, which CG wrote after modifying the content and grammar. By CG's recommendations, R1 modified the content of questions Q3 and Q4 and made grammatical revisions to questions Q1, Q3, Q4, Q7, and Q10 based on CG's inquiries. Table 1 presents examples of R1's operations concerning the queries.

**Table 1**

*Final interview questions of the first researcher*

No	Question	Question Source	Arrangements	Theme
Q1	What are your thoughts on using ChatGPT in scientific research as a scientist?	M1	In the questions prepared by CG, the expression "in science" was replaced with the expression "in your scientific research," as it was inspired by the concept of "in your scientific research."	Intended use
Q6	What are the challenges you have encountered during the use of ChatGPT?	CG30	The question proposed by CG was simplified.	Difficulty of use
Q12	<p>In which steps and how do you use ChatGPT in the scientific research process?</p> <p>Probe: In which steps and how do you use ChatGPT in the methodology determination process?</p> <p>Probe: In which steps and how do you use ChatGPT in the literature review process?</p> <p>Probe: In which steps and how do you use ChatGPT in the data analysis process?</p> <p>Probe: Which steps are needed, and how do you use ChatGPT in the data collection?</p> <p>Probe: In which steps and how do you use ChatGPT in the data interpretation process?</p>	M10- CG2- CG7- CG16	CG's questions were added to this question as probe questions. The correction suggested by CG was included in the question.	<p>Scientific research process</p> <p>Literature review,</p> <p>Data analysis,</p> <p>Data collection,</p> <p>Data interpretation,</p> <p>Methodology selection</p>

R1 completed 13 interview questions for his research in cooperation with CG. He directly benefited from 10 of the 30 questions created by CG. He also developed the interview questions by indirectly benefiting from CG's suggestions and questions. R1's final interview questions included the themes of the purpose of use, advantages, disadvantages, user experience, presenting new ideas, concerns, ethics, reliability, future vision, scientific research process, literature review, data analysis, data collection, data interpretation, and methodology selection, acceptance within the scientific community, and difficulty of use.

### Findings for the Second Researcher

The Second Researcher (R2) has prepared 11 main questions (O1...O11) and three follow-up questions for one question for the research problem of ‘What are scientists’ thoughts on using ChatGPT?’ The researcher has prepared questions addressing themes such as literature review, defining the research problem, identifying gaps in the literature, selecting a methodology, providing theoretical support, determining the sample or participants, choosing data collection tools, conducting data analysis, interpreting data, ethical concerns, and researcher biases. The questions prepared by the second researcher consist of descriptive inquiries that outline the steps of the scientific research process regarding scientists’ use of ChatGPT. The questions prepared by R2 are included in Figure 5.

**Figure 5.**

*Questions prepared by the second researcher*

	Prepared Questions	Theme
O1	Do you think ChatGPT will make it easier for you to search the literature? Why?	Do a literature search
O2	Do you think ChatGPT can identify your problems in your work? Why?	Determining the research problem
O3	Do you think ChatGPT can fully identify the gap in the literature regarding your study? Why?	Recognizing the gap in the literature
O4	Do you believe that ChatGPT will form your theoretical foundation? Why?	Providing theoretical support
O5	Do you think ChatGPT will help you determine your research method? Why?	Method determination
O6	Do you think ChatGPT can guide you in determining your sample or participants? Why?	Sample/Participant Determination
O7	Do you think ChatGPT can build your data collection tools? Why?	Data collection tools
O8	Do you believe that ChatGPT can analyze your data? Why?	Data analysis
O9	Do you think ChatGPT can guide you in interpreting your data? Why?	Data Interpretation
O10	Do you think that the section created by ChatGPT will constitute plagiarism? Why?	Ethical Concern
O11	Do you think there will be differences in how scientists navigate ChatGPT? Why? Probe: Do you think that two different scientists would create a different/similar introduction using ChatGPT on the same subject? Why? Probe: Do you think that two different scientists would create different/similar questions for a data collection tool using ChatGPT on the same subject? Why? Probe: Do you think that two different scientists using ChatGPT on the same subject will create the results-discussion section differently/similarly? Why?	Investigator differences

### Second Researcher’s Process for Preparing Interview Questions with ChatGPT

After preparing the questions, R2 had ChatGPT formulate his questions. A summary of the correspondence between R2 and CG is provided below.

**Figure 6.***R2's correspondence*

**R2:** I want to investigate scientists' thoughts on the use of ChatGPT. Can you formulate interview questions in this context?  
**CG:** Sure, here are some questions you can use to ask scientists for their opinions about the use of ChatGPT:  
Questions numbered (1, 2,... 12) were generated.  
**R2:** Can you add questions that relate the scientist's scientific work process to the use of ChatGPT?  
**CG:** Questions numbered (13, 14,... 24) were generated.  
**R2:** Do you think that two different scientists using ChatGPT on the same topic would create a different/similar conclusion-discussion part? Why?  
**CG:** I think that if two different scientists create the conclusion-discussion part using ChatGPT on the same topic, these sections can be both similar and different. The reasons for this can be the following: (Here, the process was stopped midway because he commented on the topic instead of creating a question.)  
**R2:** Write questions that bring out the differences in the directions that scientists give when using ChatGPT.  
**CG:** Questions numbered (25, 26,... 40) were generated.  
**R2:** Write questions about the differences that will emerge in a scientific study that two different scientists want to create on the same topic using ChatGPT.  
**CG:** Questions numbered (41, 42,... 56) were generated.  
**R2:** Generate questions about the similarities and differences between two different scientists' use of ChatGPT.  
**CG:** Questions numbered (57, 58,...74) were generated.  
**R2:** Generate questions about whether more than one scientist would use ChatGPT in the same way.  
**CG:** Questions numbered (75, 76,...92) were generated. These questions can be used to understand the similarities and differences in the way multiple scientists use ChatGPT. This can help users review their approach and make potential improvements.

R2 generated a total of 92 questions using CG to prepare interview questions. Initially, R2 outlined the research question and generated questions related to it. Then, he made more specific requests to produce questions in his commands. After question CG24, the researcher wanted to create questions focusing on 'the differences in how two different scientists use ChatGPT on the same topic,' but he could not obtain the types of questions he wanted. Therefore, he wrote prompts with content similar to CG's in different ways. For each prompt written by R2, CG generated 12 questions. The questions were classified according to their theme, and two alternative questions were produced for each. Additionally, CG wrote an informative paragraph at the end of the questions it generated. All the questions created by CG are included in [Supplement 3](#). For example, the questions generated by CG are shown in Figure 7.

**Figure 7.**

Questions prepared by the second researcher for CG

	Prepared Questions	Theme
CG1	What do you think about ChatGPT, and what role do you expect such AI tools to play in the scientific world?	General Introductory Questions
CG2	How do you evaluate the use of ChatGPT in scientific research?	General Introductory Questions
CG3	What kind of contribution do you think ChatGPT can make to scientific data analysis and research processes?	Technical Assessment Questions
CG4	What do you think about the accuracy and reliability of such AI systems?	Technical Assessment Questions
CG17	How do you intend to use ChatGPT to process or analyze large data sets?	Data Processing and Analysis
CG19	What impact can ChatGPT have on the scientific article writing, editing, or publication process?	Publishing and Communication
CG39	How do you approach ethics and responsibility issues when using ChatGPT?	Ethics and Responsibility
CG44	How do you expect ChatGPT to contribute to your hypothesis generation and theory development processes?	Hypothesis and Theories
CG48	What different perspectives can ChatGPT provide in interpreting the results?	Interpretation of Results
CG67	What are the main challenges and limitations you encounter when using ChatGPT?	Challenges and Limitations
CG83	How do you rate the responses you receive from ChatGPT?	Evaluation of Responses

Upon examination of Figure 7, it is evident that the questions generated by CG demonstrate an adequate level of grammatical accuracy and theoretical understanding. CG explicitly articulated the topic underlying the questions and formulated them in an open-ended and comprehensible fashion. The themes explored by CG encompass intended use, interaction and collaboration, education and learning, ethics, future vision, scientific research process, methodology, data analysis, hypotheses, data interpretation, theoretical support, innovation and problem-solving, publication and communication, and education and training. The subjects included mentoring, scientific creativity and discovery, engagement with artificial intelligence, sources of data and information, difficulties and solutions, and constraints. These themes might be articulated as inquiries pertinent to the specified research subject. Due to R2's inability to obtain the desired questions, CG generated other questions aligned with comparable themes based on the new prompts he composed. Despite the apparent range in question types, CG has exhibited repetitiveness in specific themes, albeit not identical. In the following example, CG employed a consistent theme in the Data Collection and Analysis Process theme. In the formulated questions, two inquiries, CG45 and CG17, are posed differently concerning their application in data analysis. Moreover, a comparable scenario can be observed with CG46 and CG18 regarding their application in extensive data sets.

**Figure 8.**

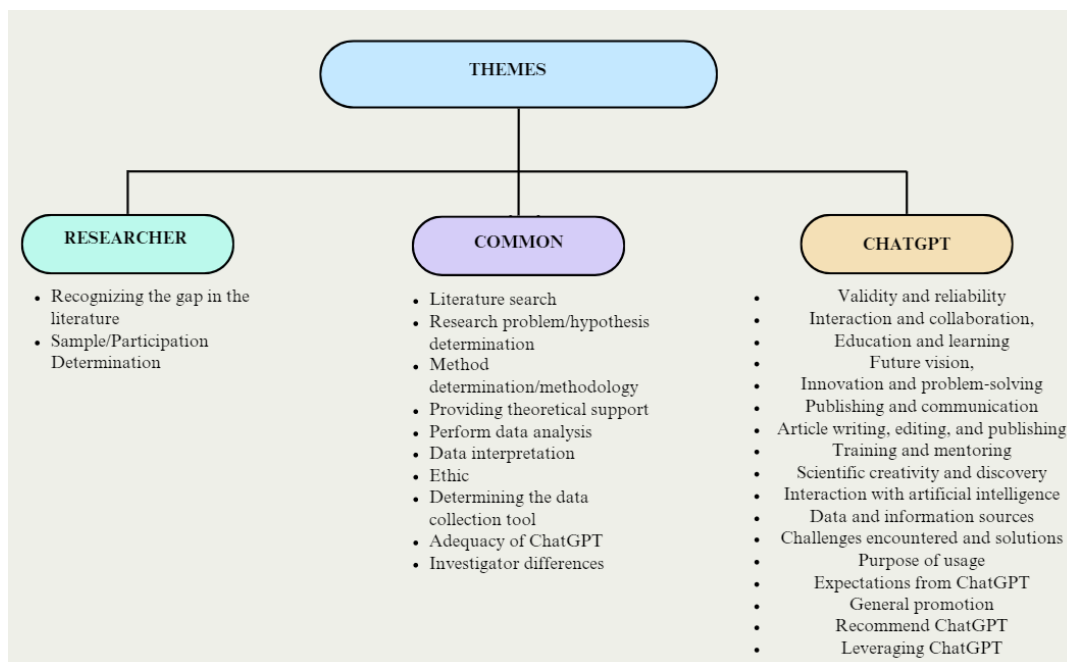
Similar Question Examples

<p style="text-align: center;"><b>Data Processing and Analysis</b></p> <p>CG17. How do you intend to use ChatGPT to process or analyze large data sets?</p> <p>CG18. How do you think ChatGPT can benefit the process of extracting information from complex data sets?</p>
<p style="text-align: center;"><b>Data Processing and Analysis</b></p> <p>CG45. What type of data do you intend to collect and analyze using ChatGPT?</p> <p>CG46. What differences do you foresee in ChatGPT's role in the data collection and analysis process?</p>

Figure 9 reveals the themes of the questions formulated by R2 alongside those developed by CG. R2 and CG produced shared inquiries across ten themes. R2 generated questions on two themes not addressed by CG, whereas CG formulated questions on 17 themes not mentioned by R2.

**Figure 9.**

Themes addressed in the prepared questions



In the concluding phase of formulating interview questions, R2 employed a blend of his inquiries and the question pool produced by ChatGPT. After completing the interview questions, R2 employed 29 questions in his research (Supplement 4). An examination of the inquiries formulated by R2 identifies three categories: those utilized without alterations, those employed alongside his inquiries and CG's queries, and those that solely incorporated CG's questions. Of the 29 questions prepared by R2, 10 were original, while 19 were derived from CG's questions. R2 delineated the questions numbered Q2, Q3, Q5, Q6, Q15, Q16, and Q17, which CG formulated into distinct

inquiries due to their integrated presentation. Table 2 presents examples of the modifications implemented by R2 in the questions.

**Table 2**

*The second researcher's final interview questions*

No	Question Asked	Question Source	Edits Made	Theme
Q1	Will ChatGPT make it easier for you to search the literature? Why?	O1	The question has not been changed	Use in the literature review
Q2	What kind of contribution can ChatGPT make to data analysis?	CG3	The question prepared by CG was, "What kind of contribution do you think ChatGPT can make in data analysis?" The question was divided into two separate questions because the data collection and analysis processes differed.	Data Analysis
Q3	What kind of contribution can ChatGPT make to data collection processes?			Data collection process

Table 2 indicates that R2 has completed all procedures and finalized the 29 interview questions for his research in collaboration with CG. He employed 19 of the 92 questions developed by CG. R2 elaborated on themes not covered in his questions through the use of CG, thus refining the final form of his inquiries. The final interview questions for R2 encompass themes including literature review usability, data analysis, data collection, identification of literature gaps, researcher collaboration, teamwork impact, theoretical foundations, educational learning processes, ethics, sample and participant determination, future vision, adequacy of CG, innovation, problem-solving, article writing and editing, publication, researcher differences, scientific creativity and discovery, interaction with artificial intelligence, encountered challenges and solutions, method selection, definition of research problems or hypotheses, and data interpretation.

### Finding for the Third Researcher

The Third Researcher (R3) has prepared six main questions (§1...§6) and two follow-up questions for the research problem of 'What are scientists' thoughts on using ChatGPT?' R3 has prepared questions regarding themes such as knowledge about ChatGPT, user experience, usage, purpose of use, contributions of ChatGPT, and advantages and disadvantages. The questions prepared by R3 consist of descriptive inquiries that characterize scientists' use of ChatGPT across various fields. The questions prepared by R3 are listed in Figure 10.

Figure 10.

Questions prepared by the third researcher

	Prepared Questions	Theme
§1	Do you know about artificial intelligence/ChatGPT? Explain.	Getting information about ChatGPT
§2	Have you used any artificial intelligence tools for your research before? Probe: If yes, for what purpose did you use it? Probe: At what stage did you use it?	User experience and intended use
§3	What is your perspective on the use of artificial intelligence/ChatGPT in scientific research?	Using ChatGPT
§4	Do you think that artificial intelligence will help researchers when conducting scientific research? Probe: If yes, how can it contribute? Probe: If not, why?	ChatGPT's contribution
§5	What are the advantages of using artificial intelligence/ChatGPT in the scientific research process?	Advantages
§6	What are the disadvantages of using artificial intelligence/ChatGPT in the scientific research process?	Disadvantages

### Third Researcher's Process for Preparing Interview Questions with ChatGPT

After R3 prepared the questions, she had CG prepare his questions. The summary of R3's correspondence with CG is below;

Figure 11.

R3's correspondence

**R3:** Hello. I am an academic. I'm curious about what scientists think about the use of ChatGPT, and I'm looking for an answer. That's why I'm doing research. In my research, "What do scientists think about the use of ChatGPT?" The answer to the question is sought. I want to collect the data for the research by interviewing. Can you prepare interview questions so that I can find answers to my research questions?

**CG:** Hello! For an academic study, addressing the topic "scientists' thoughts on the use of ChatGPT" could be a very interesting and valuable research area. When preparing interview questions for your research, it is important to delve deeper into participants' experiences with ChatGPT and understand the impact of this technology on their scientific work. Below are some suggested questions addressing various aspects of this topic: Questions numbered (1, 2, 3,...15) have been prepared.

**R3:** Thank you. Under some headings, it seemed like moving away from the question that the topic was "What do scientists think about the use of ChatGPT?". Can you prepare questions again in a way that will directly answer this question and be more precise?

**CG:** Questions numbered (16, 17, 18,... 29) have been prepared.

**R3:** The people we ask questions about may have used ChatGPT before or may have never used it. I think this should be taken into consideration, and both different groups should be brought together in the middle. Can you prepare again accordingly?

**CG:** Questions numbered (30, 31,...37) have been prepared.

**R3:** Ok. Now, can you write by ordering and simplifying without categorizing?

**CG:** Questions numbered (38,...45) have been prepared.

**R3:** Even so, I didn't like it. :(

**CG:** Thank you for your previous feedback, and I apologize for not meeting your expectations. Let's rearrange the questions in a better way: Questions numbered (46,... 53) have been prepared. This version offers a simpler and more direct approach compared to previous proposals. I hope it meets your expectations better this time.

R3 used CG to prepare interview questions, producing 53 questions. R3 initially introduced herself, specified the data collection tool, explained the research question,

and generated questions regarding it. She asked to make new questions after the first ones. R3 used more friendly language than R1 and R2. R3 requested arrangements from CG on issues such as moving away from the topic, participants' experience, and simplification. She stated that she did not like the parts in CG's edits and requested re-editing.

CG made various suggestions to R3. CG stated which theme the questions she generated belonged to and produced two alternative questions for each. He made arrangements according to R3's request and apologized for the incorrect feedback. Additionally, CG wrote an informative paragraph about the questions she generated at the end of the questions. All of the questions produced by CG are included in [Supplement 5](#). Examples of questions generated by CG are given in Figure 12.

**Figure 12.**

*Questions prepared by the third researcher for CG*

	Prepared Questions	Theme
CG1	How often and for what purposes do you use ChatGPT?	Purpose of usage
CG3	What are the biggest challenges and obstacles you encounter when using ChatGPT?	Challenges encountered
CG4	How do you use ChatGPT in your scientific research or publication process?	The scientific research process, publishing
CG5	What are the implications of ChatGPT on your scientific research methods or data analysis processes?	Research method, data analysis
CG10	Do you have ethical concerns about using ChatGPT? What are these concerns, if any?	Ethic
CG24	How do you evaluate the accuracy and reliability of the information produced by ChatGPT?	Validity and reliability
CG27	What approach do you take to attribution and citing when using information obtained from ChatGPT?	Reference and attribution
CG28	What expectations do you have for ChatGPT's future role in science?	future vision
CG31	In the context of whether or not you have used ChatGPT, what are your general perceptions and expectations of the role this technology can play in the field of science?	Perception and expectation
CG33	What do you think about ChatGPT's potential to increase effectiveness and efficiency in research processes, especially in areas such as data collection, literature review, or hypothesis development?	Data collection, literature review, and hypothesis development
CG41	How do you evaluate the contribution of ChatGPT to research processes?	ChatGPT's contribution

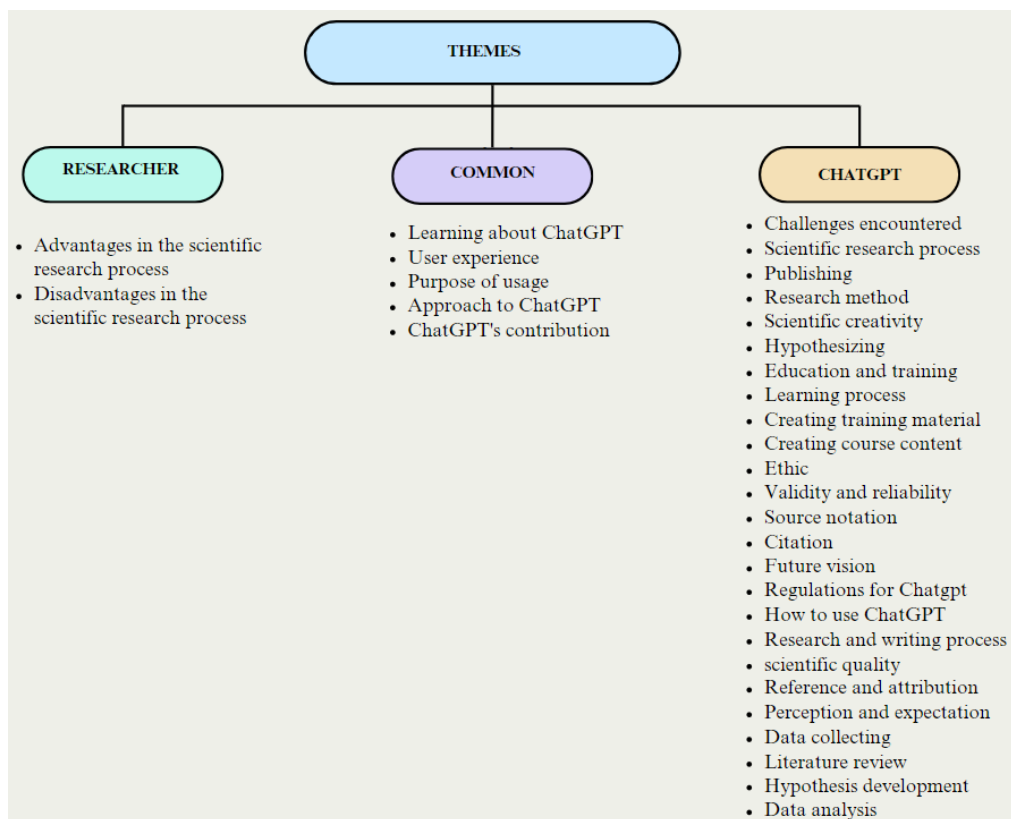
The questions produced by ChatGPT demonstrate a satisfactory standard of grammar and theoretical understanding. ChatGPT has explicitly articulated the themes for which it formulated the questions, presenting them in a comprehensible manner to be open-ended. The inquiries formulated by ChatGPT encompass a diverse array of themes, including intended usage, user experience, challenges faced, scientific research methodology, publication processes, research methodologies, data analysis, data collection, scientific creativity, hypothesis development, education and pedagogy, learning processes, creation of educational materials and course content, ethics, validity and reliability, amendments regarding ChatGPT, utilization of ChatGPT, citation and referencing, future perspectives, attitudes towards ChatGPT, and prospective visions. These themes can be characterized as inquiries into the requisite competency pertinent to the research question. Due to R3's failure to acquire the intended queries, ChatGPT

has formulated alternative inquiries based on analogous themes to the revised prompts provided by R3.

Upon examining Figure 13, the topics of the questions formulated by R3 and those devised by CG are evident. R3 and CG produced shared inquiries spanning five themes. R3 generated inquiries on two issues not addressed by CG, whereas CG formulated questions on 25 themes not referenced by R3.

**Figure 13.**

*Themes mentioned in the prepared questions*



In the last round of formulating the interview questions, R3 utilized both his prepared questions and the question pool generated by ChatGPT. R3 employed eight inquiries in his research to settle the interview questions (Supplement 6). Upon examination of the questions formulated by R3, it is evident that he employs them unchanged, utilizes them in conjunction with CG, and exclusively utilizes CG's questions. R3 formulated three questions from his inquiries, three from CG's, and two from his and CG's queries. R3 has divided the questions formulated by ChatGPT, specifically Q2, Q3, Q5, Q6, Q15, Q16, and Q17, into distinct inquiries due to their integrated presentation. Table 3 illustrates the procedures executed by R3 on the inquiries.

**Table 3.**

*Final interview questions from the third researcher*

No	Question Asked	Question Source	Edits Made	Theme
Q1	Do you know about artificial intelligence/ChatGPT? Explain.	Ş1	No changes have been made to the question.	Learning about ChatGPT
Q2	Have you used ChatGPT before? Probe: What kind of results did you get from this experience?	Ş2, CG38	R3 made a grammatical change in the research question and revised its probe.	User experience
Q8	Do you have ethical and reliability concerns about using this technology in science?	CG10, CG11	Two questions were combined and asked as a single question.	Ethics and reliability

R3, who completed all the procedures according to Table 3, completed the eight interview questions he will use in his research in cooperation with CG. She directly benefited from six of the 53 questions CG created. R3's final interview questions included the themes of knowledge about ChatGPT, user experience, the purpose of use, approach to CG use, way of using CG, ease and difficulties in use, advantages and disadvantages, ethics, and reliability.

## Discussion

### Content of the Prepared Questions

Researchers have developed questions to investigate the utilization of ChatGPT by scientists, emphasizing themes such as the purpose of use, user experience, ethical considerations, concerns, future perspectives, auxiliary tool functions, the scientific research process, literature review, data analysis, data collection, data interpretation, identification of literature gaps, definition of research problems, methodology determination, researcher variability, awareness of ChatGPT, its applications, contributions, and the associated advantages and disadvantages. The themes of the prepared questions align with studies in the literature regarding the application of ChatGPT in scientific contexts. Costa (2023), Dengel et al. (2023), Gill and Kaur (2023), Hill-Yardin et al. (2023), Huang and Tan (2023), Khlaifi et al. (2023), Obaid et al. (2023), Sun (2023), Şen et al. (2023), Tang et al. (2023). R1 and R3 developed questions focused on the general application of ChatGPT in scientific contexts, whereas R2 created questions that addressed the scientific research process. The flexible nature of qualitative research design allows each researcher to formulate questions that reflect their perspective (Yücel & Kızıkan, 2023). ChatGPT and the researchers formulated questions based on the themes present in the scientific literature. This indicates that both

parties can formulate questions by engaging with pertinent and contemporary issues related to the topic. Nonetheless, including similar themes in the questions prepared by the CG for each researcher in our study proves that the CG can formulate questions impartially. This study posits that researchers may hold varying perspectives on a topic due to their distinct past experiences. The aforementioned perspectives will enhance research grounded in the interpretive paradigm; however, the CG may operate independently of the researchers.

### **Question Preparation Duration and Language**

The analysis of the themes presented in the questions formulated by ChatGPT indicates alignment with topics identified in existing literature regarding the application of ChatGPT in scientific contexts (Costa, 2023; Gill & Kaur, 2023; Hill-Yardin et al., 2023; Huang & Tan, 2023; Obaid et al., 2023; Qasem, 2023; Sun, 2023; Şen et al., 2023; Tang et al., 2023; Xiou & Zhi, 2023). ChatGPT has produced a variety of questions across both standard and unique themes for researchers. The questions formulated by ChatGPT that aligned with the theoretical framework were straightforward, grammatically accurate, and designed to be open-ended for participant responses. In this context, ChatGPT has fulfilled the requirements for developing qualitative interview questions (Ezberci-Çevik, 2023; Creswell & Creswell, 2018; Patton, 2018). Moreover, its text-generation capability demonstrates that the questions were articulated in clear and understandable language (Bordt & von Luxburg, 2023; Handa et al., 2023; Kızıldağ, 2023; Lee et al., 2023). ChatGPT, similar to the researchers, adhered to the standards of grammar and clarity required for effective communication. This indicates that ChatGPT, similar to the researchers, adjusted to methodological frameworks and formulated questions that enabled participants to articulate their thoughts openly.

Given the duration typically associated with the preparation of interview questions in qualitative research, it is crucial that CG effectively develop these questions in a significantly reduced timeframe. The language employed by the researcher in the conducted procedures does not disadvantage the researcher. Multiple studies corroborate this finding, indicating that there are no challenges associated with the use of ChatGPT across various languages (Şen et al., 2023; Wang et al., 2023). This study advocates using ChatGPT to prepare interview questions, highlighting advantages such as efficient time management, appropriate language use, and comprehensive content generation. The authors of this study contend that researchers ought to compare their prepared questions with those generated by ChatGPT to finalize the questions. The comparison process is significant as it highlights the utility of ChatGPT in this context.

### **User Experience**

R1, who utilized CG more extensively than the other two researchers, experienced tremendous advantages from its features. R1 achieved the desired outputs more rapidly during his conversation while utilizing CG. He trained CG in the desired direction using CG's document reading feature (OpenAI, 2024). In contrast to R2 and R3, R1 employed ChatGPT to evaluate the final version of the prepared questions and establish their

sequence. R2, with limited experience using ChatGPT, made multiple attempts to formulate prompts to obtain the desired outputs. R3 employed a more personal language in interactions with ChatGPT compared to R1 and R2 and modified ChatGPT's responses as needed to generate new outputs. Analysis of the interview question preparation process among R1, R2, and R3, about their experience with CG, revealed that R1, possessing greater familiarity with CG, could identify desired interview questions with fewer prompts and effectively utilize various features of CG. Despite R2 and R3 having less usage experience than R1, they were able to acquire the desired interview questions through the use of additional prompts. Lee and Park (2023) found that ChatGPT literacy notably enhances user satisfaction and partially impacts the information acquisition process. Experience with CG enhances the researcher's ability to formulate interview questions effectively. Researchers with limited experience in usage can effectively utilize CG when formulating interview questions. This study emphasizes that researchers should continue utilizing ChatGPT despite their limited experience.

### **Benefiting from ChatGPT**

CG addressed the themes each researcher prepared and formulated questions related to further themes. CG identified the theme associated with the questions he presented to the researchers and various alternatives. The broader range of themes in CG can be attributed to its training on a more extensive data set. Researchers conducted a literature review and formulated their questions before developing the interview questions; however, CG possesses resources that researchers cannot match in this context (OpenAI, 2024). In this context, CG offers researchers a perspective by addressing themes previously explored by them. This study identifies both similarities and differences between ChatGPT and the questions formulated by the researcher. This situation is advantageous as it offers data richness and diverse perspectives inherent in qualitative research.

The final questions prepared by the researchers indicate that CG's inquiries provided both direct and indirect benefits. The researchers revised their questions and the control group's questions regarding content and grammar, utilized the control group for comparative purposes, and incorporated additional questions on themes not addressed in their final inquiries by employing the control group. Researchers actively utilize CG in the preparation and finalization of interview questions. The authors suggest that CG may aid researchers in formulating interview questions due to its capacity for generating human-like language and executing complex tasks (Lund & Wang, 2023).

## **Results**

This research has concluded that ChatGPT can be utilized as a valuable auxiliary tool by scientists during their research processes, particularly in preparing interview questions. The study's findings demonstrate that, by leveraging its extensive dataset and various features, ChatGPT can generate questions with the diversity and depth required

by researchers. This allows researchers to broaden their perspectives and create more comprehensive interview questions. Although various studies have identified limitations of ChatGPT, such as presenting outdated or incomplete information, lack of contextual awareness, issues with maintaining context in extended conversations, limited domain-specific expertise, inability to interact with external systems, limitations in different languages, limited creativity, and overgeneralization limitations, the results of this study do not encounter these limitations (AlZu'bi, Mughaid, Quiam, & Hendawi, 2024; Ray, 2023; Rice, Crouse, Winter, & Rice, 2024). Researchers were able to prepare questions in their native language, Turkish, that were current, contextually consistent, domain-specific, creative, and tailored to their specific requests throughout the process. Additionally, it was observed that ChatGPT could provide consistent responses to previous commands regardless of the length of the conversation and utilize PDFs uploaded by researchers. In this context, the researchers argue that these limitations of ChatGPT can be overcome when used effectively in preparing interview questions.

Researchers' experiences have shown that the use of ChatGPT can be flexible according to users' needs and expectations, and there are many ways in which researchers can benefit from ChatGPT while developing their questions. Notably, more experienced researchers can utilize the opportunities offered by ChatGPT more efficiently, preparing more effective questions with less effort. Moreover, the similarities and differences between the questions prepared by ChatGPT and those by researchers highlight that ChatGPT will not replace human researchers but can significantly contribute to the research process. ChatGPT can assist researchers in broadening their perspectives and developing questions from different angles, enhancing their research quality.

This research demonstrates that CG supports scientific inquiry significantly, particularly during the qualitative research and interview question preparation phases. The support offered by CG enables researchers to utilize their time more efficiently, formulate their research questions more thoroughly, and enhance the quality of the data collected in their studies.

### **Limitations**

The limitations of this study primarily stem from linguistic, methodological, and sample-related constraints. Since the research was conducted in Turkish, the native language of the researchers, the findings and interpretations are inherently shaped by linguistic and cultural nuances specific to this context. Additionally, the interview questions were designed by the researchers within the framework of their chosen research topic, which may have influenced the scope and focus of the inquiry. Furthermore, the study was based on the personal experiences of only three researchers, limiting the generalizability of the findings and necessitating caution in drawing broader conclusions.

## Recommendations

The results of this study indicate that CG is an excellent instrument for formulating interview questions in qualitative research. Both seasoned and novice qualitative researchers can utilize the CG as an advantageous resource for formulating interview questions. The CG is trained on data sets and algorithms, so in some cases, it may provide incomplete or outdated information. Researchers should critically evaluate and validate the information obtained, considering such limitations.

Qualitative research frequently involves sensitive subjects; thus, safeguarding participants' privacy and ensuring data confidentiality is a crucial ethical obligation. In AI-assisted research, particularly when utilizing ChatGPT (CG) for generating interview questions, it is essential to ensure that the questions avoid language that may be intrusive, coercive, or leading. Researchers should rigorously evaluate AI-generated questions for methodological soundness and adherence to ethical principles to mitigate potential harm to participants. Questions must not infringe upon participants' privacy, subject them to distressing or manipulative circumstances, or undermine the principle of voluntary participation in research. AI models are trained on datasets that may reflect particular cultural or socio-political contexts, potentially resulting in biased or exclusionary language. Researchers must systematically review, modify, and evaluate the ethical validity of AI-generated content prior to implementation to mitigate ethical risks. To ensure ethical sensitivity in qualitative research, researchers must avoid dependence on AI-generated questions. Instead, they must engage in an ongoing process of ethical oversight, critical evaluation, and necessary revisions to uphold research integrity and safeguard participant well-being.

Researchers utilizing ChatGPT (CG) or analogous AI tools must explicitly disclose this in the methodology portion of their studies and furnish a comprehensive account of the AI integration within the research process. This should encompass the objectives and parameters of CG utilization, the degree of human supervision and alterations made to AI-generated content, the data sources and training methodologies that inform the AI model, and the constraints of the algorithm. Researchers must specify if CG was utilized solely as a supportive instrument or if it actively contributed to data collection while highlighting the impact of human intervention on the results. Considering that AI-generated information may exhibit biases or contextual inaccuracies, researchers must elucidate how these constraints were addressed and what validation procedures were implemented to guarantee the reliability and accuracy of the findings. Enhancing openness in AI-assisted research requires a methodical explanation of CG utilization, which will bolster the academic rigor of the study and foster a critical awareness of AI's role in scientific inquiry.

The CG correspondence in this study was conducted in the researchers' native language (Turkish). By utilizing the multilingual capacity of ChatGPT, researchers can prepare interview questions in different languages and cultural contexts. However, additional research and expert opinions are important to understand the specific dynamics of each

language and culture. Since researchers with more experience in using the CG can benefit more efficiently from the opportunities offered, it is recommended that researchers familiarize themselves with the use and features of the CG before preparing interview questions. Preparing interview questions for a single study topic can be considered a limitation. For this reason, research can be conducted on the ability of CG to prepare interview questions for different topics.

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## Genişletilmiş Türkçe Özet

### Giriş

Yapay zeka teknolojileri uzun zamandır mevcut olsa da, bu teknolojilerin geniş çaplı kullanımı OpenAI'nin Kasım 2022'de sunduğu ChatGPT ile başlamıştır. ChatGPT, doğal dil işleme teknolojilerini kullanarak kullanıcı taleplerini anlamakta ve doğal insan dilinde yanıtlar üretebilmektedir (OpenAI, 2024). Özellikle GPT-4 sürümü, geniş bilgi tabanı, karmaşık sorguları anlama, metin üretimi ve dil işleme becerileriyle öne çıkmaktadır. ChatGPT'nin bu özellikleri, nitel araştırmalarda görüşme soruları hazırlama gibi karmaşık süreçlerde etkili bir araç olarak kullanılabileceğini göstermektedir (Lund & Wnag, 2023).

Yapay zeka (YZ) araçlarının özellikle ChatGPT gibi gelişmiş modellerin, nitel araştırmalarda etkisi giderek artmaktadır (Costa, 2023; Dengel vd., 2023; Hamilton vd., 2023; Khlaif vd., 2023; Morgan, 2023; Siiman vd., 2023; Şen vd., 2023; Taylor, 2023). Bu çalışma, araştırmacıların görüşme soruları oluştururken karşılaştıkları zorlukları azaltmak ve süreci daha etkili hale getirmek için ChatGPT'nin sağladığı katkıları değerlendirmeyi amaçlamaktadır. Araştırma, üç farklı araştırmacının deneyimlerinden yola çıkarak ChatGPT'nin nitel görüşme soruları hazırlama becerisini incelemiş ve bu süreçte araştırmacıların kendi soruları ile ChatGPT tarafından üretilen soruları karşılaştırmıştır.

Çalışmanın temel amacı, ChatGPT'nin nitel araştırma sürecindeki potansiyel kullanımını değerlendirmek ve bu aracın görüşme soruları hazırlama aşamasındaki etkisini incelemektir. ChatGPT'nin geniş veri seti ve kullanıcı taleplerini doğal insan dilinde anlama yeteneği, bu süreci hem daha verimli hem de daha kapsamlı hale getirebilir. Bu kapsamda, şu sorulara yanıt aranmıştır:

1. Araştırmacıların "Bilim insanlarının ChatGPT kullanımına yönelik düşünceleri nasıldır?" araştırma sorusuna yönelik hazırladığı soruların içeriği nasıldır?
2. ChatGPT'nin "Bilim insanlarının ChatGPT kullanımına yönelik düşünceleri nasıldır?" araştırma sorusuna yönelik hazırladığı soruların içeriği nasıldır?
3. Araştırmacıların ChatGPT kullanma deneyimlerinin, ChatGPT üzerinden soru hazırlama sürecine katkıları nasıldır?
4. ChatGPT'nin hazırladığı sorular ile araştırmacıların hazırladığı sorular arasındaki benzerlik ve farklılıklar nelerdir?
5. Araştırmacılar ChatGPT'yi görüşme sorusu hazırlarken yardımcı bir araç olarak nasıl kullanmaktadır?

## Yöntem

Bu araştırmada, araştırmacıların ChatGPT (CG) kullanarak görüşme soruları hazırlama deneyimlerini incelemek amacıyla bireysel araştırma deseni kullanılmıştır. Çalışma grubu, nitel araştırma ve CG deneyim düzeyleri farklılık gösteren üç araştırmacıdan oluşmuştur. Veri toplama aracı olarak, araştırmacıların bireysel olarak ve CG ile hazırladıkları sorular kullanılmıştır. Süreçte, "Bilim insanların ChatGPT kullanımına yönelik düşünceleri nasıldır?" araştırma sorusuna yönelik sorular oluşturulmuş, CG'nin katkıları araştırmacılar tarafından bağımsız şekilde değerlendirilmiş ve nihai sorular revize edilmiştir. Veriler, tümevarımsal içerik analizi ile incelenmiş; kodlama süreçleri bağımsız olarak gerçekleştirilip fikir birliği sağlanarak temalar oluşturulmuştur. Araştırmanın geçerlik ve güvenilirliğini artırmak için süreç detaylı açıklanmış, veriler değiştirilmeden alıntılanmıştır. Bu kapsamlı yöntem, CG'nin nitel araştırmalardaki potansiyelini değerlendirmek için yapılandırılmıştır.

## Bulgular

### *ChatGPT'nin Soruları ve Araştırmacıların Soruları*

Araştırma sonucunda, ChatGPT'nin hazırladığı soruların teorik bilgi açısından yeterli, dilbilgisi kurallarına uygun ve katılımcılar için anlaşılabilir olduğu görülmüştür. Ayrıca, ChatGPT'nin oluşturduğu soruların açık uçlu olduğu ve katılımcıların düşüncelerini özgürce ifade etmelerine imkân tanıdığı belirlenmiştir. Araştırmacılar, ChatGPT'nin sorularını inceleyerek bazı temalarda doğrudan, bazı temalarda ise dolaylı olarak fayda sağlamıştır. Bu süreçte, ChatGPT'nin daha önce araştırmacılar tarafından ele alınmamış temaları da içeren kapsamlı sorular oluşturduğu gözlemlenmiştir.

### *Araştırmacıların Deneyimleri ve Kullanım Farklılıkları*

ChatGPT'nin kullanımı, araştırmacıların deneyimlerine bağlı olarak farklılık göstermiştir. Daha deneyimli araştırmacıların, ChatGPT'nin özelliklerinden daha etkin bir şekilde faydalandığı görülmüştür. Örneğin, ChatGPT'nin doküman yükleme özelliğini kullanarak daha spesifik çıktılar elde eden deneyimli araştırmacılar, daha az sayıda komutla istedikleri sonuçlara ulaşmıştır. Daha az deneyimli araştırmacılar ise süreç boyunca daha fazla deneme yapmış ancak yine de ihtiyaç duydukları soruları hazırlayabilmiştir.

### *ChatGPT'nin Avantajları ve Sınırlılıkları*

ChatGPT'nin geniş veri seti ve hızlı sonuç üretme yeteneği, araştırmacılara zaman kazandırmakta ve daha geniş bir perspektif sunmaktadır. Ancak, araştırmacıların etik kaygıları dikkate alarak ve soruları eleştirel bir yaklaşımla değerlendirerek nihai hale getirmesi önemlidir. Ayrıca, ChatGPT'nin bazen benzer temaları tekrar etme eğiliminde olduğu ve bu durumun dikkatle yönetilmesi gerektiği belirtilmiştir.

## Sonuç ve Öneriler

Bu çalışma, ChatGPT'nin (CG) nitel araştırma süreçlerinde, özellikle görüşme soruları hazırlama aşamasında, araştırmacılara değerli bir destek sağlayabileceğini göstermektedir. CG, geniş veri seti ve özellikleriyle araştırmacılara çeşitlilikte ve derinlikte sorular üretebilme imkânı sunmuş, bu da araştırmacıların perspektiflerini genişletip daha kapsamlı soru setleri oluşturmalarını sağlamıştır. Literatürde belirtilen bağlamsal farkındalık eksikliği ve alana özgü uzmanlığın sınırlı olması gibi olumsuzluklar bu çalışmada gözlemlenmemiştir. Araştırmacılar, ana dilleri olan Türkçe'yi kullanarak güncel, yaratıcı ve bağlamsal olarak tutarlı sorular üretebilmiştir. CG, uzun sohbetlerde önceki komutlarla tutarlılığını koruyup yüklenen dokümanlardan faydalanabilmiştir. Deneyimli araştırmacılar, CG'den daha verimli şekilde yararlanarak etkili sorular hazırlayabilmiştir. Sonuç olarak, CG'nin nitel araştırma süreçlerine katkı sağlayarak araştırmacıların zaman ve verimlilik açısından önemli kazanımlar elde etmelerine olanak tanıdığı ortaya konmuştur. Araştırmacılar, ChatGPT'yi bir yardımcı araç olarak kullanarak sorularını daha kapsamlı ve derinlemesine geliştirebilir, böylece elde edilen verilerin kalitesini artırabilir.

## Öneriler

- ChatGPT'yi kullanırken oluşturulan soruların eleştirel bir yaklaşımla değerlendirilmesi ve araştırmacının kontrolü altında nihai hale getirilmesi gerekmektedir.
- Araştırmacıların, ChatGPT'yi etkin bir şekilde kullanabilmek için önceden bu araca aşinalık kazanmaları önerilmektedir.
- ChatGPT'nin farklı temalarda sorular oluşturma yeteneği, nitel araştırmalarda çeşitli bakış açıları geliştirmek için kullanılabilir.

Bu sonuçlar, ChatGPT'nin nitel araştırma süreçlerinde etkin bir şekilde kullanılabileceğini ve araştırma soruları hazırlama aşamasında sağladığı katkılarla alan yazına önemli bir katkı sunduğunu ortaya koymaktadır.

**Ethics Committee Approval:** This study did not involve any direct interaction with human subjects for the purposes of data collection. As such, no ethical approval was required, and no personal or sensitive data was collected from individuals.

**Data Availability:** Below are the ChatGPT conversations that the researchers had with the raw data supporting the results of this paper:

R1: <https://chatgpt.com/share/3395409a-5209-4e32-9497-b24cc2ad951c>

R2: <https://chatgpt.com/share/19d3d771-2887-44a5-a2a8-2fdebd1b3872>

R3: <https://chatgpt.com/share/c7a82711-8062-4b0d-bde6-c8ea70579e5a>

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# Teacher Experience in the Precarization Process

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## Abstract

Precarization, which signifies the destructive consequences of the expansion and deepening of neoliberal conditions on the working classes of the 21st century, has also affected the field of education, which is increasingly regarded as a service sub-sector rather than a universal public necessity. This study aims to reveal how teachers experience processes of precarization. In line with this purpose, based on a phenomenological research design, in-depth interviews were conducted with a group of participants consisting of teachers from private schools, private course centers and hourly-paid teachers from public schools in Istanbul. The analysis of the interviews revealed that the experiences of teachers in the process of precarization have three main dimensions: the experience of the material conditions surrounding precarious teaching labor, social relations that can be described as the immaterial dimensions of this mode of labor, and strategies for coping with and resisting the conditions of precarization. The research indicates that like private course teachers and hourly-paid teachers, who have been frequently shown to work in low-status and insecure positions, private sector teachers are also being drawn into precarious life contexts. The article also shows that for many teachers unionization becomes a means to maintain their hopes for their future and their profession.

**Keywords:** Neoliberalism and education, teacher labor, precarity and precarization.

## About the Article

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## Introduction

As the first quarter of the 21st century draws to a close, teachers in Türkiye, who make up approximately 1.5% of the population, 3.3% of the employed labor force, and one-fifth of all public sector employees, are not only a sizeable professional group at the national level; they are also the bearers of a specific and indispensable category of labor that the global operation of neoliberal capitalism, as in the rest of the world, has devalued and suppressed. Neoliberalism, which operates, in Pierre Bourdieu's words, as "a program for the methodical destruction of collectives" (Bourdieu, 1998: 96), since its first laboratory experience in Chile in the 1970s (Barder, 2013; DeVault, 2024), has been shaped as a composite of global processes of liberalization, privatization, deregulation, marketization, reduction of entrepreneurial tax burdens and acceleration of the flow of capital, services, and commodities (Mudge, 2008; Moini, 2016). This last stage of capitalism is characterized by the flexibilization of labor processes, the precarization of labor markets, working conditions, and income, and the formalization of employment conditions. One of the salient consequences of the process has been the emergence of a broad category of labor, largely composed of temporary workers, those working on part-time or freelance contracts, and extended interns, who exist in living conditions that are explicitly below the standards of the welfare society. This category and the processes that shape/define it constitute one of the most important sociological issues of our time. Although there are ongoing debates on the scope, class characteristics, political transformation, and transformative potentials of the precariat as a collective subject(ivation) phenomenon and a concept, there is a consensus on the phenomenon and processes of precarization that shape it (Arnold and Bongiovi, 2013; Casas-Cortés, 2014; Foti, 2017; Jørgensen, 2016; Kalleberg, 2009; Standing, 2014).

Education has always been one of the public activities that neoliberal forces have primarily sought to transform. Today, education, which offers a global profit potential of two trillion dollars annually, has increasingly attracted the attention of capitalist investors and market-oriented bureaucracies in line with the neoliberal governance paradigm (Hirtt, 2009). From North America to Africa, from Zimbabwe to Ireland, from Scandinavia to New Zealand, education has been rapidly marketized, commercialized, and privatized; the field of education has been turned into a quasi-market, services for schools and, in many places, education itself have been outsourced in a process that operates with similar dynamics almost everywhere in the world (Ball & Youdell, 2007; Dahlstedt & Fejes, 2019; Hwami, 2011; McMaster, 2013; Skerritt & Salokangas, 2019). Under the new conditions of capitalism, schools began to function more and more like private companies, and education goals were determined by the market's needs (Apple, 2004; McLaren, 2007). Teachers' wages had fallen dramatically since the 1980s when neoliberalism began to spread; still in many countries in Latin America and Africa, a large proportion of educators must take secondary jobs to make ends meet (Robertson, 2008; Stromquist, 2018). Wherever possible, new hires have favored contract teachers over permanent staff. According to 2018 figures, the proportion of teachers worldwide

with security of tenure has fallen to just over 50% (Compton and Weiner, 2008; Kablay, 2012; Stromquist, 2018).

Within the framework of neoliberal governance models, the social, bureaucratic, and political context of education and schooling has also been transformed. From being the central institution that should intervene in social issues and alongside in education for the sake of the public, states have become administrative agents that operationalize entrepreneurial freedom towards the 'market,' 'investment in human capital,' and the 'cooperation of stakeholders' from different sectors of society (Simons and Masschelein, 2009). The imposition of neoliberal modes of governance that emphasize controlling principles such as measurability, performance, and accountability, which are increasingly compressed into narrower and narrower frameworks, has forced educational processes to become routinized and standardized, limiting educators' autonomy, initiative and creativity based on interaction and (re)contextualization in their fields. An understanding of education defined based on these dry criteria has rapidly relegated fundamental issues such as "humanity, difference, democracy, culture, thinking, personal meaning, ethical deliberation, intellectual rigor, social responsibility, and joy in education" (Lipman, 2009: 373). For teachers forced to conform to these patterns, the result has been the deskilling of the educators and the weakening of specialization (Elvira, 2020; Hursh, 2000; Means, 2019; Rasco, 2020). Education's share of public expenditure generally fell during the first phase of neoliberalism in the last quarter of the 20th century, although it seems to have stabilized in the 21st century (Kim and Boyle, 2013). Teachers and unions are pressured to accept performance-based wages (Robertson, 2008).

In Türkiye, which, like Chile, was subjected to a military coup to adapt to neoliberalism (Parliamentary Research Commission, 2012; Beriş, 2022), the conditions of this new phase of capitalism were dominant in education. First and foremost, education was adapted "to meet the needs of international competition that has been enhanced by the global market economy, and the demand for an intellectual ability compatible with the highly globalized economy" (Ertürk as cited in İnal, 2012: 23). The share of the MoNE budget allocated to public education investment has fallen dramatically; the education system has become test-oriented, fueling competition among students, educators and institutions (İnal, 2012). The rights-based understanding of education was eroded, institutional purposes and functions were transformed in line with marketization, education and knowledge production processes were commoditized, and access to quality education became more complex (Gök, 2014; İnal, 2006; Koray, 2012; Sayılan, 2006;). As in all education components, there has been a staggering transformation in teacher labor (Yıldız, 2014; Durmaz, 2014; Buyruk, 2015). In the last two decades, as the number of students has increased, teacher appointments have become exam-based, and not enough appointments have been made, the increasing need for educators has been met through contracted, temporary, and hourly-paid teachers (Güvercin, 2014; Kablay, 2012; Keskin Demirer, 2012). The ratio of private schools to the total number of schools has increased five-fold in the past two decades (Altun Aslan, 2019; Can & Sezer, 2022); private course centers and private schools have created a market context

in which teachers, who often cannot be appointed to permanent positions, are employed under precarious conditions, low wages, and performance pressure (Tomruk Ünal, 2020; Ulutaş, 2014).

Teaching practices outside permanent positions have undergone intense precarization in this process. In the last fifteen years, these practices have attracted attention especially from researchers in the field of educational sciences: There are studies which discuss problems of hourly-paid public teachers in various provinces of Türkiye (Çınkır & Kurum, 2017; Polat, 2014), measure their commitment to the profession (Sarıbaş et al. 2020), evaluate the opinions of administrators about hourly-paid teachers (Doğan, Demir, & Turan, 2013; Öğülmüş, Yıldırım, & Aslan, 2013), discover the opinions of permanent teachers about hourly-paid teachers (Turan & Bozkurt, 2010), reveal the views of teachers and administrators on employment differences in education (Soydan, 2012), examine the attempts of unassigned teachers to organize as a social movement (Kiraz & Kurul, 2018; Üstün, 2011), identify the precarious and temporary working conditions and risks of teachers (Gümüş & Çetin, 2014; Günerigök & Oğur 2018), criticize the proliferation of private course centers that menaces public education (Ulutaş, 2014; Balkız, 2014; Ural, 2018), and evaluate hourly-paid teaching in the context of public education and the right to education (Tunç & Taner, 2020).

The subject of this research is how teachers working in the public and private sectors experience the effects of the processes of precarization created by neoliberal policies. In addition to teachers in private course centers and hourly-paid teachers in public schools, whose working conditions are characterized by low wages, weak personal rights, and working conditions that are stretched in various ways for the benefit of the employer, private school teachers, whose working conditions have been little studied, are the focus of this research conducted in Istanbul. The aim is to understand the forms that the educator's experience takes and the ways of coping with these conditions under the pressure of marketization and the vacuum created by precarity at the professional, institutional, and personal levels. In this way, the views and perspectives of the category of labor, which is responsible for producing the experience and production capacities of the next generation, on the conditions of its activity are exhibited, while the damage done to this activity by neoliberalism, which is now considered to have reached the end of its term, is made a little more visible.

## Method

### Research Design

The design of this qualitative research is based on the interpretative phenomenological analysis approach. The phenomenological interpretive analysis makes it possible to understand the experiences, opinions, and perspectives of the participants and to interpret the social phenomena that emerge based on the meaning attributed to the experiences (Creswell, 2013). Phenomenological interpretive analysis was adopted as

the research design to understand teachers' experiences and perspectives on the process of precarization that emerged as a result of neoliberal practices in the field of education and to explore the meaning they attribute to the relationships in this process.

## Participants

Participants of the research consist of teachers who have worked in private schools and private course centers in Istanbul after 2000, as well as teachers who have worked in preschool, primary, secondary, and high school levels for at least one academic year in the public sector. In accordance with the study's objectives, preliminary in-depth interviews were conducted with a small number of participants, and the chain process was completed by referring these participants to others with similar characteristics, who in turn recommended other participants. Consequently, 22 participants with precarious teaching experience were reached through 'snowball or chain sampling', which is classified as one of the 'purposeful sampling strategies' (Patton, 2018). **Table 1.** *Demographic information of the participants*

Code Name	Gender	Age	Marital status	Teaching Experience in Private School(s)	Teaching Experience in Private Course Center(s)	Hourly-Paid Teaching Experience	Branch
P1	Male	49	Married	-	-	8 years	English
P2	Female	44	Single	-	5 years	1 year	PCG
P3	Female	36	Married	-	-	2 years	Classroom Teacher
P4	Female	34	Married	6 years	4 years	-	Mathematics
P5	Female	39	Married	-	-	2 years	Music
P6	Female	42	Single	9 years	-	-	Philosophy group Teacher
P7	Female	30	Married	4 years	2 years	-	Mathematics
P8	Male	39	Single	8 years	1 year	1 year	Physics
P9	Female	48	Married	15 years	-	-	Pre-school Teacher
P10	Female	32	Single	9 years	-	-	Classroom Teacher
P11	Male	30	Single	3 years	-	-	PCG
P12	Male	38	Married	10 years	-	3 years	Physical Education

P13	Female	29	Married	6 years	-	-	English
P14	Female	35	Married	-	2 years	-	Philosophy Group Teacher
P15	Female	23	Single	-	1 year	-	PCG
P16	Female	28	Single	7 years	-	-	Classroom Teacher
P17	Female	34	Married	6 years	3 years	-	Literature
P18	Male	42	Married	-	10 years	8 years	Mathematics
P19	Male	33	Married	4 years	4 years	-	Geography
P20	Female	48	Married	20 years	-	2 years	Folk Dances Music
P21	Female	29	Married	1 year	-	-	Turkish
P22	Female	33	Single	2 years	6 years	1 year	Geography

Six male and 16 female teachers from different branches participated in the study. Eight teachers were single, and 14 were married. The length of teaching experience varies from one year to 22 years. There are three teachers who have only worked in the public sector in an hourly-paid status, two teachers who have only worked in private course centers, and six teachers who have only worked in private schools. 11 teachers have experience working in at least two sub-sectors of education. Two teachers have worked in all sub-sectors.

### **Data Collection Tools**

This study was conducted using the qualitative research method, with data being collected through in-depth interviews. The in-depth interview technique is predicated on the acquisition of exhaustive information regarding the experiences, perspectives, and opinions of a small number of participants by the problematics of the research (Creswell, 2013). The study participants were recruited from three fields: private school, classroom, or paid teaching. To this end, a semi-structured interview form of 22 open-ended questions, including alternative questions to cover all sectors in the precarious teaching category (private school, paid teacher, and classroom teacher), was created to obtain detailed information. Most of the questions in the form were asked of all teachers, regardless of sector; however, several questions were directed to participants according to the sector(s) in which they had worked. The interview form was drafted after a literature review on the research topic, by the research problem and in compliance with research ethics. To understand the validity of the content of the questions, the interview form was finalized with the opinions of two colleagues (an expert in the field of sociology of

education and a social psychologist experienced in conducting applied studies with teachers and students in schools). The comprehensibility of the questions was tested and clarified in a preliminary interview.

The questions were designed to capture teachers' views on the status of the teaching profession in society; their motivations for teaching in the public and private sectors; their opinions on the differences in terms of personal rights compared to permanent teachers; their opinions on their relations with permanent teachers, school administration, pupils and parents; their assessment of the working conditions during their service as a teacher; the reasons behind interruptions in their teaching career (if any); their experiences of precarious working conditions; their relations with their families and their environment during this process, their views on the impact of traditional and gender stereotypes on the teaching profession; their assessment of the impact of the marketization of education on the teaching profession and the field of education; the survival strategies they have developed in flexible and precarious working conditions, their thoughts on collective resistance, association or union initiatives for their personal rights, and their proposals for improving working conditions and solving problems.

### **Data Collection Process**

In-depth interviews were initiated with people who had worked as hourly-paid teachers, as private course teachers, or as private school teachers through the social network of researchers. Then other participants with similar characteristics who would contribute to the study were contacted using the snowball method via references of the first interviewees. In-depth interviews lasting approximately one hour were conducted face-to-face by the researchers in the research team at a time and place deemed appropriate by the participants. Semi-structured, open-ended questions were used in the interviews that paid attention not to being directive and were developed as the interviews progressed. With the permission of all participants, the in-depth interviews were audio recorded and then transcribed.

### **Data Analysis**

This research used the interpretive phenomenological analysis method, allowing the participants' teaching experiences, views, and perspectives to be explored and social phenomena to be understood and interpreted. The researchers transcribed the audio recordings obtained from the in-depth interviews. The analytic phase of the study was conducted following the steps propounded by Smith et al. (2009) regarding interpretive phenomenological research design. In the first step, the transcribed text was read, and the audio recordings were listened to again when needed to interact with the data obtained, and the text was read over and over. In the second step, the interpretive note-taking phase, the researchers took interpretive notes on the transcribed texts in three stages, first describing the content of the participants' words, then exploring how they used the language, and finally focusing on conceptual connections. The texts were read over and over again and related concepts and ideas were noted, colored and underlined,

and coded. The researchers did the coding processes separately and compared the codes and related notes when they came together. In the third step, the researchers tried to discover the meanings that the participants attributed to their experiences on the basis of the direct quotations and transformed the notes and codings obtained into themes by associating them with the relevant concepts according to the problematic of the research. The fourth step was to try to find connections and relationships between the themes, and to identify main themes and sub-themes referring to the literature data. In the fifth step, the themes and sub-themes generated separately by each researcher for each interview text were compared and a consensus was reached. In the final stage, the data obtained from each participant was placed under the themes and sub-themes and patterns were searched for, (sub-)themes were restructured and renamed when necessary. The statements selected as representative examples were associated with the relevant literature and the interpretative phenomenological analysis was completed.

### **Credibility and Ethics**

Lincoln and Guba (1985) emphasize that the criteria of credibility, transferability, dependability, and confirmability should be fulfilled in qualitative research. They emphasize the importance of interaction with participants and peer review to ensure credibility. This study aimed to obtain genuine responses in the interview by establishing mutual interaction and trusting relationships with the participants. Peers were consulted about the questions' clarity and relevance to the literature. Participants were allowed to express themselves freely during the interview. The raw data obtained from the research were read and coded several times, organized under themes, and the participants' statements were directly transcribed. To ensure the dependability and confirmability of the research, the same semi-structured questions were asked to each participant; all interviews were recorded and transcribed after obtaining their permission. The data, which were read many times, were first coded separately by two researchers, and then the coded data were compared and analyzed. The text was read aloud many times by the researchers who came together regularly, and the emerging data were organized according to their similarities and differences, and themes were formed. The researchers, who periodically exchanged views on data collection and analysis, reviewed the themes repeatedly. Connections were established between the themes and sub-themes were generated according to the inclusivity of the experiences assessed. A consensus was reached among the researchers in selecting the statements of the participants to be directly quoted, and the chosen statements were directly shared in the findings section. The findings were interpreted based on the theoretical framework.

Participants were informed about the ethical sensitivities of the study. It was stated that the participants' experiences, sincere evaluations, and opinions were important for the research. The study was initiated after obtaining approval from the university's ethics committee. "Informed Consent Form" was given, and consent to participate in the study was obtained against signature. The participants were informed about the subject of the study, the researchers, the purpose of planning the research, how in-depth interviews would be conducted, that a voice recorder could be used with their permission and

approval and that based on the principles of confidentiality and voluntariness, they could terminate the interview whenever they wished. The confidentiality of the identities of the participants was ensured. Care was taken not to decipher the participants' identities to protect privacy and confidentiality. Ethical principles were followed before, during, and after the interview to prevent harm to the participants.

## Findings

### 1. Experiencing Material Working Conditions

#### 1.1. (Fixed-term) Contract and Interruptions in Teaching Careers

The official defining feature of precariousness for precarized teachers is that, unlike their tenured colleagues in the public sector, they do not enjoy the benefits of collective bargaining agreements and are bound by a contract that can be customized for each teacher separately. Such contracts are the central conditioning fact that articulates their life contexts to the general market conditions. Almost all of the participating private school and classroom teachers associated the contract and the contract process with feelings of fear and anxiety. The contract, which at first glance appears to be a formality for a work whose conditions are known in advance by the parties and which will be carried out in any case, is noticed to sit at the center of an emotional spectrum shaped by a series of negative feelings. Private school teacher P12 stated that one of the main factors forcing teachers to accept the conditions is the dread of unemployment. He and P22, who worked both in private schools and private course centers, reported that these institutions sometimes impose 10-month contracts on their employees.

"Employers can impose a 12-month contract; they have the right to do so. After 12 months, they can say I don't want to work with you (...), but they cannot offer a 10-month contract, as they often do. We call this illegal contract, which is not actually approved by MoNE, a 'drawer contract'; but the functional contract is, unfortunately, the document that the teacher signs with the terror of unemployment" (P12).

"Claiming that the minimum wage is too high, most institutions impose 10-month contracts. (...) I told them that I had no security, I wouldn't sign a 10-month contract, and left the institution. I asked for my severance pay, they didn't give it to me... Because of the excess of teachers in my branch, they say, "Teacher, if you don't work, we will find a new graduate who will work cheaper," and they actually find a new graduate" (P22).

The 10-month contract, which is a sector-specific example of flexible work, seems to document the cornering of the precarious teacher: On the one hand, years of painstaking professional training are disregarded; on the other, those who impose the contract make it clear that the teacher can be easily replaced if they don't accept the job. Contract processes divide the lives of precarious teachers into loops, during which subsistence anxiety fluctuates and at the end of which all conditions are reset. The vocational experience gained during the cycles is of limited value in terms of securing

work and earning a living, as the main issue for employers is the price rather than the quality of teaching. Overtime is hardly ever paid for.

"At the end of the 12-month contract, when they say 'I don't want to deal with you', we become unemployed (...) Usually in the third month of the second semester, in May, if it is clear that they will no longer work with a teacher, the teacher starts looking for a new job. This lowers my morale and enthusiasm for work a lot. Every year in the second semester I get very stressed with subsistence anxiety. Even though we earn little above minimum wage, our social security premium is paid on the basis of minimum wage. They impose extra work on Saturdays and Sundays under the name of two-day courses and even on public holidays; but overtime is not paid. If they want to work with you, the principal calls you at the end of the year, puts a blank piece of paper in front of you and says, 'Sign it!' (P7).

### **1.2. Low Wages, Long Working Hours and Temporary Status**

As is customary, the primary issue at the center of contracts for both employers and teachers is wages. The interviewees reported earning at or slightly above the minimum wage, which is considered appropriate for any job in the country that does not require qualifications or training. On this front of the labor market, the reserve labor army of millions of unassigned teachers and millions of university graduates who have to pin their hopes on the field of education deprives the individual teacher working in the private sector of any bargaining opportunities and grounds for self-confidence and individual resistance.

"Towards the end of each semester, in May, something like that would happen in the classroom: The owner of the institution would come -they usually have a room at the top of the buildings- and we would wait downstairs like sacrificial lambs. They would call everyone upstairs one by one. 'We are forming next year's staff, we want to discuss whether we will continue with you or not!' First of all, there is always this anxiety: Do they want to continue with me or not? Let's assume they want to! How much will they offer? I remember such times, for example -this was a very humiliating thing: I want to sign you for next year at this price... There is very little room for negotiation, if you object, he might say 'no!'; you never know it from the beginning. You accept, of course you accept it most of the time..." (P2).

There are employers who argue that they do not have to pay teachers enough to live on, despite the fact that the working day is unofficially extended beyond working hours due to the insistent demands of parents, violating the boundaries of private life.

"During the contract process we even said to our founders, 'We can't make a living on such salaries' They said, 'We don't have to provide your livelihood!' But we spend all day here for the school? We are teachers who keep on working even after our shift ends. We are constantly disturbed by calls and messages from parents. How on earth can you say that you don't have to support us?" (P16).

One of the private school teachers (P19) reported that a newly graduated pupil of his is earning the same amount as him by working in an unskilled job. This is one of the most striking examples of the devaluation of teacher labor.

"Working conditions are very bad, wages are the most important problem. For example, I met a former student of mine who is now studying at university. He was working in a clothing

store. I asked him how much he gets paid. He said: minimum wage for 30 hours a week, plus travel and meal allowance... This is what we get at our private school" (P19).

The legal requirement of 40 hours of instruction per week (Milli Eğitim Bakanlığı Özel Eğitim Kurumları Yönetmeliği, 2012) in private schools is often violated by corporatized educational institutions, forcing teachers to work well over the limit.

The legal requirement of 40 hours of instruction per week (Milli Eğitim Bakanlığı Özel Eğitim Kurumları Yönetmeliği, 2012) in private schools is often violated by corporatized educational institutions, forcing teachers to work well over the limit. P15, who worked in a private course centre, stated that she worked about 19 hours over the legal period. According to private school teacher P21, who said that she had resisted the increase to over 40 hours, one of the most frustrating experiences is that teachers are forced to complete their working hours after pupils have left school, even though there is nothing left to do.

"They try to convince you somehow to take extra classes. When they increased my shift over 40 hours, I said, 'If you are going to increase it any more, I will not be able to continue.' One of the most annoying pressures they put on us is that they force us to stay at the school even after our classes are over... The children leave, but we can't. Even if they don't put extra-classes after school, we can't leave. I never understood this, strangely enough, it was not something that anyone objected to. Why do we stay, we have no work, no children? 'Mrs. Teacher, please, that's how it goes...'" (P21).

Hourly-paid teacherships constitute a specific category of precarious experience created by the state to take advantage of the excess of university graduate labor. P1 characterizes this temporary status with the term "seasonal", which is often used for unskilled labor in the agricultural sector.

"You belong to the seasonal worker class, and what it brings to education is definitely negative... For example, I witnessed an hourly-paid teacher whose major was chemistry delivering math lessons because they couldn't find another teacher.... It is used as a hasty, gap-filling method. That cannot be called a profession. That's an intermediary category that administrators can use to fill the gaps if you have a university degree" (P1).

### **1.3. Personal Rights Issues**

The most important objective indicators of precarization, apart from low wages and high working hours, are the weaknesses in the personal rights of contract and hourly-paid teachers. These educators are deprived of many of the rights enjoyed by permanent teachers, such as regularly paid pension contributions, food and travel expenses, and vacation rights. P18 implies that health insurance, even if it appears to be valid on paper, is rendered de facto inaccessible in practical terms. P1 states that the government only pays half of the insurance premiums and doesn't cover the travel expenses of hourly paid teachers, although this is a relatively feasible matter.

"It becomes an issue to utilize the health coverage in hospitals. Because they never start it on time, it was very difficult for us to fulfill the 120 working days required for the insurance to take effect until June; and that's the time for schools to close. You can only get paid for 30

hours maximum and the insurance premium is paid for a maximum of four days per week. Public holidays and midterm vacations are not counted as work anyway. By occasions at weekends like parent-teacher meetings, we must have paid for our own meals and travel expenses. We covered the costs out of our own pockets" (P18).

"For a long time, the discounted transportation card granted to regular teachers was not given to hourly-paid teachers. Then the municipality, not the state, announced that they granted this benefit as their own disposal. (...) The social insurance premium was paid in half, and we were expected to make up the insurance from our salaries. I have never come across an hourly-paid teacher who covered the other half of their insurance out of the pittance they received" (P1).

P16, a private school teacher, complained about not being able to benefit from the smallest privileges of permanent teachers that come almost naturally from their position in the production and reproduction of culture.

"We are affiliated to the MoNE, our contracts go there, but we cannot enter museums, nor can we use green passports or other rights of permanent teachers. Why don't they see the teachers in private schools as teachers, although so many private schools have been established and allowed to do so? This is the real problem" (P16).

#### 1.4. Marketization

Teachers are experiencing the phenomenon that sociology has labeled 'the process of marketization' through its different dimensions and indicators. One of the serious aspects of this experience is that the social relationship between students and teachers has begun to be squeezed into the framework of a vendor-customer relationship, and private educational institutions have normalized this framework.

"In institutions where the student is a customer, I think there is generally no educational ethics. Even if not explicitly, they wanted us to look on students as customers and act in that way... The system is based on selling something to the parents. They sell a package deal to parents. It is enough for a child to have five hours of literature a week, but they sell a package by saying that they would instruct more literature lessons and more hours of mathematics, and so they offer more hours but with an insufficient numbers of teachers. (...) You become both a part of that package and the implementer of it. Of course, you don't think about this much when you are alone with your students in class. More often in the meetings at the beginning of the semester, administrators make you feel as if you are selling something. You sit there with nausea inside without being able to object" (P21).

As seen from the viewpoint of P4's struggle for livelihood, the primary meaning of the term "market" (piyasa) seems to overlap with its secondary meaning in Turkish, which can be translated as "the place, the environment" or "here and there." Private schools, which grow steadily in number by demand, have begun to appear on the streets like ordinary workplaces. The fact that salaries remain low due to the excess of teachers is one factor that makes this development possible. P22 feels that her self-investment in teaching has been rendered meaningless by the market's demand for cheap labor.

"The number of schools in the market (piyasa) has increased. Our salaries remain constant or they raise them very little... Now there are private schools even on the alleys (P4). Education has completely turned into commerce... Unfortunately, I worked in the private sector for eight

years, and in the process I saw this: If you are a cheap teacher, you can find a job. This shows this: Your knowledge and years of experience are of no importance; unfortunately your qualifications are of no importance” (P22).

By comparing private schools to public schools, P6 finds the commercialization of education understandable not in terms of the goals of education but in terms of its conditions. However, when the 'teacher' element, which is essential to education, is placed as if naturally right behind these incidental conditions that have been made purchasable, the result is the commercialization of teaching labor in a hurtful way and the undermining of the status of the teacher.

“Within private schools, both teachers and comfort are bought; in other words, a safer environment, a better social environment, a 'more hygienic' environment and an accessible teaching staff... As teachers, we are commercialized and the value of the teaching profession is diminishing compared to when I was a student. There are school owners who value teachers, but there are also administrators who see us as unqualified workers. As a result, teachers are actually perceived as commercial beings. I mean, it looks as if we are selling knowledge in exchange of money, but of course this is offending...” (P6).

The phenomenon of competition, a banal consequence of market mechanisms among private schools, is channeled by administrators into relations between educators. P4 observed that competition creates mutual suspicion and uneasiness among employees and transforms the race between institutions in the field of education into a rivalry between teachers, leading to a kind of symbolic rent formation based on the name of educators.

“(...) After I got involved, I realized that there was a different kind of rant going on there... I mean, the teachers are very competitive with each other... For example, everyone wants their name to be more prominent. I think it was partly because of ambition and partly because of the attitude of our principal... He was encouraging this by getting everyone fired up; he was trying to achieve success by making them compete. Competition was eventually tied to this fact, that is, to make points with the principal who himself was in a race to promote the institution...” (P4).

### **1.5. Pressure, Mobbing, Drudgery**

Unfair contracts, weak personal rights, lack of public support, the pressure of an excessive supply of reserve labor, and the bendability of the rendition of teaching according to the demands of students' parents make private school and private course teachers vulnerable to the managerial layer. P4 describes how drudgery imposed in the final stages of her pregnancy becomes exhausting:

“During my pregnancy I worked for 32 weeks. I had difficulty even attending my own classes, but in cases like the absence of a sick teacher I was the one who was assigned to take their place. Or, for example, they were going to AFAD for an earthquake drill, and they saddled me with the watching over task. What was I supposed to do in such a drill in my condition? Or they were going on a trip to the Belgrade Forests, and the watch-over burden was mine again, and I was seven months pregnant. I was having crying fits, trying not to show them to anyone. Now my friends were speaking for me and reminding them that I was pregnant... After going through a lot of mobbing by the management it is not possible to step into the

classroom and leave everything outside. We are human beings, not robots, it is not that easy... They didn't give me my salary in the summer because I got a report that I could not work due to pregnancy..." (P4).

Two participants, P22 and P2, who worked as hourly-paid teachers in the private and public schools, stated that their precarious conditions were used recklessly against them. P2 noted that hourly-paid teachers are forced to undertake floor watches for which they are not obliged and can not be paid. Their testimonies show once again that hourly paid teaching is the form of work most vulnerable to exploitation in the field, where legal and institutional safeguards are weakest and where the job description set out in contracts can easily be stretched to the detriment of the educator.

"...And teachers working in private sector are subjected to mobbing a lot. The principal comes in without knocking, scolds a student, covertly talks down to the teacher. Hourly-paid teachers in public schools also face drudgery from school administrators, such as irrelevant workloads and floor watches. We, hourly-paid teachers, could not oppose them, we were afraid of losing our jobs. (...) But there is a price for not speaking out, you feel that your dignity is damaged" (P22).

"There were jobs that could not normally be assigned to a permanent teacher. The permanent teacher could say "No, this is not my job". Of course, when they saw that I was doing everything, there occurred a constant burden of work. I couldn't draw the line there, I couldn't say, "No, this is not my job," because frankly I was afraid that I might be sent away... They also saddled me with the attendance entries..." (P2).

P11 emphasized that being in a union, conducting union activities, and sometimes even just talking about union issues can become one of the specific reasons for the oppression of teachers in private schools. On an emotional level, such oppression does not only generate simple and individual feelings of anger or resentment. Here, due to the nature of the collective struggle, a spectrum of emotions is generated by different subjects/subjectivities and the intersectionalities arising from their positions.

"(The administration) was trying to put us under pressure with questions like 'What did you talk about in the teachers' room? Did you talk about the union?' This pressure also created a lot of emotional turmoil for us. We were exercising a basic constitutional right and we had to hide (it) as if it were a crime. We even had to hide that we were talking about it. When we thought about the possible consequences of all this, both for the lives of our friends and for our own lives, it seemed like we needed to question our consciences. I mean, my friends could be unemployed next year just because the management thought they had talked to me about it. On the other hand, it is impossible not to get angry at this bullying" (P11).

### **1.6. Uncertainty of the Future, Invisibility of the Life Horizon, Sense of Loss.**

The interviewed teachers frequently referred to different dimensions of precariousness in their living and working conditions. The experience of work, which becomes central to other dimensions of P22's life, allows us to trace how social ties outside working life loosen and how a socioeconomic phenomenon is almost being somatized.

"You do not feel safe. You will take out a loan for a simple need; there is the fear of whether the job will continue, whether you will be laid off. It's not just insecurity while working, you can't even create a small saving for the future. You shouldn't think ahead. There is a constant

feeling of being stuck, like shortness of breath. You don't have the luxury of being sick during the semester. If you miss a day of class, the program is disrupted, you have a heavy workload, there are very few teachers. When a teacher doesn't show up, the program may be disrupted. There is no way let a class go by unattended. So you never feel safe. Unhappiness at work is being reflected at home. I used to deliver 10-12 hours a day; so when you come home, you cannot tolerate your nephew, mother or father" (P22).

P2 observed how precarity makes it challenging to make important life decisions, leading to postponement or cancellation of choices that could be pivotal in one's life. According to her, the uncertainty caused by precarity creates different gender burdens.

"If I were a man, I am sure I would have been asked, 'Are you going to work for such a low wage?' If I were married, it would be impossible for my wife not to work. There is no assurance. Both spouses may be fired at any time. There were people who could not get married or build their lives for a long time because of that" (P2).

## 2. The Experience of the Immaterial Dimensions of the Labor Process

### 2.1. The Erosion of Intra-School Relationships Among Educators

The working context of hourly-paid teaching combines precarious modes of labor with a conventional mode of labor, creating a contrast that clarifies the process of precarization of the teacher experience and the status quo in teaching labor. The interviews revealed that hourly-paid teachers' experiences of the differences between them and permanent teachers were generally negative. Participants often felt markedly marginalized, minimized, excluded, or even tacitly humiliated. The manifestations of difference and incompatibility in everyday life, which at first glance appear to be simply a matter of status, were described by P2 as 'class difference'.

"The permanent teachers were slightly condescending to us... I could really feel it. Even when I went to the teachers' room, I could feel that I didn't belong there... First of all, of course, because we were temporary, because they had been there for many years, relationships and friendships were already established; but we, the hourly-paid, would come and go anyway (...). My best friend at school was also an hourly-paid one... She, either, couldn't connect with the permanent staff. But unlike me, she was in the teachers' room almost all day. So there was a class difference between the permanent and the hourly-paid teachers" (P2).

P22 emphasizes that this difference goes so far as to create spatial segregation in the school where she works. In the experience imposed on P22, she felt that offering desserts, a sign of social intimacy or a desire for such affinity became a fortification of the existing hierarchy. P20, on the other hand, described how difference and hierarchy were embodied in the attitude of a colleague in front of the students when she took her class time to catch up on her syllabus.

"In the teachers' room, hourly-paid teachers would always sit together, permanent teachers would pass to the other side. If an event was to be held, for example, a dinner was to be organized, hourly-paid teachers were never asked. If baklava was to be bought and served, we were never asked nor offered" (P22).

"In a class where I was teaching music, a core teacher asked for my hour to catch up on her schedule. I said yes. "Well, it's all the same to you, you're paid hourly anyway, sit down." She was implying that I was temporary and trivial and she did that in front of the children. It was very offensive." (P20).

According to P14, a similar distinction (and the way this distinction is being experienced) exists between STEM and humanities teachers in public schools. P14 stated that the salary difference between the two groups of teachers is significant enough to dissociate their socialization styles.

"In a way, I also was in the status of an hourly-paid teacher there (at the private course center). I had fewer classes. They were busier, earning much better. They could get together, go out for coffee because they were busier at school and had better salaries. I was already earning very little; I couldn't go out for coffee with them. The salary difference affected my relationships so negatively" (P14).

## **2.2. The Gendering of Labor Processes**

Educators interviewed continue to experience similar stereotypes about teaching, which, since the beginning of Turkish modernization, has been represented as the most suitable profession for educated women. Female teachers expressed discomfort with the naturalisation of their professional activity as an extension of the caring work attributed by the school context to the "mother" figure in the family.

"Most of my entourage sees teaching as the best profession for a girl" (P15).

"There is a segment of parents who only expect their children to spend their time at school in a healthy and safe way, receive a good or bad education and return home in the evening. Therefore, in the eyes of such parents, we can be seen as a kind of caregiver rather than an educator. The administration, too, often sees us in such a way; therefore our working hours are long, study sessions are organized after classes... So we actually release the children from school at the time their parents return home" (P17).

"In the past, teachers were respected and were valued by institutions. Now they are seen as caregivers. Even my son... He said you are taking care of children, look at the salary you get. The undervaluation of our labor has changed the perception, it's so galling... Yet infant schools are where preparation for primary school and acquaintance with reading and writing begin. In recent years, institutional administrators have not stood behind teachers, so parents see us as caregivers" (P9).

Female participants who worked in private schools talked about how they experienced different aspects of the intersection of capitalist working conditions and patriarchal domination. P7 argued that the profession's performance should be freed from the symbolic burden arising from its identification with motherhood. She noted that female teachers face drudgery practices more frequently than their male colleagues. P17 also confirms that female teachers are expected to behave emotionally.

"Teachers are called 'half-mothers', which is very wrong... Yes, they are my students, but I am not their mother. I am very much against this emotional connection. Frankly, there is no need to put such a burden on oneself. We do our jobs and provide education, we affect their lives, but we do our jobs and we earn money in return. But the bosses try to sentimentalize

that. (...) We don't get the same salary as male teachers. Unfortunately, there is no equal pay for equal work. (...) For example, when I and a male friend of mine are at leisure at the same time and there's an unsupervised class whose teacher is absent that day. They send me to fill that hour. They make female teachers do the paperwork" (P7). "They attribute a motherly role to woman teachers. This may also be true for male teachers, but we don't hear much about fatherhood. They attribute motherhood to us because of our femininity and impose a particular mission, expecting us to fall into sentimentality and romanticism" (P17).

P4 observed that her male colleagues used such stereotypes about women to avoid workload and that there was tacit cooperation between male executives and male employees in this regard.

"When we were preparing for a science festival or setting a board, we might need to prepare materials or do something like model making. Male teachers would stand back remarking they are incapable of doing it. There was a misuse of female teachers and the principal actually was overlooking that" (P4).

P1 describes how the responsibility of providing for the family, which is generally attributed to men in patriarchal orders, takes a heavy turn in precarious conditions, and comments on how the performance of hourly-paid teaching is perceived according to gender stereotypes.

"The fact that a man is working as an hourly-paid teacher means that he is still unemployed, that his unemployment continues. As to a female teacher, it is as if- again, according to the general perspective of the society – she somehow is seen as an auxiliary force; like 'She manages to earn an income from somewhere, even if it is just a smidgen'... The attitude towards women may be softer in these matters" (P1).

### **2.3. Imposition of the 'Family Discourse'**

One of the most striking phenomena revealed by the everyday experiences of private school teachers is the 'family discourse' to which they are frequently exposed. This discourse is used to impose extra-contractual burdens or to naturalize the institution's demand for tolerance when it fails to fulfill its responsibilities towards the teacher. The family discourse is performed through an institutional allegory, in which the students who are fragile and vulnerable children of the family in question, and teachers are assigned the role of parents sanctified by patriarchy. Based on their own experiences P7, described how the discourse and the practice work together.

"The society represents you in a sublime position, you are so great. Teachers are the crown of our heads, the teacher's labor is unpayable... There are a lot of epithets such as 'half-mothers' but unfortunately we teachers have to work with impositions based on this understanding. We have to work under this pressure created by society. For some of these reasons, teachers cannot quit their jobs because we are emotionally affected by the bosses' statements such as 'Please, go through the motions, cover that, too, teacher; take on also this class, teacher; we are a family, teacher; we are in the same boat, teacher'" (P7).

P17 and P21 also think that the family discourse and the artificially created feelings of closeness conceal and deepen the exploitation they have experienced.

"They say 'we are a family, come to us first when you have problems', but of course, over time you feel very clearly that you are being exploited. Especially female teachers feel that much more" (P17).

"'We are a family!' The school administrator - I don't call him an administrator anymore - our teacher friend who owns the capital always seemed to be very friendly with us. I see this as a way of not giving worth to teacher's labor. He chums up with you. I used to hear this from many of my teacher friends: 'The founding teacher is a very nice person!' But he doesn't pay your salary! He gives us just a whisker above the minimum wage, paid by hand. And you have to visit him many times to ask for that" (P21).

#### **2.4. Hierarchy between STEM and Humanities Branches**

One of the key divisions between teachers is shaped by the demand for STEM courses, which, for students, may pave the way to better positions in capitalist production. Within this status quo, the teachers of humanities subjects interviewed felt that they were becoming increasingly subordinated. P17 and P14 emphasized that when combined with characteristics such as gender, age, and marital status, being a teacher of humanities subjects becomes a categorical disadvantage.

"STEM teachers are clearly more favorable. Institutions are more flexible towards male teachers and STEM teachers in terms of class hours and special agreements through special agreements... But if you are female and a teacher in a humanities subject, you would be underpaid and cannot choose the off-day as you want. While someone else can get a weekend off very easily, they do not offer you that flexibility depending on your gender, marital status, whether you have children or not" (P17).

"Since I teach subjects in humanities and because I am younger and work with (university entrance) exam students, my classes were deemed a space of freedom for the pupils. As if my hours were free time from the very beginning" (P14).

#### **2.5. Negative Transformation of Educator-Student and Educator-Parent Relations**

Teaching for money in private schools has the consequence of undermining the minimum level of authority relationship between teachers and students and of reducing the student and their parents to the status of ordinary customers receiving services and the teacher to the status of a customer representative of any company operating under liberal market conditions. According to P6's experience, in private schools, there is a clear contempt for teacher labor. The value placed on teachers and their ability to practice their profession autonomously decreases as the annual tuition level of the school increases.

"We encounter so many attitudes, especially from parents, like 'We pay you, so you have to do this and that' or students in classes saying 'Teacher, what are you talking about, we do pay your salary'... It really hurts and here I show a very harsh attitude: I get paid for my labor, if I were porter, I would get paid for that too. Of course there will be a price for my labor, but you don't pay my salary, I say. Teaching is seen as something that is bought. In the case of a school where the income level of the parents is high (I know this because my children are in such a private school), the things expressed in the communication groups of the parents (as a parent I am a member of one of those groups) are horrible. 'She has to take care of

my child one-to-one!" We have just experienced something, for example, and the teacher is easily asked to leave immediately. They forget that teachers are also human beings..." (P6).

Since students and their parents are seen as customers, teachers in private schools may be subjected to direct and indirect pressure from parents, students, and administrators. P11 complains about a school system and an administrative approach in which the objective requirements of education and training are bent in favor of students.

"Students complain very easily; parents come and make complaints; they threaten that they will have their enrollment taken away. Therefore, such teachers can be taken by the school counselor or by the principal and exposed to lectures about teaching. If the teacher is still not good enough for the students, they can send them away... According to an article on "mutual satisfaction" in our contracts" (P11).

P7 is disappointed to find that the private school system has become a banal commercial enterprise and that even decisions about how homework is done are made by parents who have become ordinary customers.

"They say, 'Let's do that according to the will of parents, teacher.' For example, our homework system changed because the parents wanted it that way. Because they take the money from them... That's a business organization... Yes, they are customers and we are working slaves..." (P7).

P13 witnessed that in private schools where market conditions prevail, parents can be involved in evaluating teachers' performance, and in at least one case, they were able to ensure the dismissal of a teacher.

"If you are teaching in a private school, as I said, first of all you have to please the parents very much so that you can stay there permanently. Even if the administration is satisfied as much as possible, when there are complaints from the parents, they will not make a deal with you again... The parent who is not satisfied with you talks to another parent. Like a flock of sheep... They say, 'Yes, I don't like (this teacher) either', then together, 'We don't like this teacher, we don't want her/him'. The administration says, 'We are happy with you, teacher, but I'm sorry, we can't work with you if there are complaints' and fires you. Last year we sent one of our friends away crying in such a situation" (P13).

## **2.6. Feelings of Competence and Incompetence and Ethical Concerns**

All of the participants who work as hourly-paid teachers in public schools are aware that they are not competent in the relevant field when they work in place of teachers who cannot be appointed, which burdens their conscience. P5 argues that the system obliges them to work as a substitute labor force to survive. P3, on the other hand, could not bear this burden of conscience, so she quit the job.

"I am not actually a graduate of a faculty of education; I attended there occupying the place of another regular teacher who could not be appointed there, who should have been appointed. But of course I had to work. I had to continue my life, but I knew from the very beginning that this was a great injustice because the work I did should have been done by a professional of that field" (P5).

"They do this injustice to people just to pay half of the salary and half of the insurance. And injustice to students too... There are teachers who have graduated from the relevant departments at one side, maybe they would be much more useful to children, waiting to be appointed, but instead of them, someone from an irrelevant department comes and gets the job. How useful can someone who left a managership in a cargo company be for example? There were also those who came looking for part-time jobs so that they would have time to take care of their children. For example, I wouldn't want my child to be taught by someone who is not a primary school teacher, who graduated from a different department. Since I felt the discomfort of this myself, I said, I would not apply again for the job" (P3).

## **2.7. Decline in Occupational Status and Its Relation with Marketization**

Another commonly held opinion among the participants is that the status of the teaching profession has undergone a significant decline compared to that of the educators who played a pivotal role in their formative years. According to these opinions, the lowest status is that of hourly-paid teachers. These teachers are taught to be not competent in their jobs and used as a substitute labor force. In fact, due to the generally negative perception, P18 does not even want his experience as an hourly-paid teacher to appear on his resume.

"I realized this later. It is not right to serve as an hourly-paid teacher anyway. I am filling the place of someone who is going to be appointed and that is why they cannot be appointed. (...) Hourly-paid teaching is a waste of time, it does not add anything to the person doing it. I put it on my CV as job experience when I went to private course centers for job interviews. One course center founder said, 'It would be better if you don't write it down' because they used to think, 'He couldn't do anything, so he worked as an hourly-paid.' There is still such a perception" (P18).

P1 reported that the school administration strictly hid the fact that they employ hourly-paid teachers and that being the subject and sharer of this 'secret' was emotionally difficult for him.

"We are ordered not to tell that we are hourly-paid teachers, we are supposed to hide it. Normally I wouldn't make it a matter of pride, I would tell them (...) 'He is not a competent teacher; he is someone who comes and teaches for money, he will be sent away at the end of the year, he has a temporary job'; in other words, there is a conviction like 'He is not even a teacher'. Here, of course, we are asked by the administration to hide our situation, thinking that the parents of the students would not want an hourly-paid teacher to work. I was reprimanded by the principal for telling the students that I was an hourly-paid teacher... After I found out that the administration wanted me to hide it, a different kind of panic started, I mean I felt like I was lying. You find your self between a rock and a hard place" (P1).

P2's observations on the commodification of teacher labor show that the distance and difference between the personality/subjectivity of the laborer and their professional activity have become relatively blurred and that new dimensions have been added to the alienation of teaching labor, as in all forms of affective labor. According to P2, the selection and supervision of teachers by the school administrations and parents, which started in private schools, creates a new and generalized pressure setting in public schools where teachers are surveilled and "picked over" through social media and electronic means.

"Teachers are selected as if they were picking out fruits from the market. This also happens in the state schools. The status of the teacher has fallen down. Whether the teacher is hourly-paid, contracted or permanent, all parents know everything and their approaches change accordingly. I mean, in 2009 when I started, parents didn't know much about the teachers in the region where I worked, they weren't that conscious... Now they all know the entire genealogy of any teacher. All of the parents follow the social media of the teacher; they find out who the teacher is on the internet; they ask around about them" (P2).

## **2.8. The Impact of Precarious Work on Teachers' Family Relationships**

The plainest manifestation of the erosion of teachers' social relationships caused by precarious work is what the participants experience in their family lives. P5 and P18 talk about different kinds of sadness and shame resulting from precariousness:

"My family was pretty much aware of the problems; they knew it was a temporary thing, that I was only trying to save the day. Just a small income to cover my own expenses, not enough to cover the rent, not enough to cover the bills. If something unexpected came up, I had to rely on my family for support. My parents try not to crush me, but they are always upset. I was ashamed to face my father during the two summers I was unemployed" (P5).

"If you ask my wife, she would say that it made her summer vacations miserable. I was really unhappy, and every summer I was anxious about how much money we would earn, which school we would work in, and whether there would be an assignment afterwards? It is embarrassing on the one hand, but while all teachers were happy for the appointments, we were worried. We thought we would lose our jobs" (P18).

## **3. Experiences of Coping and Resistance**

### **3.1. Family Support**

The first resource that economically challenged participants rely on to cope with the threat of precarity and poverty is their families. They explain that they develop a type of survival strategy by keeping their expenses limited to basic needs. For P5, living with his family feels like an extended childhood experience, combined with feelings of guilt. P17, in contrast, experiences the pressure and dissatisfaction of having to put her new life with her husband on hold and return to her parents because of the harsh living conditions.

"The salary of an hourly-paid teacher is low. (...) I was single at the time, (the salary) seemed to be relatively sufficient, but I was with my family. Even though I didn't want to be a burden, I couldn't leave. (...) You inevitably act according to their needs, their rhythm. It was hard not to be independent, not to make adult choices" (P5).

"I moved to my parents' house. My husband thought we were not going to get anywhere here and started looking for opportunities abroad. He is a graphic designer and now he is trying to get a foothold abroad. He is also going through different difficulties as an immigrant. I also moved in with my family, to get rid of the rent. I live very minimized at the moment. In fact, I live incredibly minimalist. I am someone who already tends to live modestly, but that I have to live this way because of the circumstances makes me unhappy" (P17).

### 3.2. Subsistence on Additional Jobs

The majority of teachers who work in precarious conditions take on additional jobs to make ends meet. Participating teachers describe their experiences in these unstable situations as an overwhelming rush rather than a routine. P12 illustrates the plight of her colleagues, whom she saw working beyond their official hours, as "a vise within a vise." Other testimonies further confirm the existence of this breathless, suffocating, and dehumanizing extra work.

"Our friends who work privately go for private lessons, they give additional lessons. There are people working in construction, or as taxi drivers, truck drivers. Everybody I saw seemed like crushed in a vise that was squeezed in another vise. (...) There is also a well-off, aristocratic group there, or those who have better conditions in terms of teaching subjects, but on the other hand, there are also oppressed ones in the lowest conditions" (P12).

The experiences and testimonies of teachers who must work as taxi drivers, give private lessons, or teach in additional courses at school to meet their basic needs confirm the reality of this exhausting, suffocating, machine-like extra work.

"I know a teacher whose wife does not work because she takes care of the children, so he is the sole breadwinner, drives a taxi and is late for classes all the time... It is a breathless, sleepless life" (P7).

"I have students, I'm tutoring, so I can make some extra money from there. I was also questioning the private tutoring business at first. I felt like I was somehow taking advantage of the vulnerabilities of the system. But you have to do something to survive" (P13).

"The school has Saturday courses, it is not compulsory to attend those courses, but we feel obliged to attend them because we get paid from there. And of course I'm additionally tutoring one or two students so that I can pay my rent, because the salary barely covers my own needs. But it has caused this, I have turned into a complete machine. Sometimes I come home very late" (P8).

### 3.3. Issues of Organization and Solidarity

Participant teachers express that the collective attitude and solidarity that should be developed in response to the constraints and working conditions in which their profession operates in private schools remain insufficient. P18 articulates his disappointment in this regard, comparing it to the respect and support that physicians show each other. P4 voices concerns about colleagues who recognize the need for collaborative action but abandon their friends who step forward, fearing job loss.

"Everyone says (teaching) is "sacred", but I don't think it is highly respected. I have often seen that even teachers do not show much respect to each other. We actually envy doctors, I mean, when one of them has a problem, the others stand behind their colleague, but there is nothing like that in teaching" (P18).

"There is no unity among teachers. When the government raised the minimum wage, the school gave us a very small raise. Everyone was very angry about this situation, everyone talked about it; they talked about it in online groups, they got together and talked about it, "Let's go, let's meet the founder" and so on... Then, when it got serious, I said, 'Let's go, let's

talk, let's stand up for our rights'; no one came with me, I was left alone. I was in a bad situation in the eyes of the principal" (P4).

P13, harboring resentment towards her colleagues and the education community, highlights the rise in violent crimes against teachers as a facet of precariousness and the symbolic devaluation of the teaching profession.

"Today we see the condescending attitude of many. Why is that? Because there is no respect anymore. Every day we see on TV, 'The child stabbed the teacher after school' or 'The parent beat the teacher' or 'The parents complained about the teacher at school, the teacher was expelled... These things should not happen. People should resist: 'How dare you lay a hand on my teacher, insult them?' There is no such thing unfortunately.... Some quit teaching because of this (...) Being a teacher doesn't make any sense anymore" (P13).

A significant number of interviewees noted that the discounts provided by these institutions for their employees' children removed any chance of resistance from the beginning.

"For example, I have a colleague who is very unhappy (because of her job), but she has a child in our school and there is a discount for teachers' children. Yes, facilities at school like discounts or the possibility to leave work early prevail on women to accept poor conditions..." (P7).

"For some teachers, the fact that their child is attending the same school is actually a hindering factor. There are many teachers who say 'My children are here, let's not do anything,' and keep silent so that nothing bad happens to their child" (P10).

### **3.4. Unionization Experience**

Private school and classroom teachers can join unions as the most effective form of professional solidarity. The experience of union membership occurs under various conditions, processes, and emotions, even though the underlying motives are similar. While P17 describes her liberation from the pressures of an isolated work experience, which left her feeling quite helpless, with the metaphor of "thirst," P15 reflects that she found relief from her troubles during her transition out of her job by becoming a union member.

"I heard about the union through my friends. I also saw them promoting it on social media. I never thought 'What is this, who formed it?' I was so thirsty that I directly became a member without thinking about who I would meet, what kind of path we would take, thinking that I could feel stronger" (P17).

"I became aware of the existence of the union during the process of leaving the job. It was quite a troublesome situation. I met with the union's lawyers; thanks to them, they supported me and I was able to leave the job without any loss of benefits" (P15).

For precarized teachers, participation in union activities opens a horizon of experience that erodes the artificial boundaries drawn between individual/private and collective/public levels of affect and action under the capitalist mode of production. P12 describes the change in the socio-economic status of teachers in the process marked by

the economic crisis in Türkiye in recent years by matching it with the weight transformation in the emotional repertoire.

"Heretofore the private school teacher's anxieties and fears were in the frame. They were unorganized, unable to express themselves. People esconsed in their comfort zones did not find it "ethical" to tell each other their salaries for instance, but today everyone has the courage to tell their salaries and voice their demands. Because people cannot make a living. They cannot pay their rent, they cannot buy anything. The only source of their income is the salary they receive from school. Of course they will make demands on their employer to improve that salary..." (P12)

P10 describes how union activity boosts collective self-confidence while underlining the emotional cost of this activity at the individual level. P15, on the other hand, conveys the sense of achievement when employee rights are defended at the institutional level against the employer to whom capitalism grants institutional authority through a company.

"Our biggest goal in the union is the base salary. We have social media and street activities as well as workshops. These require a certain sense of collective self-confidence and indeed increase that self-confidence as the activity and participation rise. But of course, you have to spend time you spare from your loved ones... A time you could maybe have a breather outside the work..." (P10).

"But unfortunately, I know from my friends that they are very hesitant about unionization etc. because they worry about being fired. I clearly remember when I told my boss, who said he would not give me my rights, that I was unionized and he said, 'OK then'... The biggest benefit of the union here is that it creates pressure on the bosses and balances the power conditions between the administration and the teachers. In other words, you see how effective unity can be... which is the goal... We learn together..." (P15).

### **3.5. The Cost of Solidarity and Struggle**

Private school and tutoring center employers do not easily tolerate union activity in practice, which officially is a constitutional right. The fact that contract renewal is left entirely to the authority of employers makes it almost impossible for workplace representatives, who are the key agents of union activity, to stay in the same school and hampers the struggle for employee rights. P12, one of the participants, continues his legal struggle against such an injustice.

"I know that they did not renew my contract because I was openly conducting unionization activities. They dismissed me because I was unionized, using the limited-term contract as an excuse. If being a union member is a constitutional right, it should be protected and the right to work should be ensured. Of course, our sense of justice is being violated" (P12).

P13 witnessed that pressures in private schools regarding unionization issues can turn into prosecutions through social media.

"The bosses won't allow it. If someone joins a union, the administration would get wind of that through social media accounts or platforms. Even if you don't mention the name of the institution, they would follow you in case you make a bad comment. In other words, if someone else sees it, takes a photo of it, shows it to the administration, then there will be

trouble. They never want that... It creates a kind of pressure... We cannot speak out, if we do, we will lose our jobs" (P13).

P8 reported that even the most moderate civil protests cause significant discomfort to the employer. The message of the teachers wearing black for just a few days got through and caused panic among the employers. Of course, for the teachers who organized the action, this came at the cost of increased fear of losing their jobs.

"It is not so easy to talk about the union at school, to say that we need a union organization. You have to bide your time for a new trigger. For example, the general improvement (in public wages) in January (2024) -and I'm using it in quotes- created a spontaneous trigger in our school. In that process, one of our friends started an action by sending a message to everyone he knew, unionized and non-unionized, saying "let's wear black" and a black-wearing frenzy lasted for a few days. The situation was noticed. The atmosphere got tense, of course. Meetings were held immediately... The contracts are renewed every year. This has a legal basis, unfortunately. They can arrange that as they want. But we don't want it. The union also voices this demand. In fact, every year, everyone feels this concern, whether strongly or weakly. I know that it is known that I am a union member. Yes, the anxiety of being fired is a bit more (in me)" (P8).

## Conclusion and Discussion

The narrations of the educators who participated in this study, which explores the repercussions of the neoliberalization of education in Türkiye on the experience of precarious teaching, reveal three main aspects of this experience. The first of these is related to the material conditions that can be said to position teachers in the system they exist in and which, over the last quarter of a century, have significantly transformed education into a service sub-sector. The second aspect corresponds to the immaterial or affective relations of teaching labor based on the experience of more social relations in education. The third aspect is centered on how participating teachers cope with the imposed economic conditions and the relations of social domination that represent their actual subordination in everyday life.

According to the conclusions of one of the most comprehensive field studies on the processes of precarization to date (McKay et al., 2012), two of the four characteristics inherent in precarity: (1) job insecurity based on the uncertainties of working on fixed-term contracts and (2) having to make do with low wages, are experienced by all teachers participating in this study. The other two features of precarity, (3) exclusion from social and employment rights and (4) lack of representation rights, are partially immanent - especially in the de facto working conditions of hourly-paid and private course teachers.

In this context, the first phenomenon that becomes apparent in this research is that the contract, which by its very logic should define the rights and responsibilities of two parties in an exchange or a legal relationship, secures precarious work in the field of education and structures the relationship between teachers and their employers in a highly unequal way. The contract process appears to be the most tense element for the participating

teachers of this relationship and livelihood cycle. All of the participants working in private schools and private course centers experience this process with intense feelings of anxiety and distress. What is striking in the literature on the subject is that despite the increasing prevalence of limited-term contracted teacher employment under neoliberal conditions, the practice of contracting itself and its effects on the life contexts of educators have never been problematized.

There is a consensus, feeling, and experience among participants that long working hours, low wages, and deficient benefits compared to those of tenured teachers crush precarized teachers in a vise of livelihood hardships and time deprivation. Since the 2000s, trade union investigations and academic field research in Türkiye have warned of the emergence of this neoliberal yoke that oppresses the lives of hourly-paid teachers, public employee contract teachers, and classroom teachers (Bayram, 2009; Dinçer, 2008), and witnessed the aggravation of conditions throughout the 2010s (Buyruk, 2015; Dali, 2017; Durmaz, 2014; Ertürk, 2012; Gümüş & Çetin, 2014; Güvercin, 2014; Keskin Demirer, 2012). A key feature distinguishing this study from previous research in the same field is that most of its participants are private school teachers, who constitute the most vibrant segment of the teachers' occupational solidarity and resistance movement today. After the private course institutions, whose spread across Türkiye took place in the 1970s within a completely different social formation, teachers of incorporated schools, which represent the main neoliberal context of the capitalization of education in the 21st century, constitute one of the fastest proletarianizing and precarizing segments among white-collar workers.

A common aspect of participants' experiences is that their social relations at school are subject to the corrupting influence of the market. They witnessed that with the commercialization of teacher labor, the ties and communication patterns between teachers and students/parents begin to resemble those of a vendor-customer relationship. This phenomenon, which Bayram's (2009), Cerev & Coşkun's (2020), Kılıç and Tunç's (2022), Keleş & Aslan's (2022) studies detected in public and private schools but left almost without comment, is addressed with relative richness in Kablay (2012), which is not based on a field study. According to Kablay, the customerization of students (and parents) accompanies a shift from a civic, rights-based, public-interest approach to a service perspective that emphasizes the private benefit of customers. This transition, as per the logic of neoliberal functioning, threatens to transform all teachers, regardless of public or private sector, from public agents into private field workers offering private lessons. When we look at how the participants experience this structuralized effect, we see that the teaching profession has begun to require the dispositions and abilities of customer representation. A significant part of their work now requires their ability to persuade and manage their interlocutors. The COVID-19 pandemic deteriorated the "work-life balance" of educators severely on account of the online working frenzy and the boundary between working and private time blurred. This process rendered teachers more accessible to students and their parents as ordinary customer representatives to ordinary customers. Durmaz's research (2014) reveals another aspect of the precarization process, which started and progressed in private course institutions, which

he calls "employers' becoming invisible." When the student, and especially the parent, becomes a customer purchasing the educational process and its results who can call for account for the functions and quality of the product they receive, the owner of capital and the administrators seem to position themselves in this relationship as neutral intermediaries who execute the requirements of measuring the performance of the educator (in the form of firing, not renewing the contract or 'adjusting' the salary) on behalf of the market. As one of the results of this research, it can be said that due to the open competition based on exams such as LGS and YKS, which define the existence of private course institutions, processes such as switching to customer representative status and 'employers' becoming invisible' have now become an ordinary part of the lives of private school teachers. Furthermore, it has been observed that teachers are exposed to widespread pressure and drudgery practices even in situations that require extraordinary care, such as pregnancy, and it has been conveyed that union member educators encounter these practices more intensely.

The experience of hourly-paid teaching, which makes it possible to observe precarious educational labor in public schools together with more conventional forms of labor, also allows us to see the strength of the precarization process. Partially in line with the findings of previous studies (Bayram, 2009; Çolak & Altınkurt, 2022; Dali, 2017; Kirlibal, 2024; Polat, 2014), many of the participants of this study who were working as hourly-paid teachers stated that they experienced contempt and marginalization in the institutions they worked in due to their working status. Some interviewees even mentioned that this experience was not simply a matter of institutional status but also corresponded to a class difference, which is suggestive of the accuracy of relying on a class-emphasizing term such as precariat to denote the difference between tenured and salaried workers, whose cultural capital, workloads and modes of work performance are not easily distinguishable from one another. Another contradiction regarding variables that directly affect professional satisfaction and self-confidence, such as income, time control, and job security, arises from the difference between the status of humanities and STEM teachers. In particular, humanities teachers working in private course centers reported that they were at a disadvantage compared to their counterparts in STEM subjects. How and to what extent this distinction contributes to the deepening of the status differentiation between teachers and the process of precarization needs to be further explored.

Gender inequality persists in the experience of precarization. An issue accompanying the widespread devaluation of labor power and the vulnerabilization of labor in the neoliberal phase is the marked increase in women's employment, in other words, the "feminization of labor" (Standing, 2014), and one of the consequences of the process has been the global manifestation of the so-called "feminization of poverty" (Moghadam, 2011). As Kayacan (2021) has shown, the clearest indicator of this process in Türkiye is the rapidly rising proportion of women in the teaching profession, which has been rapidly devalued since the 2000s. Especially in private sector schools where economic exploitation increases steadily, two-thirds of teaching labor is performed by women. The female participants in this study have also experienced the lack of "equal pay for equal

work" in the privatized education universe, as well as the drudgery of work stereotypically assigned to women. Another instrument of domination that female participants are more frequently made the object of is the 'family discourse.' Participant educators witnessed the widespread use of a family discourse by their supervisors to perpetuate economic exploitation or to stretch management obligations in practice. In this discourse, the family, imposed as the normative environment of human upbringing, is presented as the social logic of the teaching work in a patriarchal allegory produced in the school environment. In this crude allegory, the position of children remains unchanged. Still, teachers are positioned as the parents with whom children are expected to enter into loving relationships, and capitalists and administrators are the grandparents of such a social order and must be respected. The teacher's actions to protect their violated rights are condemned as violating the sanctity of this family and, thus, the established order of symbolic violence. Female teachers are positioned at the bottom of the hierarchy as 'mothers' and caregivers within this order.

Another salient dimension of the experience of precarity in this research is that precarious teachers in Türkiye, like all precarized contemporary workforces (Standing, 2014), are deprived of the possibility to design their future. This applies not only to the idea of a long-term future but also to medium- and even short-term plans, especially in the case of private courses and private school teachers who work on annual contracts. The level of wages makes it difficult to acquire even the essential equipment of modern life, let alone the possibility of creating a minimum saving. Ordinary life events that require a minimum of financial self-confidence, such as establishing an autonomous life from the parental generation or getting married, become experiences that crush precarious teachers psychologically, and sociologically. Social life is becoming increasingly limited, and even the sustainability of family ties is being eroded.

Hourly-paid teachers, who are not only deprived of the guarantees that the state can offer but also rendered objects of exploitation by the state itself (Kırlıbal, 2024; Polat, 2014), constitute the most researched category among pre-service teachers. Participants in the status of hourly-paid teachers, who in many cases take on courses that are not fully compatible with the profession or science in which they are specialized, are aware that their job is based on a great injustice because hundreds of thousands of educators wait for their appointments. They admit they carry out their work with a deep guilt. In an economic limbo conditioned by part-time work, these individuals experience the most severe forms of precarization among educators, and their bitterness is often aggravated by the idea that they are a burden on their families.

The fact that the family is the most essential element of the welfare regime in Türkiye that provides refuge in the face of economic crises (Buğra, 2001) can be demonstrated once again in the context of precarizing teachers. Among the participants of this study, the most important mechanism for coping with the conditions of precarization appears to be reliance on family support. While there are various forms and levels of this support, despite the heavy emotional burden it brings, continuing to live with the parent generation or returning to the family home is a remedy many participants had to resort

to. Some of the participants work in extra jobs, which adds to the pressure of long working hours. It should be emphasized that the 'coping' here almost entirely refers to the economic conditions of subsistence, as the relative economic relief expected from additional jobs is accompanied by psychosociological distress and associated risks.

Almost all participants acknowledged the futility, irrationality, and alienation in trying to cope individually with the harsh conditions surrounding precarious life. Some interviewees concluded from their own experiences that a collective initiative would not succeed. According to them, support and solidarity among teachers is extremely weak. Except for hourly-paid teachers, who do not have the chance of union membership anyway, some of the participants saw a way to defend their rights and lives in union organizing. These participants' testimonies reveal hopeful and relatively shadowy aspects of the still very recent unionization process of private school teachers. While these testimonies do not show any improvement in the general wage level of corporatized schools or in the base salary, which was the most critical demand of the union, the union was able to push back its opponents on a number of issues such as overtime, drudgery, and arbitrary dismissal. On the other hand, the non-renewal of the contracts of educators who serve as workplace representatives, the most important figures in the organizing process in schools, which has been the subject of several lawsuits, hinders the spread of the union. At least three participants observed that engaging in union activity, or even discussing whether or not to become a member, leads to great pressure and harassment. Therefore, becoming a union member becomes a matter of courage for precarious teachers.

The loss of professional autonomy, the obligation to implement a curriculum without any input in its design, parents inundating with messages at all hours, demanding returns for the school fees they pay, overtime stretched into weekends for centralized exam preparations, colleagues who embrace competition over solidarity, supervisors who turn hazing into a daily routine, and the relentless stress of a second job necessary to make ends meet -all combine to create an unrelenting and exhausting reality. The most absurd but probably the most meaningful thing we heard about in the whole ordeal of the precarious educator was what a school boss said to a teacher who could not earn enough to live on in return for her 50 hours of work a week: "We don't have to provide your livelihood!" The irresponsibility conveyed in this statement -a sentiment even an ancient master would hesitate to address toward their slave in the absence of an abundant supply of labor- can only be expressed from one subject to another within the framework of a fantasy where value is detached from labor, and individuals (parents and students) are deceived into believing the lie that each of them is "special," with their subjective choices framed as the sole determining factor. Only in a fiction where education's "decisive role both in the production of goods and services and in the production of producers" (Bourdieu, 1998: 95) is ignored and where the school system is turned into a matter of profit to be maximized can such a sentence be uttered. Only in a neoliberal world where teachers are increasingly transformed into temporary, unqualified and precarious workers can a capital owner pronounce this cruelty on educators who work 50 hours a week and have practically no lives outside of work. And

as an instance of the methodical destruction of collectives (Bourdieu, 1998), the devaluation of teacher labor can only be resisted through collective resistance and activism.

## Recommendations

In the context of global capitalism, where marketization and precariousness permeate every aspect of life, the precarisation of teaching practices other than permanent status in the public sector has deepened the social problems experienced by teachers. The abolition of the practice of "hourly paid teaching", which reproduces low-wage employment and acts as a band-aid in the field of education, the reinstatement of non-appointed teachers in their rightful positions and the equalization of teachers' rights, without making any distinction between the private and public sectors, can have an impact on eliminating the destructive effects of precarization. It is imperative to stop the practice of fixed-term contracts that lead to precarious work, to improve working conditions against pressure and harassment, to reinstate the practice of a basic salary in the private sector against long working hours and low wages, to recognize private sector teaching as part of the education work branch, and to ensure that trade union activities can be carried out in accordance with the rights enshrined in the constitution. In the face of the devaluation of teachers' labor and the social problems experienced, it is necessary to plan and implement rights-based social policies in the field of education and employment, and perhaps more importantly, it is required to step up the social struggle to recover and advance social and professional gains.

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## Genişletilmiş Türkçe Özet

Neoliberal koşulların yaygınlaşmasının ve derinleşmesinin 21. yüzyılın çalışan sınıfları üzerindeki yıkıcı sonuçlarını ifade eden prekerleşme, giderek yaygın bir kamusal ihtiyaçtan çok bir hizmet alt sektörü gibi görülmeye başlanan eğitim alanını da etkiledi. Ulusal düzeyde en geniş meslek gruplarından birini oluşturan öğretmenler, tüm dünyada olduğu gibi Türkiye’de de neoliberal kapitalizmin küresel çaptaki işleyişinin, değerini düşürerek baskı altına aldığı özgül ve vazgeçilmez bir emek kategorisinin yüklenicileri haline geldiler. Pierre Bourdieu’nün deyişiyle, “kolektiflerin yöntemli olarak yıkımına yönelik bir program” olarak işletilen neoliberalizm (Bourdieu, 1998: 96), serbestleşme, özelleştirme, kuralsızlaştırma, piyasalaştırma, girişimci vergi yüklerinin düşürülmesi ve sermaye, hizmet ve metaların akışının hızlandırılmasına yönelik küresel süreçlerin bir bileşkesi olarak biçimlendi (Moini, 2016; Mudge, 2008). Kapitalizmin bu son aşaması, emek süreçlerinin esnekleştirilmesi; emek piyasalarının, çalışma koşullarının ve gelirin güvencesizleştirilmesi ve istihdam koşullarının enformelleşmesi ile karakterize olur. Proleterya ve ‘precarious’ (güvencesiz, tehlike altında, istikrarsız) terimleri birleştirilerek prekarya olarak adlandırılan bu kategori ve onu biçimlendiren/tanımlayan süreçler günümüzün önemli sosyolojik meselelerinden birini oluşturur. Bir kolektif özne(leşme) olgusu ve kavramı olarak prekaryanın kapsamı, sınıf nitelikleri, siyasal dönüşüm ve dönüştürme potansiyelleri konusunda tartışmalar sürse de onu biçimlendiren prekarizasyon olgusu ve süreçleri hakkında genel bir mutabakat bulunduğu söylenebilir (Arnold ve Bongiovi, 2013; Casas-Cortés, 2014; Foti, 2017; Jørgensen, 2016; Kalleberg, 2009; Standing, 2014).

Eğitim, neo-liberal güçlerin öncelikli olarak dönüştürmeye çalıştığı kamusal etkinliklerden biri olageldi. Yeni kapitalizm koşullarında okullar giderek özel şirketler gibi işlemeye, eğitimin amaçları piyasanın gereksinimlerine uygun olarak belirlenmeye başladı (Apple, 2004; McLaren, 2007). Türkiye’de de hak temelli eğitim anlayışı aşındırıldı, kurumsal amaç ve işlevler piyasalaşma doğrultusunda dönüştürüldü, eğitim ve bilgi üretim süreçleri metalaştı ve nitelikli eğitime erişim zorlaştı (Gök, 2014; İnal, 2006; Koray, 2012; Sayılan, 2006). Son yirmi yıllık süreçte öğrenci sayısının artmasına, öğretmen atamalarının sınava bağlı hale gelmesine ve yeterli atamanın yapılmamasına bağlı olarak giderek artan eğitimci ihtiyacı, sözleşmeli, geçici ve ders saat ücreti karşılığında çalışan ücretli öğretmenler aracılığıyla karşılanmaya çalışıldı (Güvercin, 2014; Kablay, 2012; Keskin Demirel, 2012). Özel okulların toplam okul sayısına oranı son yirmi yılda beş kat arttı (Altun Aslan, 2019; Can ve Sezer, 2022); dershaneler ve özel okullar, genellikle atanamayan öğretmenlerin güvencesiz koşullarda, düşük ücretle ve performans baskısıyla istihdam edildikleri bir piyasa bağlamı oluşturdular (Tomruk Ünal, 2020; Ulutaş, 2014).

Bu araştırmanın konusu, neoliberal politikaların yarattığı prekarizasyon süreçlerinin kamu ve özel sektörde çalışan öğretmenlere etkilerinin deneyimlenme biçimleridir. Düşük ücretlerle, zayıf özlük haklarıyla ve işveren lehine çeşitli biçimlerde esnetilen iş koşullarıyla çalıştıkları daha önce yürütülmüş araştırmalarda belirginleşmiş bulunan dersane öğretmenleri ve ders saat ücretli devlet okulu öğretmenlerinin yanı sıra, varlık

koşulları şimdiye kadar pek az incelenmiş bulunan özel okul öğretmenleri, İstanbul'da yürütülmüş bu araştırmanın odağında yer alıyorlar. Amaç, piyasalaşmanın basıncı ve güvencesizliğin mesleki, kurumsal ve bireysel yaşamlar düzeyinde yarattığı vakum altında eğitimci deneyiminin aldığı biçimleri ve bu koşullarla baş etme biçimlerini anlamaya çalışmaktır. Böylece zamanımızda bir sonraki kuşağın deneyim ve üretim kapasitesini üretmekle yükümlü emek kategorisinin kendi etkinliğinin koşullarına ilişkin görüşleri ve bakış açıları sergilenirken, artık vadesinin sonuna vardığı düşünülen neoliberalizmin tüm bu etkinliğe verdiği hasar da biraz daha görünür kılınmış oluyor.

Nitel yöntemle ile yürütülen bu çalışmada eğitim alanındaki neoliberal uygulamaların yarattığı prekarizasyon süreçleriyle bağlantılı öğretmen deneyimlerini ve bakış açılarını anlamak, eğitimcilerin bu süreçteki ilişkilere attıkları anlamı keşfetmek üzere fenomenolojik yorumlayıcı analiz (Creswell, 2013), araştırma deseni olarak benimsendi. Araştırmanın katılımcıları, İstanbul'da 2000 yılından sonra özel okullarda ve dershanelerde istihdam edilmiş öğretmenlerin yanı sıra kamuda en az bir eğitim öğretim dönemi ders saat ücreti karşılığında çalışmış öğretmenlerdir. Çalışmanın amacına uygun olarak, amaçlı örnekleme stratejilerinden "kartopu veya zincir örnekleme" (Patton, 2018) yoluyla ulaşılan, preker öğretmenlik deneyiminden geçmiş 22 katılımcıyla, açık uçlu sorulara dayanan, yarı-yapılandırılmış derinlemesine görüşmeler gerçekleştirildi.

Eğitimin neoliberalleştirilmesinin güvencesiz öğretmenlik deneyimindeki karşılıklarını araştıran bu çalışmaya katılan eğitimcilerin anlatımları, söz konusu deneyimin üç temel veçhesi olduğunu ortaya koyar. Bunların ilki, öğretmenleri içinde buldukları sistemde konumlandığı söylenebilecek, son çeyrek yüzyıllık dönem içinde eğitimi belirgin bir biçimde bir hizmet alt sektörü haline getiren maddi koşullarla ilişkilidir. İkinci veçhe ise öğretim emeğinin eğitim alanındaki daha sosyal nitelikli ilişkilerinin deneyimlenmesine temellenen gayri-maddi ya da duygulanımsal ilişkilerine denk düşer. Üçüncü veçhe ise katılımcı öğretmenlerin dayatılan ekonomik koşullarla ve onların gündelik yaşamdaki gerçek boyunduruğunu temsil eden sosyal tahakküm ilişkileriyle başa çıkma yöntemlerinde yoğunlaşır.

Bu bağlamda elinizdeki çalışmada belirginleşen ilk olgu, sınırlı süreli sözleşme uygulamasının eğitim alanında güvencesiz çalışmayı güvenceye aldığı ve öğretmenlerle işverenleri arasındaki ilişkiyi son derece eşitsiz yapılandığıdır. Uzun çalışma saatlerinin, yetersiz ücretlerin, ve kadrolu öğretmenlerinkilerle karşılaştırıldığında son derece güdük kalan özlük haklarının prekerleştirilmiş öğretmenleri geçim sıkıntısı ve zaman yoksunluğundan oluşan bir cendere içinde ezdiği konusunda da katılımcılar arasında bir fikir, duygu ve deneyim birliği bulunur. Katılımcıların deneyimlerinin ortak yanı, okuldaki sosyal ilişkilerinin piyasanın yozlaştırıcı etkisini alıyor olmasıdır. Katılımcılar, öğretmen emeğinin ticarileşmesiyle birlikte öğretmenlerle öğrenciler/veliler arasındaki bağların ve iletişim kalıplarının satıcı-müşteri ilişkisinininkileri andırmaya başladığına tanıklık etmektedirler. Yaygın baskı ve angarya pratiklerinin, gebelik gibi ihtimam gerektiren durumlarda bile uygulanabildiği görülmüş, sendika üyesi eğitimcilerin bu pratiklere daha yoğun maruz kaldığı aktarılmıştır.

Kamu okullarındaki güvencesiz eğitim emeği ile daha konvansiyonel emek tarzlarını bir arada gözlemlemeyi olanaklı kılan ücretli öğretmenlik deneyimi, prekerleşme sürecinin

kuvvetini de görmemizi sağlar. Toplumsal cinsiyet eşitsizliği prekerleşme deneyimi içinde de varlığını sürdürür. Bu araştırmanın kadın katılımcıları da “eşit işe eşit ücret”in özelleştirilmiş eğitim evrenindeki eksikliğini bizzat yaşamışlar; aynı zamanda stereotipik olarak kadınlara yüklenen işleri angarya olarak deneyimlemişlerdir. Kadın katılımcıların daha sık nesnesi haline getirildikleri bir başka tahakküm aracı ‘aile söylemi’dir. Güvencesizlik deneyiminin bu araştırmada göze çarpan bir başka boyutu, tüm prekerleşmiş çağdaş işgücünde olduğu gibi (Standing, 2014) Türkiye’deki güvencesiz öğretmenlerin de geleceklerini tasarlayabilme olanaklarından yoksun kılınmış olmalarıdır.

Bu araştırmanın katılımcıları arasında prekerleşme koşullarıyla baş etme mekanizmalarının en önemlisi aile desteğine dayanmak olarak görünür. Katılımcıların bir bölümü ek iş yapmaktadır ki bu, uzun çalışma saatlerinin oluşturduğu baskıyı daha da artırmaktadır. Katılımcıların hemen tümü preker hayatı kuşatan bu ağır koşullarla bireysel olarak baş etmeye çalışmanın beyhudeliğini, yabancılaştırıcılığını ve akıldışılığını kabul eder. Görüşülen bireylerin bir kısmı kendi deneyimlerinden kolektif bir girişimin başarılı olamayacağı sonucuna varmıştır. Sendikal faaliyet yürüten olan katılımcılara göre, şirketleşmiş okulların genel ücret düzeyinde ya da örgütlenmenin en önemli talebi olarak görülen taban maaş konusunda bir gelişme görülmesi bile sendika, fazla mesai, angarya ve keyfi işten çıkarma gibi bir dizi meselede muarızlarını geriletebilmiştir. Öğretmenlerin giderek geçici statüde, vasıfsızlaştırılmış ve güvencesiz işçilere dönüştürüldüğü neoliberal bir dünyada kolektiflerin yöntemli yıkımının bir örneği olarak öğretmen emeğinin değersizleştirilmesine ancak kolektif direniş ve eylemlilikle karşı koyulabilir.

**Anahtar Kelimeler:** Neoliberalizm ve eğitim, öğretmen emeği, güvencesizlik ve prekarizasyon

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# Problem, problem-posing, and -solving: Perspectives and cases

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## Abstract

The first aim of this study was to investigate perceptions about the concept of 'a problem'. The second aim was to then investigate posed and solved problems. This was a qualitative study conducted with 46 pre-service middle school mathematics teachers who studied at a state university in Türkiye. The 'Problem, Problem-Posing and -Solving Form' was a data collection instrument designed for this study. The data related to the concept of 'a problem' were evaluated by content analysis. The posed problems were analyzed by using an evaluation path. A rubric was used to evaluate the solved problems. The results showed that the concept of 'a problem' was perceived as a question that the individual does not like the moment s/he encounters it, requires analysis and reasoning, and needs to be solved. The posed problems were mathematical and solvable. Problems related to data processing and probability learning domains were not posed. Problems of easy and medium difficulty were generally posed at the fifth-class level. Nearly all (93%) of problems were routine. Consequently, the pre-service teachers posed routine mathematical problems that could be solved. Likewise, there were deficiencies in these problems, such as the use of mathematical terminology and the inability to create problem texts. In problem-solving, more than half of the pre-service teachers did not focus on understanding the problem, no strategy was chosen, and only a partial logical evaluation of solving a problem was made. In summary, result-oriented solutions were widely evident without considering the problem-solving stages.

**Keywords:** Problem, problem-posing, problem-solving, perspectives, cases

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## Introduction

What is the problem? When we encounter such a question, we think of the mathematics lessons and the problems solved in these lessons, as well as the problems we encounter in daily life. As a matter of fact, this situation arises from the impression we have at school, that the problems come from the textbooks or teachers, and that the students' task is to solve them (Brown & Walter, 2005). In this case, we first encounter the process of establishing a problem and then solving it. Understanding mathematics is also all about doing it, and problem-solving (PS) and problem-posing (PP) are at the center of mathematics (Polya, 2002) and are seen as important cognitive activities for mathematics teaching and learning (Voica et al., 2020). Likewise, PS is seen as an indispensable element of both mathematics and life (Kılıçkaya & Toptaş, 2017). Although PS has different meanings in different countries, it is seen as a main subject in both research and curricula worldwide (Törner et al., 2007). In addition, PS is the most important skill in demand and is seen as a vital element that helps students overcome future difficulties (Rahman, 2019).

The first necessary step in the examination of PS and PP skills is to examine the meaning of the concept of 'a problem' (Gonzales, 1998). Leavy and Hourigan (2021) reported that pre-service teachers (PSTs) have little experience and understanding of what a mathematically valuable problem is. Similarly, it was found that PSTs confuse the concepts of problem and practice (Yenilmez & Ev-Çimen, 2014). In contrast, Baş and Özturan-Sağırılı (2016), suggested comparing PSTs using examples related to the characteristics of the concept to create a correct perception of what is a problem. In addition, it is considered important to create a correct problem concept to improve PSTs' PS and PP skills to the desired level. Furthermore, Uygun et al. (2016) highlighted that it is important to understand both positive and negative perceptions about mathematical problems. Halmos (1980) also stated that at the heart of mathematics are problems, and he hoped that as teachers, we can train our students to be better problem-solvers and problem-posers than we are. Thus, it is important to investigate the meaning of the concept of a problem to create a correct perception of this concept, to understand the situations in both PS and PP, and to determine to what extent Halmos' hope has been realized.

It is obvious that these three concepts (problem, PP, and PS) are closely related and cannot be considered separately from each other. When students pose a problem, they must also think about its solution. This clearly shows the relationship between PS and PP (Chen et al., 2015; Silver, 1994). Kilpatrick (1987) suggested that the form and type of problems posed by students are good indicators for understanding how they will solve problems. It has been shown that even in simple PP studies changing the way that given problems are presented improved students' PS skills (Silver & Cai, 1996). It is also stated that the problems posed by students contain important clues about their mathematical abilities (Stoyanova, 1998). Some researchers found that students' success in PS was related to their PP skills, and therefore they used PP as a measure of PS success (Cai & Hwang, 2002; Cai et al., 2013; Silver & Cai, 1996). For example, Cai et al. (2013)

found that students who exhibit positive characteristics in PP are also strong problem solvers. However, although this strong relationship has been demonstrated, PS has a much more important place than PP (National Council of Teachers of Mathematics [NCTM], 2000). It is also noted that PP has not yet been included in mathematics curricula in ways that help students develop a deep and strong understanding of mathematics (Cai & Hwang, 2021). PP studies are still rare in both teacher education and classrooms (Bataller et al., 2022). It is stated that PP activities are not consistently or purposefully included in the mathematics curriculum (Cai & Jiang, 2017), and therefore teachers do not include PP activities in their lessons (Cai & Hwang, 2021). However, while the problems posed by a teacher shape the learning in their classroom, they help the teacher to understand the mathematical thinking of the students (Cai & Howson, 2013; Li et al., 2020; Silver, 1994). Being able to pose mathematically efficient problems is a critical element of high-quality mathematics teaching (Cai et al., 2015). For this reason, it is considered important to pose problems to teachers. Cai and Hwang (2021) state that PP should be an important part of mathematics curricula and practices due to its importance and potential. It is also stated that comparing students with PP activities is advocated in the mathematics curriculum of many countries (Li et al., 2022). It should be noted that PP has a fundamental position in the PS process (Leavy & Hourigan, 2021), PP activities develop PS and metacognitive skills (Akben, 2020), and that teaching mathematics with PP is like teaching mathematics with PS (Schroeder & Lester, 1989). PS and PP should therefore be considered together in mathematics. Since the problems, PS, and PP are intertwined, studies and activities related to these concepts should be included in curriculums, classroom environments, and teacher training programs together and frequently.

There is no significant evidence showing a negative effect of PP teaching and that it is a useful strategy to improve students' PS skills (Calabrese et al., 2022). One of the aims of mathematics teachers should be to educate students to have high PS and PP skills and who can increase their mathematical competence through these skills. Teachers are at the center of the implementation of educational innovations and developments (Cai & Hwang, 2020). There is potentially great value in helping teachers learn effective PP (Cai & Hwang, 2020) as teachers who understand PP will gain insight into their students' understanding of mathematics (Cai & Hwang, 2002; Kotsopoulos & Cordy, 2009). It is also suggested that more research is needed on what PP-based teaching entails in real practice (Zhang & Cai, 2021). It has been reported that in Türkiye PP studies inadequately contribute to mathematics education and that teachers and teacher training institutions do not have enough experience and knowledge about what PP is (Kanbur-Tekerek & Argün, 2019).

Despite all this evidence of the importance of PS and PP being considered together, recent studies have revealed that there is a lack of experience in PP among PSTs (Leavy & Hourigan, 2021). Their experience is generally limited to traditional PS, which focuses on arithmetic operations (Leavy & Hourigan, 2020), that PS is an important learning activity, but the quality of its teaching should be improved (Jiang et al., 2022), which is a strategy that is expected to be used by all students in their daily lives and future

professions. Thus, the teaching of PS strategies is important so that students learn to manage their lives (Al Farra et al., 2022). Given all this evidence, it appears necessary for teachers to have acquired knowledge about both PS and PP while they are still PSTs. Testing and improving the abilities of PSTs, who have not yet started to work, is important in terms of both increasing the quality of mathematics lessons and understanding the measures to be taken in the training of teachers to be able to practice and teach these subjects effectively.

To sum up, it is important to understand the meaning of a problem correctly, comprehend both PS and PP processes, and recognize how these three concepts complement each other. Therefore, they should be considered together. Including studies and activities related to these concepts in curricula, classroom environments, and teacher training programs will help enhance students' skills while deepening their mathematical understanding. PP teaching is a valuable strategy for improving students' PS skills. Teachers play a crucial role in developing these skills and supporting them in learning effective PP, which can enhance their understanding of students' mathematical abilities. However, more research is needed on the practical application of PP, and in some areas like Türkiye, there is a lack of sufficient knowledge and experience in PP within mathematics education. Recent studies show that PSTs lack experience in PP, with their focus mostly on traditional PS, which is often limited to arithmetic operations. While PS is an essential learning activity, its teaching quality needs improvement. Teaching PS strategies is important for students to manage their lives and future professions. Therefore, it is crucial for teachers to gain knowledge of both PS and PP during their training, to improve the quality of mathematics lessons and better prepare teachers for effective practice and teaching.

### **Research Questions (RQ)**

In the current study, the first aim was to reveal the perceptions about the concept of 'a problem'. The second aim was to investigate both posed and solved problems. To achieve these objectives, the following questions were tried answered:

**RQ1.** What are the perceptions of PSTs regarding the concept of problem?

**RQ2.** How are the PP-cases of PSTs?

**RQ3.** How are the PS-cases of PSTs?

### **Conceptual Framework**

#### **The Concept of a Problem**

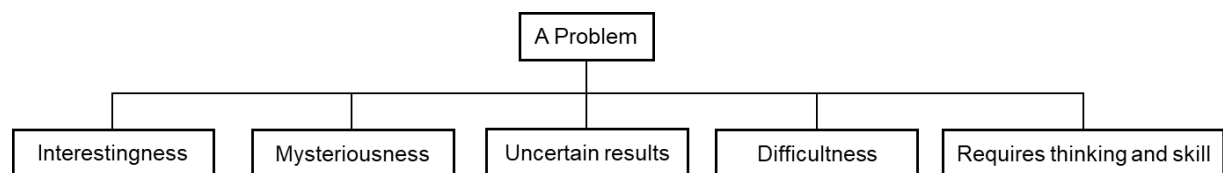
Since the existence of humanity, individuals have faced difficulties such as finding food, providing shelter, dealing with and communicating with wild animals, and so on, and struggled with all of them. However, this struggle is necessary for survival. In this context, a problem, which is expressed as something that is thrown in front of the individual and prevents him (Adair, 2000), is defined as a situation where the person wants to do something but does not know what to do (Altun, 2001). A problem is an event, activity,

or subject for which the individual does not know a predetermined or memorized rule (Van de Walle, 2003). In addition, a problem is a situation that challenges the individual by shaking his self-belief at the first encounter and when the individual does not know the rule(s) for finding the solution (Katrancı, 2014). A problem has also been defined as a situation where an individual does not know how to reduce the distance between the place they are currently at and the place they want to reach (Rahman, 2019). Merriam and Tisdell (2016), on the other hand, describe a problem as a subject involving doubt, uncertainty, or difficulty. Thus, a problem may be defined as a difficulty that confuses the individual's mind and established thought processes but makes him want to solve it, but the individual does not know the method to find the solution.

Clearly, problems are related to real life. However, problems can also be related to mathematics. The problem of 'How many times higher is the invisible part of an iceberg than the visible part?' is a real problem, while the problem of 'Can every even number be written as the sum of two prime numbers?' is a mathematical problem (Altun, 2014). A problem requires more thought and skill before the right approach can be found, and a good problem is interesting and mysterious (Zeitz, 2007). It has been suggested that the result of a problem will be an uncertainty or difficulty, and that research, effort, and thinking are required for its solution (Yenilmez & Ev-Çimen, 2014). In summary, Figure 1 shows the characteristics of a problem.

**Figure 1**

*The Characteristics of a Problem*



Problems may be divided into two categories: routine and nonroutine. Routine problems are also known as ordinary problems. Altun (2014) expressed ordinary/routine problems as problems that are frequently encountered in daily life and require four operations. A problem that can be solved mechanically by an individual using past experiences in an almost similar or exactly the same situation is defined as a routine exercise (Nancarrow, 2004). For example, 'What is the average success rate of our class in mathematics?' This problem is routine because we need to know it in our daily lives, and we can solve it mechanically with four operations. Nonroutine problems are also extraordinary problems. These types of problems require more thinking than routine problems. Mayer and Hegarty (1996) stated that a nonroutine problem arises when the individual who encounters it cannot immediately predict how to solve it. A nonroutine problem is defined as a task that is difficult to solve cognitively and that the solver does not know a method for solving (Selden et al., 2000). Such problems can be solved with the right strategies and different thinking skills (Kalaç & Çalışkan, 2022). For example, 'Hasan, the grocer,

has a package of 2-, 3-, and 7-kilogram sugar and a scale. Due to Eid al-Fitr, he wants to prepare sugar packages from 1 to 9 kilograms without breaking the packages and using only them. Is it possible for Hasan to prepare the packages?' The problem cannot be solved mechanically and is unusual because it requires thinking. In this context, nonroutine problems can be expressed as problems that the individual cannot solve immediately with the knowledge available on first encountering them.

### **Problem-Solving (PS)**

Every problem needs to be solved whether it is routine or not. Merriam and Tisdell (2016) state that a person with a problem usually seeks a solution, an explanation, or a decision. This process is often referred to as PS, which is at the heart of mathematics (Cai & Hwang, 2021). PS is defined as eliminating the confusion in the mind of the individual (Silver, 1994), the individual's effort to reach a goal in the absence of an automatic solution (Schunk, 2012) and developing a solution or methods for resolving issues and questions (Karakuş-Aktan et al., 2021). In addition, PS is a planned process carried out to obtain solutions to both routine and nonroutine problems (Dostál, 2015; Goldhammer et al., 2014). PS, which includes an interaction between the experiences of the individual and the demands of the task, is not an advanced process reserved only for adult learners. Individuals of all ages should be able to be problem solvers (Martinez, 1998). There is a widespread consensus that teaching through PS encourages students' learning (Cai, 2003; Hembree & Marsh, 1993; Henningsen & Stein, 1997; Kroll & Miller, 1993; Schroeder & Lester, 1989; Stein et al., 1999). Cai (2003) states that students think about possible solutions while solving problems, then use one of these approaches and validate their ideas if they find a believable method of solution. Zhang and Cai (2021) also accept this situation as theoretically logical. On the other hand, Senemoğlu (2011) states that PS is an activity that requires choosing and using appropriate cognitive strategies with subject knowledge. It is also expressed as the elimination of the problem situation by using processing skills and existing knowledge through mental activities (Altun, 2008). Similarly, PS is expressed as a complex mental process that includes the use of learned information and the establishment of connections with abstraction, evaluation, and visualization (Gonzales, 1998). In summary, PS can be expressed as the process in which the confusion that occupies the mind is eliminated by using processing skills, as well as subject knowledge.

Performing the PS process, which is stated as a job that individuals of all ages should do, in a series of stages is recommended to facilitate coping with this complex process. These stages are i) understanding the problem, ii) planning, iii) implementing the plan, and iv) looking back (Polya, 1957; Senemoğlu, 2011). There are two basic questions that need to be answered in the first stage: understanding the problem. These are; i) What are the terms and conditions? and (ii) What is unknown/desired? Planning is the stage in which the relationship between what is given and what is desired is investigated. Implementing the plan involves solving the problem step by step using the strategy chosen for the solution. Although looking back is perceived by most individuals as

checking the accuracy of the results, it has a broader meaning and is an enlightenment phase related to the PS process (Altun, 2008). In summary, these stages are i) understand, ii) plan, iii) solve, and iv) evaluate.

A fifth stage was added by Gonzales (1994). This stage is referred to as problem posing/creating. It was stated by Altun (2008) that another study on the evaluation of the solution to a problem is PP. In this context, the stages related to PS and PP are i) understanding the problem, ii) planning for the solution, iii) implementing the plan, iv) evaluating the solution, and v) posing the problem. However, if an individual is solving his own problem instead of a given problem, the step of understanding the problem can also be considered as a PP-step (Leung, 2009). When evaluated as a whole, these stages are understand-plan-solve-evaluate and pose.

### **Problem-Posing (PP)**

PP, which is a special case of PS and is seen as the focal point of mathematics education (Christou et al., 2005; English, 1997; Kontorovich et al., 2012; Silver & Cai, 1996), is accepted as problem finding (Dickerson, 1999) and is a given involving reformulation of the problem (Mestre, 2002). In contrast, some researchers have defined PP as activities similar to PS but characteristically different (Baumanns & Rott, 2021; Dickman, 2014; Pelczer & Gamboa, 2009). Stoyanova and Ellerton (1996) see PP as a process. In this process, concrete situations are transformed into meaningful mathematical problems. Bonotto (2010) defines PP as the process of constructing personal interpretations of abstract situations by students and formulating them as meaningful mathematical problems, while Gonzales (1996) and Stickles (2006) describe this process as posing a new problem or reformulating an old problem. Unlike PS, in PP the focus is on generating problems based on situations (Cai et al., 2015). Silver (1994), on the other hand, defined PP as the rearrangement of a problem in the solution process or the creation of new problems to discover a mathematical situation.

Studies into generating new problems are expressed by Stoyanova and Ellerton (1996) under three headings, which are structured-PP (SPP), semi-structured-PP (SSPP), and free-PP (FPP). Special PS strategies are developed by teachers in SPP studies. What is expected from the students is to create problems that involve using these strategies in their solution. In SSPP studies, it is expected that problems will be created by students suitable for an open-ended situation. Visual figures, mathematical equations, or expressions can be used in such studies. In FPP studies, students are asked to pose problems without any limitations (Abu-Elwan, 1999; Christou et al., 2005; Dickerson, 1999; Stoyanova, 1998). All these activities have been reported to help increase the skills of analysis-synthesis and abstraction-generalization by developing creative and critical thinking, while also developing attitude, self-confidence, and motivation. It has been stated that these activities have positive effects in areas (Bayazit & Kırnap-Dönmez, 2017). Through PP, both students and teachers gain the opportunity to explore mathematical concepts (Silber & Cai, 2017).

## **The Place of PS and PP in the Turkish Educational System**

In Türkiye, all teachers and middle (classes 5-8, and ages between 11 and 14) and primary (classes 1-4, ages between 7 and 10) school students follow the same curriculum, which is called 'mathematics curriculum (primary and middle school classes 1, 2, 3, 4, 5, 6, 7, and 8)', developed by the Ministry of National Education (MoNE, 2018). At the primary school level, there are four learning domains which are i) Numbers and Operations (NO), ii) Geometry, iii) Measurement, and iv) Data Processing (DP). There are 229 learning outcomes (of which 21 are related to PP and 31 are related to PS) related to these learning domains. Furthermore, there are 19 sublearning domains of which seven are related to NO, four are related to geometry, seven are related to measurement, and one is related to data processing. At the middle school level, there are 215 learning outcomes (of which 3 are related to PP and 33 are related to PS) associated with five learning domains, which are i) NO, ii) Algebra, iii) Geometry and Measurement (GM), iv) DP, and v) Probability. There are 39 sublearning domains, including 16 related to NO, five related to Algebra, 15 related to GM, two related to DP, and just one of them is related to Probability.

## **Method**

The study was designed according to basic qualitative research principles. As words are used as data in qualitative research (Braun & Clarke, 2013), in this study, the meaning of the concept of problem was investigated based on the thoughts and statements of the participants. In addition, all qualitative research is concerned with how individuals make sense of their world and their lives and how meaning is constructed. The primary purpose of basic qualitative research is to reveal and interpret these meanings. For this purpose, data are collected through observations, interviews, or document analysis (Merriam & Tisdell, 2016). In the present study, the meaning of the concept of problem, PS, and PP cases were examined through the collected documents. The study sample consisted of 46 pre-service middle school mathematics teachers (PSM<sup>2</sup>Ts) who were in their last year at a Faculty of Education, in a state university in Türkiye.

## **Data Acquisition Process**

The data were collected with the 'Problem, Problem-Posing and -Solving Form (PPPSF)'. The PPPSF consists of two parts. The first part includes the question of 'What is a problem?' to determine the perceptions of PSM<sup>2</sup>Ts about the concept of problem. In the second part, the participants were asked to pose a problem at the middle school level and they should also provide the solution to their problem. Thus, the study was also an example of FPP activity. Since the study was not intended to evaluate the problems posed and solved in any mathematics subject, no explanation was given to the PSM<sup>2</sup>Ts. The aim here was to determine what kind of problems they would pose and solve with their existing knowledge. Thus, it was hoped that it would be possible to see the general approach of PSM<sup>2</sup>Ts in regard to PP and PS. Furthermore, by analyzing the study results,

it may be possible to determine what improvements can be made in the evaluation of the posed problems. Similar studies can then be conducted in the context of specific mathematical topics.

The data collection tool was distributed to the PSM<sup>2</sup>Ts, and they were informed that participation in the study was on a voluntary basis. They were given 50 minutes to fill out the form. This period is a course hour in education faculties in Türkiye. Time was considered sufficient for this study. It was also confirmed that the time was sufficient by asking the PSM<sup>2</sup>Ts at the end of the study. They found the time sufficient. However, in cases where more than one problem was posed and solved, it would be possible to vary the duration. However, the time can be kept shorter if working with a group that frequently performs PP and PS practices. The duration could be considered a study variable, to observe the effects of applications. At the end of the period, the forms were collected back. In total, 48 data collection tools were obtained. These forms were coded as PST<sub>00</sub>, PST<sub>01</sub>, ..., PST<sub>47</sub>.

### Data Analysis

First, the 48 data collection tools were examined. Two data collection tools were not filled in and these were immediately excluded from the study. In addition, the first part of two forms, 'what is a problem?' was not completed so the data from 44 forms were used to answer RQ1. These data were evaluated by content analysis. In this analysis, the meanings and relations of certain words and concepts in the text or texts are determined, analysis is carried out, and inferences are made (Büyüköztürk et al., 2012). The data were coded, then the codes were brought together under certain themes, and the analysis was completed.

To answer RQ2, 46 forms were re-examined, and only 43 forms had problems, and the problems in these forms were evaluated. The literature review showed that researchers used certain criteria in the evaluation of the problems. For example, researchers (Silber & Cai, 2017; Silver & Cai, 1996) first determined non-problematic statements, non-mathematical problems, and mathematical problems in the classification of the problems, and then evaluated the problems according to whether they were solvable or not with certain complexity criteria. In another study, the criteria of quantity, originality, and complexity were discussed in the evaluation of the problems (Silver & Cai, 2005). Leung and Silver (1997) evaluated the problems posed in their studies according to whether they were mathematical problems, whether the problem was logical or not, whether the information provided was sufficient, and arithmetic confusion. They divided the problems posed in the first step of the evaluation, which they completed in three stages, into mathematical and nonmathematical. In the second step, they divided the mathematically determined problems into two categories: logical and non-logical. Finally, the problems determined as logical mathematical problems were evaluated according to whether the information given was sufficient or not. Korkmaz and Gür (2006) divided problems into five categories: open-ended, creative in terms of subject, four verbal processing problems, transforming expression, and impossible-to-

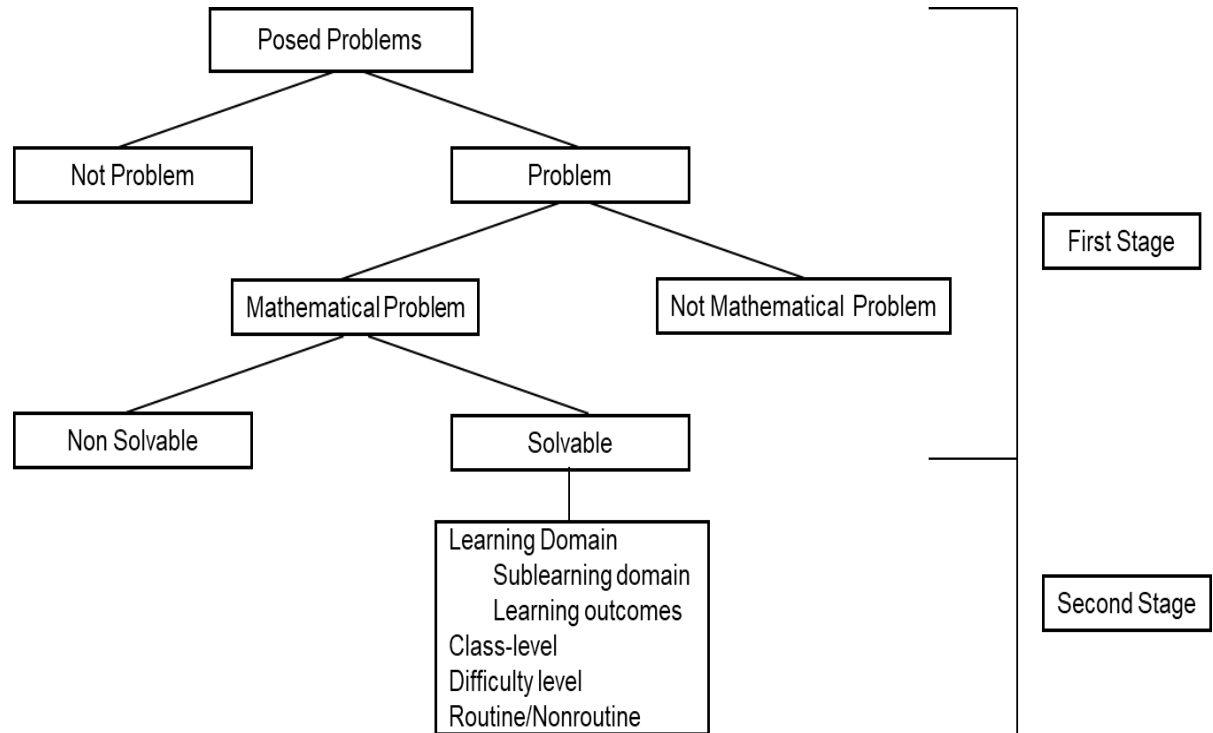
meaningless. They evaluated them by assigning points to these categories, which were 25-15-10-10-0, respectively. Albayrak et al. (2006) evaluated the problems using a PP skill measurement tool that includes criteria such as i) not writing anything, ii) using all the given material, iii) adding new material, and iv) creating a sample from the given ones. Işık et al. (2011) evaluated the posed problems by the PSTs as not a problem but as an empty problem. The problems evaluated in the problem category were then divided into three: homework, relational, and conditional. Işık and Kar (2012a) initially divided the problems into two as appropriate and unsuitable for the data set, and then evaluated the problems suitable for the data set in terms of quantity and originality. Kılıç (2013), first, separated the problems in her study according to whether there were four operation problems or not, and then evaluated the four operation problems according to whether they were solvable or not. Kar and Işık (2015) divided the problems into two categories, which were problems and not problems, and divided the ones they identified as problems into two categories: valid and not valid. Xie and Masingila (2017) used the assessment rubric they adapted from the work of Rosli et al. (2013). Özdemir et al. (2022) first evaluated the problems as appropriate and inappropriate. After separating the problems identified as appropriate according to the task formats they determined, they were classified in the context of fluency, flexibility, and originality.

Therefore, in the present study, the problems were evaluated in two stages. In the first stage, the 43 problems posed were divided into two, according to whether they were a problem or not. Those evaluated as problems were then divided into two according to whether they were mathematical problems or not, and mathematical problems were evaluated according to whether they were solvable or not.

In the second stage, solvable mathematical problems were categorized into five: learning domain (Numbers and Operations (NO), Algebra, Geometry and Measurement (GM), Data Processing (DP), and Probability), sublearning domains, learning outcomes, class-level (5th-class, 6th-class, 7th-class, and 8th-class), difficulty level, and routine/nonroutine. Figure 2 shows the evaluation path of the posed problems.

Figure 2

The Evaluation Path: Evaluation Stages of Posed Problems



According to Figure 2, the cognitive domains of knowing, applying, and reasoning presented in the Trends in International Mathematics and Science Study [TIMSS] (MoNE, 2020) report were considered in determining the level of difficulty. The cognitive domain of knowing includes the information, concepts, and processes that students need to know. In this context, the posed problems at this cognitive domain level were determined as 'easy'. The application cognitive domain focuses on applying knowledge to answer problems. Problems related to this area were determined as 'medium'. The reasoning cognitive domain covers multistep problems and includes unusual situations. Kar and Işık (2015) revealed in their study that the operation structure was considered in evaluating the problems in the difficult category when posing problems related to different difficulty levels. In this framework, problems related to the cognitive domain of reasoning were interpreted as 'difficult'. The point taken into consideration in determining whether the posed problem was routine or not was as follows. Baumanns and Rott (2021) state that whether a problem is routine or not varies from person to person. A problem that is not routine for an individual may be routine for someone who knows the appropriate solution. Accordingly, if the problem posed is of the type that any student studying at the relevant class-level can know and solve the relevant solution, it is classified as routine, if he knows the solution, it requires thinking and reasoning, and if it is more in number in the context of the process step, it is classified as nonroutine.

After the analyses were carried out (Figure 2), the evaluation was organized according to the expert opinion form. This form was sent to a mathematics teacher who has twelve years of experience in her profession and who is also continuing her doctoral education, and two experts in the field of mathematics education. They were asked to examine the evaluation and to state their opinions, if any. Opinion forms were examined, differences were re-evaluated, and the analysis was completed. In addition to this, the opinions of the experts on the problems were evaluated, and the findings obtained from these opinions are presented to the reader.

To attempt to find the answer to RQ3, the solutions provided for 42 problems were evaluated, using the rubric presented by Baki (2008), who suggested that problem solutions should be evaluated in five sections (see Table 3). These sections are i) Understanding the problem (UP), ii) Devising a plan (DP), iii) Implementing the plan (IP), iv) Evaluating (E), and v) Posing the problem (PP). Each section contains four criteria. The criteria are scored between 0 and 3 depending on whether the relevant skill is fully performed or not performed at all. Thus, the lowest score that PSTs can get from each section is zero and the highest score is three. The data were evaluated separately for each stage. For example, according to the key, the evaluation of the PST who scored  $2+2+3+2+2=11$  and the PST who got  $3+2+2+2+2=11$  have different meanings. This is because the first PST partially understood the solved problem, but the second PST understood the solved problem. Therefore, the differences between the two for different stages indicate differences in PS skills of the two PSTs despite achieving the same total score. Since the study determined the PS skills of PSTs, the scores for each section are given based on frequency (f) and percentage (%).

### **Validity and Reliability of Research**

It is suggested that the concepts of persuasiveness and external validity should be used instead of the internal validity of qualitative research (Lincoln & Cuba, 1985; as cited in Erlandson et al., 1993). Credibility is about the consistency and clarity of research processes and results. In this context, the researcher needs to present evidence for the authenticity of the findings, the consistency of the process, and the objective collection of data (Yıldırım & Şimşek, 2016). Therefore, the research process and the mechanism by which the answers to each research question were found are explained in detail. In addition, it is considered important for validity to include direct quotations about the opinions of individuals interviewed in a study (Yıldırım & Şimşek, 2016). With this importance, to provide credibility and the criterion that is important for validity, both the problem and examples related to PP and PS are frequently included in the study. In addition, the differences in the fonts in these examples, the differences in the problem expressions, the problems and their solutions improve the credibility of the study. Transferability is about adequate description of the data, which can be achieved by detailed description. What needs to be considered in this is to organize the raw data according to the emerging concepts and themes and transfer it to the reader without comment (Yıldırım & Şimşek, 2016). Among the data obtained within the scope of this

study, those related to the problem were presented without comment within the framework of certain themes. The data related to PP were presented by classifying them in the context of the concepts presented in the evaluation path, and no comments were made. Similarly, findings related to PS were presented in relation to the rubric.

Like validity, different concepts are used for the reliability of qualitative research. In this framework, the concepts of consistency instead of internal reliability and confirmability instead of external reliability are adopted (Lincoln & Cuba, 1985; as cited in Erlandson et al., 1993). Consistency should show itself in the development of data collection tools and analysis (Yıldırım & Şimşek, 2016). In the context of consistency, how the data of this study were obtained and how the analysis of the obtained data were carried out was presented in a clear and detailed way. In addition, the evaluation path and the conceptualization process of the data can be clearly observed. For this reason, I believe the study to be consistent. Confirmability is about staying away from assumptions and not adopting a subjective approach. However, additional methods such as peer confirmation and diversification are recommended to ensure confirmability (Yıldırım & Şimşek, 2016). As detailed in the data analysis, no subjective approach was adopted in the evaluations, no comments and no assumptions were made. Based on the evaluation path and rubric, the assessments were conducted openly. By considering the examples presented in the study, the processes made by different researchers and/or experts can be confirmed by testing. Likewise, confirmations of colleagues who are still mathematics teachers and continued their doctoral education and who are experts in mathematics education were also obtained. In this way, the external reliability of the study was ensured.

In addition, for the reliability of assessments made using rubrics, a single evaluator and inter-rater reliability should be confirmed (Moskal, 2000). In single evaluator reliability, the same evaluator repeats the assessment at different times (Moskal & Leydens, 2000). In inter-rater reliability, the same data should be evaluated by different evaluators (Newell et al., 2002). Therefore, problem solutions in the present study were evaluated by two different evaluators, and an evaluator repeated her evaluation three weeks later. Then, agreement between single and different raters was calculated using Cohen's Kappa statistics. The result of the evaluations of one evaluator was 0.96, and the agreement between two different evaluators was 0.90. If these values are between 0.81 and 1.00, this indicates perfect agreement between evaluators and between different time points (Landis & Koch, 1977). In summary, the present research was valid and reliable.

## Findings

### ***RQ1: What are the perceptions of PSTs regarding the concept of problem?***

The aim here was to reveal the perceptions of PSM<sup>2</sup>Ts about the concept of 'a problem'. Table 1 shows the findings concerning this concept.

**Table 1***The Perceptions of PSM<sup>2</sup>Ts toward the Concept of Problem*

Themes	f	%
A case to be solved	25	56.82
An unpleasant situation	5	11.36
Difficulty	5	11.36
Trouble	5	11.36
Other	4	09.10

The perceptions of the PSM<sup>2</sup>Ts about the concept of 'a problem' were grouped under five different themes. These themes are a case that needs to be solved, an unpleasant situation, difficulty, trouble, and other. The most common theme was a case that needs to be solved (56.82%, f=25). PSM<sup>2</sup>Ts expressed the concept of problem as a situation, question, difficulty, set of procedures, and a mysterious forest. Figure 3 shows the answer of the PSM<sup>2</sup>Ts coded PST<sub>40</sub>.

**Figure 3***The Response of the PST<sub>40</sub>*

Çözülmesi gereken durumdur.

'Çözülmesi gereken durumdur.'

'It is a situation that needs to be resolved.'

The PSM<sup>2</sup>Ts also felt that a problem was an unpleasant, disturbing, and confusing situation. A problem was defined as any obstacle, difficulty encountered, and challenge to be overcome, according to the PSM<sup>2</sup>Ts. Figure 4 shows PST<sub>25</sub>'s explanation of the problem concept.

**Figure 4***The Response of the PST<sub>25</sub>*

Aşılması gereken zorluklardır.

'Aşılması gereken zorluklardır.'

'The challenges that should be overcome.'

A problem has been defined as a problem whose solution is unknown and requires analysis and reasoning. Also, a problem has been seen as imitating a subject, mathematical operation complexity, proposition, and a whole or part of a phenomenon. Figure 5 shows the PST<sub>10</sub>'s explanation of the problem concept.

Figure 5

The Response of the PST<sub>10</sub>

Belli bir sonucu olan matematiksel işlem karmaşıklığı

'Belli bir sonucu olan matematiksel işlem karmaşıklığı'

'A complexity of mathematical operations that have a certain consequence'

#### RQ2: How are the PP-cases of PSTs?

**The first stage of evaluation of posed problems:** All the problems in the 43 forms evaluated were identified as problems and mathematical problems. Then, these problems were analyzed according to whether they were solved or not. One problem was unsolvable. This problem is shown in Figure 6.

Figure 6

The Posed Problem by PST<sub>31</sub> (Unsolvable)

Bir öğrenci 3 kitap ve 1 deftere 15 TL veriyor.  
Aynı öğrenci 1 kitap ve 1 deftere 1 TL veriyor.  
Buna göre 1 kitap kaç TL'dir?

'Bir öğrenci 3 kitap ve 1 deftere 15 TL veriyor. Aynı öğrenci 1 kitap ve 1 deftere 1 TL veriyor. Buna göre 1 kitap kaç TL' dir?'

'A student gives 15 TL for 3 books and 1 notebook. The same student gives 1 TL for 1 book and 1 notebook. Accordingly, how many TL is a book.'

When Figure 6 is examined, PST<sub>31</sub> wants to find the price of a book. At first glance, the problem appears to be solvable. However, although the price of the book can be calculated as 7 TL with the information given, the price of the notebook is obtained as - 6 TL. In this case, the problem is considered unsolvable.

**The second stage of evaluation of posed problems:** Moving on to the second stage of the analysis, the remaining 42 problems were evaluated in terms of learning domains, sublearning domains, learning outcomes, class-level, difficulty level, and routine/nonroutine. Table 2 shows the findings of the second stage of the analysis in detail.

**Table 2**  
*Second Stage Evaluation Findings of Posed Problems*

PSM <sup>2</sup> Ts' Codes	Learning Domain	Sublearning Domain	Subject	Class Level	Difficulty Level	Routine/Nonroutine
PST00	NO	Operations with Fractions	Addition and Subtraction Problems in Fraction	5	Easy	Routine
PST01	Algebra	Equation and Equation	Equation Problems	7	Middle	Routine
PST02	GM	Geometric Bodies	Calculating the Volume of Prisms	6	Easy	Routine
PST05	GM	Parity and Similarity	Similarity	8	Easy	Routine
PST06	NO	Percentages	Percentage Problems	7	Easy	Routine
PST08	GM	Measuring Length and Time	Length Measurement	5	Middle	Routine
PST09	NO	<b>Natural Numbers</b>	<b>Operations with Natural Numbers</b>	<b>Primary school</b>	<b>Easy</b>	<b>Routine</b>
PST10	Algebra	Equation and Equation	Equations	7	Easy	Routine
PST11	NO	Square Root Expressions	Radical Numbers	8	Middle	Routine
PST12	NO	Percentages	Percentages	7	Middle	Routine
PST13	NO	Fractions	Finding the Complete Multiplicity Given a Fraction	5	Middle	Routine
PST14	Algebra	<b>Linear Equations</b>	<b>Equations with First Order Unknown</b>	<b>8</b>	<b>Difficult</b>	<b>Nonroutine</b>
PST15	Algebra	Equation and Equation	Equation Problems	7	Easy	Routine
PST16	NO	Operations with Fractions	Fraction Problems	6	Easy	Routine
PST17	NO	Decimal Notation	Problem Solving and Setting Up Decimal Notation	6	Very easy	Routine
PST18	NO	Exponential Expressions	Exponential Numbers	8	Middle	Routine
PST21	NO	Operations with Fractions	Fraction Problems	6	Middle	Routine
PST22	NO	Operations with Natural Numbers	Natural Number Problems	5	Easy	Routine
PST23	Algebra	<b>Linear Equations</b>	<b>Equations with First Order Unknown</b>	<b>8</b>	<b>Difficult</b>	<b>Nonroutine</b>
PST24	NO	Integers	Integer Problems	6	Easy	Routine
PST25	GM	Geometric Bodies	Calculating the Volume of Prisms	6	Easy	Routine
PST26	NO	Operations with Natural Numbers	Natural Number Problems	5	Easy	Routine
PST27	Algebra	Linear Equations	Equations with First Order Unknown	8	Easy	Routine
PST28	NO	Operations with Fractions	Fraction Problems	5, 6	Medium, Easy	Routine
PST29	Algebra	Linear Equations	Equations with First Order Unknown	8	Easy	Routine
PST30	GM	Area Measurement	Calculating the Area of a Triangle Region	6	Middle	Routine
PST32	NO	Fractions	Finding the Fraction of a Whole	5	Easy	Routine
PST33	GM	Area Measurement	Area Land Problems	6	Middle	Routine
PST34	NO	Percentages	Percentages	5	Middle	Routine
PST35	NO	Operations with Fractions	Problem Solving and Setting Up Fractions	6	Middle	Routine
PST36	NO	Operations with Fractions	Fraction Problems	5, 6	Medium, Easy	Routine
PST37	NO	Percentages	Percentages	5	Middle	Routine
PST38	NO	<b>Natural numbers</b>	<b>Operations with Natural Numbers</b>	<b>Primary school</b>	<b>Easy</b>	<b>Routine</b>
PST39	NO	Operations with Fractions	Fraction Problems	6	Middle	Routine
PST40	NO	Operations with Fractions	Fraction Problems	6	Middle	Routine
PST41	NO	Operations with Fractions	Fraction Problems	6	Middle	Routine
PST42	NO	Fractions	Finding the Fraction of a Whole	5	Easy	Routine
PST43	GM	<b>Circle</b>	<b>Basic Concepts of the Circle</b>	<b>6</b>	<b>Difficult</b>	<b>Nonroutine</b>
PST44	NO	Percentages	Percentages	6	Middle	Routine
PST45	NO	Fractions	Finding the Complete Multiplicity Given a Fraction	5	Middle	Routine
PST46	NO	Percentages	Percentages	5	Middle	Routine
PST47	GM	Measuring Length and Time	Quadrilaterals and Their Properties	5	Easy	Routine

**Findings regarding learning domains:** PSM<sup>2</sup>Ts were posed problems related to three different learning domains (NO, Algebra, GM) and 16 different sublearning domains. In total 27 (64.29%) problems were related to the NO-learning domain and these problems were related to nine different sublearning domains. The problems posed were for 12 different learning outcomes related to these sublearning domains. Figure 7 shows a problem in the NO-learning domain, fractions sublearning domain, and M.5.1.3.6. coded learning outcomes (MoNE, 2018).

**Figure 7**

The Posed Problem by PST<sub>13</sub>

Bihter Hanım, parasının  $\frac{5}{12}$  i ile bir kazak ve bir tene atak aldı.  
Bihter Hanım kazak ve atake toplam 150 TL verdiğine göre ge-  
riye kalan parası kaç TL'dir?

'Ms. Bihter bought a sweater and a skirt with  $\frac{5}{12}$  of her money. If Ms. Bihter gave a total of 150 TL for the sweater and skirt, how much is the rest of her money?'

In addition, seven (16.67%) problems were posed in the algebra learning domain. These problems were related to linear equations and equality and equation sublearning domains. The problems were set up for two different gains. In Figure 8, a problem related to the algebra-learning domain, equality and equation sublearning domain, and M.7.2.2.4. coded learning outcomes (MoNE, 2018) is given.

**Figure 8**

The Posed Problem by PST<sub>01</sub>

Ece her gün bir önceki okuduğu kitap sayfasının  
iki katı kadar kitap okumaktadır. Üçüncü gün okuduğu sayfa  
sayısı 20 olduğuna göre 160 sayfalık bir kitabı kaç günde  
bitirir?

'Ece reads twice as many books every day as the previous book page. If the number of pages she reads on the third day is 20, in how many days will she finish a 160-page book?'

Eight (19.04%) problems were posed in relation to the GM-learning domain. These problems are related to area measurement, circles, equality and similarity, geometric objects, and length and time measurement sublearning domains, and are established by considering seven different learning outcomes. Figure 9 shows a sample problem related to the GM-learning domain, geometric objects sublearning domain, and M.6.3.4.4. coded learning outcomes (MoNE, 2018).

## Figure 9

The Posed Problem to PST<sub>02</sub>

Kare uzunlukları 3 ve 4 cm olan dikdörtgenin 3 cm yükseklikte eklenerek elde edilen prizmanın hacmi kaç cm<sup>3</sup>'tür

'What is the volume, in cm<sup>3</sup>, of the prism obtained by adding 3 cm of height to a rectangle with side lengths of 3 and 4 cm?'

**Findings regarding class-level:** When the posed problems were evaluated according to the class-level, it became clear that two problems were at the primary school level. The first of these problems was in the NO-learning domain, the sublearning domain of multiplication with natural numbers, M.3.1.4.6. coded learning outcomes (MoNE, 2018) and is at the 3rd-class-level. The other problem was related to the NO-learning domain, multiplication with natural numbers sublearning domain, M.4.1.4.6. coded learning outcomes (MoNE, 2018) and was at the 4th-class-level. The problem related to the 3rd-class-level is presented in Figure 10 as an example.

## Figure 10

The Posed Problem by PST<sub>09</sub>

44 sayısının 4 eksiğinin 5 katı kaçtır

'What is 5 times the number 44 minus 4?'

Fifteen of the remaining 40 problems were at the 5th-class-level, 12 at the 6th-class-level, six at the 7th-class-level, and seven at the 8th-class-level. The problems posed at the 5th-class-level were related to the learning domain of NO (f=13) and GM (f=2). At this level, in which five different sublearning domains (operations with natural numbers, fractions, operations with fractions, measuring length and time, percentages) are considered, a problem suitable for five different objectives was posed. In Figure 11, a problem posed at the 5th-class-level is presented.

Figure 11

The Posed Problem by PST<sub>09</sub>

Kuruyeye giden Nur tenezi 2 TL den olan kalemlerden 7 tane  
tenezi 3 TL olan defterlerden 5 tane, tenezi 1 TL olan  
silgilerden 2 tane ve tenezi 4 TL olan kutusundan  
1 tane almıştır. Kuruyeye 50 TL vermiştir. Bu işi  
para üstü olarak kaç TL almıştır?

'Nur, who went to the stationery store, bought 7 pens with 2 TL, 5 notebooks with 3 TL, 2 erasers with 1 TL, and 1 from the pencil box, each of which was 4 TL. She gave 50 TL to stationery. Accordingly, how much TL should she receive as change?'

The problems posed at the 6th-class-level were also related to the learning domain of NO (f=7) and GM (f=5). The problems posed encompassed five different learning domains (area measurement, circle, geometric objects, operations with fractions, decimal notation) and are for seven different learning outcomes. Six problems were posed at the 7th-class-level and were related to the NO (f=3) and Algebra (f=3) learning domains. These problems were related to three different sublearning domains (equality and equation, operations with integers, percentages) and were posed for four different learning outcomes. Finally, the problems at the 8th-class-level were related to the learning domains of NO (f=2), Algebra (f=4), and GM (f=1). These problems encompassed four different sublearning domains (linear equations, parity and similarity, square root expressions, exponential expressions) and were related to four different learning outcomes. Figure 12 shows an example of a problem at the 8th-class-level.

Figure 12

The Posed Problem by PST<sub>18</sub>

$$\frac{2^5 \cdot 5^2}{10^2 \cdot 2^{10}} = ? \quad \frac{2^5 \cdot 5^2}{10^2 \cdot 2^{10}} = ?$$

**Findings regarding difficulty level:** Both problems posed at the 3rd and 4th-class-levels were, unsurprisingly, easy problems. When the remaining 40 problems were evaluated according to the degree of difficulty, three more problems were very easy, 16 problems were easy, 18 problems were moderate, and three problems were difficult. The problems that were considered very easy were related to the NO-learning domain and were at the 6th-class-level. Similarly, the problems that were evaluated as easy were related to each class-level. The problems with medium difficulty level were concentrated in the 5th and 6th-class-levels. Finally, the problems described as difficult are related to the learning domains of Algebra and GM at the 6th- and 8th-class levels. In Figure 13, an example problem posed at the 6th-class level of medium difficulty is presented.

Figure 13

The Posed Problem by PST<sub>36</sub>

SORU: Esmâ'nin 48 TL'si vardır. Parasının  $\frac{1}{8}$ 'i ile kalem, geriye kalan parasını  $\frac{1}{5}$ 'i ile defter almıştır. Esmâ'nın geriye ne kadar parası kalmıştır?

'Esmâ has 48 TL. She bought a pen with  $\frac{1}{8}$  of her money and a notebook with  $\frac{1}{5}$  of her remaining money. How much money does Esmâ have left?'

**Findings regarding whether the problems routine or not:** Only three of the posed problems were nonroutine problems that were related to Algebra and GM-learning domains, linear equations, and circle sublearning domains, and they were at the 6th- and 8th-class-levels. Figure 14 shows an example of a nonroutine problem at the 6th-class-level related to the GM-learning domain, circle sublearning domain, and M.6.3.3.2. coded learning outcome (MoNE, 2018).

Figure 14

The Posed Problem by PST<sub>43</sub>

Merhaba, bir öğrenci olan Efe çevresizliği herhangi bir çember biçimindeki nesnenin çevresinin uzunluğunu önce bir ip ile ölçüp sonrasında ipi cetvelin üzerinde yatırarak nesnenin çevresinin uzunluğunu bilmiştir. Yine cetvelle çap uzunluğunu öğrenmiştir. Şimdi olarak da hesap makinesiyle çevre uzunluğunu çap uzunluğuna bölüştürmüştür. Efe neyi merak edip araştırıyor, olabilir.

'Efe, a curious student, first measured the circumference of any circular object around him with a string and then stretched the string over the ruler to find the circumference

of the object. He also measured the diameter length with a ruler. Finally, he divided the circumference by the diameter using a calculator. What could Efe be wondering and researching?'

**Findings regarding experts opinions:** The final evaluation regarding the problems posed concerned the opinions written by experts on the problems. The expert opinions were that there were errors in the expressions of the problems. For example, the statement 'The cake Ali bought, Ayşe ate 3/5 of it' should be rewritten as 'Ayşe ate 3/5 of the cake Ali bought'. Additionally, instead of phrasing the question as 'What is the result of the operation?' with a question mark, it was observed that the question was directly stated. However, in some problems, punctuation marks (for example, punctuation marks such as question marks, commas) were not given importance, geometric figures were not drawn properly, and unnecessary information was included in geometry problems (for example, showing the similarity of triangles mathematically and showing it on the figure, etc.), and not a single question was asked at the root of the question (for example, ... What is the initial number of items for Ayşe and what is the total number of items for Ali at the beginning?). In Figure 15, an example problem is given where neither the question stem nor any punctuation marks are included.

### Figure 15

The Posed Problem by PST<sub>11</sub>

Problem

$$\frac{\sqrt{16} \cdot \sqrt{32}}{\sqrt{48} \cdot \sqrt{36}} \quad \frac{\sqrt{16} \cdot \sqrt{32}}{\sqrt{48} \cdot \sqrt{36}}$$

When Figure 15 is examined, it is understood that it is desired to find the result, but 'equals question mark (= ?)' to the given expression, 'What is the simplest form of the operation?', or 'What is the result of the operation?' is missed and the question stem is not written in the form.

### RQ3: How are the PS-cases of PSTs?

The solution of 42 problems was evaluated using rubrics. Table 3 shows the findings of RQ3.

**Table 3**

*Findings Obtained from the Evaluation of the Solutions of the Posed Problems*

	PS Criteria	f	%
UP	3: Fully understanding the problem	15	35.71
	2: Understanding a part of the problem	04	09.52
	1: Failure to understand the problem	00	00.00
	0: No effort is made to understand the problem	23	54.76
DP	3: Selecting a strategy that will lead to a suitable solution	00	00.00
	2: Selecting only one part of the strategy that will help the solution	00	00.00
	1: Choosing an inappropriate strategy	00	00.00
	0: No strategy selected	42	100.00
IP	3: Finding the correct and appropriate solution	39	92.86
	2: Making a solution that is partially correct	00	00.00
	1: Making a solution that is not appropriate and correct	00	00.00
	0: No solution can be made	03	07.14
E	3: Solving the problem and the new problem posed	00	00.00
	2: Logical verification of the results	01	02.38
	1: Partial validation of the results	00	00.00
	0: Not knowing how to verify the results	41	97.62
PP	3: The posed problem is logical and solvable	00	00.00
	2: A new problem was posed by changing the values of the problem	00	00.00
	1: There is a logical error in the posed problem and it cannot be solved	00	00.00
	0: Same problem or no problem written	42	100.00

According to Table 3, the problem was fully understood in the solution of 15 (35.71%) of the 42 problems, a part of the problem was understood in four (9.52%) problems, and no effort was made to understand the problem in the solution of 23 (54.76%) problems. Interestingly, no plan was prepared for the solution in any of the 42 (100%) problems, and no strategy was chosen. Figure 16 is an example of a well-understood problem solution.

Figure 16

Solution of PST<sub>12</sub>

Çözüm

Veriler  
50 tane boya kalem:  
%20'si kırılmış  
Kalemın %20'si bitmiş

İstenilenler  
Kalan boya kalemı sayısı?

Given

50 crayons  
20% broken  
20% finished

Wanted

The number of crayons remaining?

Three (7.14%) PSTs did not solve the problem they were posed, while the other PSTs (92.86%) reached the appropriate and correct solution. One (2.38%) PST made a logical evaluation of the solution, nothing was done to evaluate the results obtained in 41 (97.62%) PS. Regarding the PP stage given in Table 3, neither the same problem nor any other problem was written after 42 (100%) solutions. An example problem solution is presented in Figure 17, in which a fully understood and appropriate solution is obtained.

Figure 17

The Complete Solution of PST<sub>36</sub>

<p><u>Verilenler</u></p> <p>48 TL'si var  <math>\frac{1}{8}</math>'si → kalem          Kalem için kalan <math>\frac{1}{2}</math>'si ile defter</p> <p><u>Çözüm</u></p> <p>48 · <math>\frac{1}{8}</math> = 6 kalem fiyatı          48 - 6 = 42 Kalem kalan para          42 · <math>\frac{1}{2}</math> = 21 defter fiyatı</p>	<p><u>İstenenler</u></p> <p>Kalem kalan para ne kadardır?</p> <p>42 - 6 = 36 para kalan miktar.</p>
--	---

Given

He has 48TL  
 1/8 pencil  
 Notebook with 1/2 of the remainder

Wanted

How much money is left?

Solution

48 · 1/8 = the price of 6 pens  
 48 - 6 = 42 remaining money  
 42 · 1/2 = 6 notebook prices

42 - 6 = 36 remaining amount

When Figure 17 is examined, it is seen that PST<sub>36</sub> fully understood the problem, did not determine any strategy for the solution, did not plan, proceeded to the solution after understanding the problem, and did not make any evaluation after reaching the correct solution.

### Conclusion and Discussion

The first aim of the study was to determine how the concept of 'a problem' is perceived by the PSM<sup>2</sup>Ts. The general findings were that a problem is a difficulty that the individual does not like the moment s/he encounters it, requires analysis and reasoning, but needs to be solved. Thus, they had gained information about the meaning of the concept of a problem within the scope of undergraduate courses. In this context, I expected that the

result obtained should be meaningful. However, it may be that the reason why they attribute these expressions to the concept of problem, which they often hear and encounter in their lives, is that the concept of problem is expressed as the question, issue, and problem to be solved and not just mathematics problems. In addition, the example of 'problem child' points to those whose behavior is not normal (Turkish Language Institution [TLI], 2025). PSM<sup>2</sup>Ts often encounter such examples in their daily lives. This may be among the reasons for the meaning they attribute to the concept of problem. Baş and Özturan-Sağırılı (2016) also concluded that the concept of 'problem' is defined as a problematic situation. In addition, they concluded that the words 'need to be solved' and 'difficulty' are the most used words according to the phrases used by the candidates while describing the problem. Similarly, Uygun et al. (2016) reported that both mathematics and primary school teacher candidates attributed the expressions difficult and complex to mathematical problems. Kaba (2018) also found that the concept of problem was associated with the category of difficulty. As a result, the need to solve a problem and its expression as a difficulty are common points in these studies. The reason for this is that a problem situation causes distress to individuals. Turhan-Türkkan and Yeşilpınar-Uyar (2016) showed that the category of 'mathematical problem as a difficult and complex activity' came to the fore, while Sezgin-Memnun (2015) also found that a mathematical problem was perceived as a difficult and complex concept. These results were obtained in studies conducted with middle school students. In this case, it is seen that both future teachers and students have common perceptions of a mathematical problem and describe a problem as difficult and complex. The reason for this may be that the existing thoughts and attitudes of those who do the teaching are transferred to their students. Therefore, positive thoughts of teachers in regard of mathematical problems and knowledge of the correct definition of a concept are important. Likewise, Yenilmez and Ev-Çimen (2014) concluded that PSTs confuse the concepts of problem and exercise, and that the number of candidates who write exercises instead of problems is high. In this context, it is important that the candidates who teach mathematics should know the meaning of the concept of problem correctly. It is important to create a correct perception about the concept of problem to improve PSTs' skills using PP and mathematical problems to the desired level (Baş & Özturan-Sağırılı, 2016). In summary the perceptions of PSM<sup>2</sup>Ts regarding the concept of 'problem' suggest that they generally define problems as difficult situations that need to be solved. Both PSTs and students may often perceive mathematical problems as complex and difficult. This perception could potentially be shaped by teachers' attitudes toward mathematical problems, which they may pass on to their students. Additionally, PSTs may confuse problems with exercises, which could lead to conceptual confusion, emphasizing the importance of learning the correct definition of a problem.

On examination, the posed problems were mathematical and solvable, except for one. Thus, it seems that most PSM<sup>2</sup>Ts can pose mathematical problems with solutions. Kaba (2018) also reported that the problems posed in her study were mathematical, as did Kar and Erkan (2022) but these authors also reported that PP tendencies changed according to the problem type. Kılıç (2017) concluded that more than half (55%) of the

candidates could successfully pose a problem. Bataller et al. (2022) and Şengül and Katranacı (2014; 2015) also found that future teachers pose solvable mathematical problems, likely due to the effects of the education they have received. Erkan and Kar (2022) concluded that most of the candidates started the PP process by finding a solution, suggesting that the solutions to the posed problems were also taken into consideration. Another reason for the result may be related to the metacognitive skills of PSTs. Metacognitive skill allows for assessment of whether a problem is well defined and solvable (Baumanns & Rott, 2023). My findings, and those of other researchers, suggest that the PSM<sup>2</sup>Ts use their metacognitive skills well.

The problems provided related to only three different learning domains and there were no problems related to the DP and Probability-learning domains; the problems mostly related to the NO-learning domain. Similarly, Kaba (2018) also reported that most problems were related to the NO-learning domain. This may occur because the achievements related to the NO-learning domain are more related to PP and that PP studies for this learning domain are frequently carried out. Işık and Kar (2012b) found that teachers posed problems that excluded the geometry domain. As both pre-service and inservice teachers ignore some learning domains, there may be an inadequacy of content information related to the learning domains avoided which should be addressed in teacher training.

I found that mostly of the posed problems were at the 5th-class-level, and fewer problems were posed at higher classes. No problem was posed regarding the probability-learning domain, which is taught only in the 8th-class. Kaba (2018) reported that most problems posed by her cohort were at the level of the 6th-class. When the mathematics curriculum in Türkiye is examined, M.5.1.4.2 coded learning outcomes at the 5th-class-level as well as M.5.1.2.12. and M.6.1.1.4 coded learning outcomes at the 6th-class-level are related to PP (MoNE, 2018). These results are of importance because, despite indicating that the education given in faculties of education progresses in harmony with the curriculum, being able to pose problems for the 7th- and 8th-class-levels is important because of the significant relationship between PP and PS skills (Kar et al., 2010).

In the present study the posed problems were generally either easy or medium difficulty. Similarly, Özgen (2019) also evaluated the difficulty of posed problems and found that most tended to be of medium difficulty. Şengül and Katranacı (2014) determined that 80.95% of the candidates posed problems such as exercises and 14.05% posed simple problems. The same researchers (2015) concluded in their other study that 69% of the candidates wrote practice-type problems. Bayazit and Kırnep-Dönmez (2017) evaluated the problems in their studies according to three levels of difficulty: knowledge, practice, and reasoning. Of these, 10.3% were of the knowledge type, 67.6% were practice, and 22.1% were reasoning. Again, candidates tended to pose problems of medium difficulty. Peng et al. (2022) also found a similar result as teachers in their study tended to pose problems of low or medium difficulty. Sappaile and Djam'an (2017) suggested that teachers should perform exercises to pose problems that are neither difficult nor easy, encouraging students to think creatively. In these studies, it is observed that problem

posers generally prefer easy or medium-difficulty problems. This preference could be based on the idea that medium-difficulty problems are more suitable for enhancing students' success and encouraging them to think. Additionally, educators choose problems that match students' current knowledge and skills, ensuring they are neither too difficult nor too easy, thereby supporting the PS process. This trend provides opportunities for students to develop their creative thinking skills while minimizing the risk of decreasing motivation, which can occur with problems that are too hard or too easy.

About 93% of the posed problems were routine and thus PSM<sup>2</sup>Ts in my cohort were capable of posing routine problems. Baş and Özturan-Sağırılı (2016) also concluded that candidates pose routine problems with mathematical content. Similar findings were also published by Kaba (2018) and Bayazit and Kırnay-Dönmez (2017) who added that problems with a routine character can be solved by applying certain algorithms. These findings, taken collectively, suggest that PSTs do not go beyond the routine. This may be because the PSTs do not encounter enough PP activities. Crespo and Sinclair (2008) stated that PSTs rarely encounter the opportunity to pose their own problems, and they solve the problems that teachers pose or that are in the textbooks. However, experience is very important in PP, and it has been shown that those who have participated in PP studies are more successful than those who did not (Güveli, 2015). Or and Bal (2023) also concluded that students are more successful in solving routine problems and stated that more nonroutine problems should be included in mathematics classes and books. That the candidates from the present study mostly posed routine problems may be because such problems are mostly included in mathematics books. PP has been reported to have a marked effect on mathematical creativity (Hendrajaya et al., 2022) and is important for the posing of nonroutine problems. Thus, the more PP activities that are faced, the more mathematical creativity will increase, so that mathematics teachers will be able to deal with, and teach, more than simply routine problems.

In terms of PP, the final findings are to do with the construction of the actual problem. These included problems with the text of the problems, not paying attention to punctuation marks, not drawing geometric figures properly, giving unnecessary information, and not asking a single question in the root of the question. Barham (2020) also concluded that mathematical terminology was used in a limited or incorrect fashion. Kar and Işık (2015) reported that a teacher who participated in their studies could not form the root of the question. The poor use of mathematical terminology and the inability to create problem texts appear to be common deficiencies, perhaps because of deficiencies in mathematics concept-content knowledge and reading skills. Likewise, not paying attention to punctuation marks may be related to inadequate reading habits.

More than half of the PSTs (54.76%) did not make any effort to understand the problem in PS. This finding is concerning as the text-based nature of the problems requires reaching a conclusion after reading and understanding, and it has been shown that those who have problems with reading comprehension will also have difficulties in PS (Karakuş-Aktan et al., 2021). Proceeding to a solution without understanding the given problem may result in giving a wrong answer. Topbaş-Tat (2018) found that teacher

candidates did not pay any attention to these steps before being taught about PS, but subsequently the candidates both paid attention and realized the importance of understanding the problem.

No strategy for problem solution and no preparation for the solution process were presented by any of the PSM<sup>2</sup>Ts. This may be because mathematics teachers are result-oriented while solving problems (Gürbüz & Güder, 2016). Alternatively, they may not have been taught about the stages of PS throughout their education life or have forgotten them. However, PS strategies have been shown to be extremely important, accounting for 80% of PS success (Altun & Sezgin-Memnun, 2008). Unfortunately, mathematics teachers also have deficiencies in developing varying solutions to a single problem (Gürbüz & Güder, 2016). Çeker and Ev-Çimen (2017) reported that teachers use unplanned PS strategies without being aware of them. Teachers at the beginning of their profession used strategies remembered from undergraduate education, while senior teachers used strategies acquired through experience. Avcu and Avcu (2010) also concluded that strategies were used but were limited in terms of diversity. Altun et al. (2007) found that almost all questions were attempted using the single strategy of equation building, which may be due to the uniformity in our education system. These findings, taken together, highlight the importance of undergraduate education and that training about the stages of PS should be given. Interestingly, Guzman-Gurat (2018) reported that PSTs did use various PS strategies, perhaps because of differences in the study populations used. Most of the evidence points to deficiencies in the training of mathematics teachers, with Yayuk and Husamah (2020) showing that teacher training activities do not encourage students to plan while determining PS strategy. However, strategies should be used to implement the PS stages (Avcu & Avcu, 2010).

While logical verification of the result was presented for only one problem, evaluation of the validity of the result obtained in any of the other problems was not performed. PP studies include evaluation of the result obtained using a different strategy and this clearly did not happen in my cohort. Yılmaz (2019) found that just over a third (36%) of PSTs evaluated solutions using a different strategy. This proportion was much lower (8%) in the study of Yayuk and Husamah (2020), and disappointingly was only 2.3% in my study. The reason may be self-belief or self-confidence that they will not make mistakes. However, Şengül and Katrancı (2012) showed that candidates do not pay attention to or ignore the PS stages, and this may also have occurred in this study.

## Recommendations

The activities can be organized to help PSTs correctly distinguish between concepts like 'problem' and 'exercise'. In these trainings, the differences between problems and exercises should be highlighted, and the role of each concept in mathematics teaching should be explained. It is the classroom teachers who will lay the foundation of mathematics for the future general population. Thus, as the heart of mathematics is the idea of a problem, PS and PP, it is important for them to know the correct definition of 'a problem' and techniques for PS and PP. To achieve this, teachers should receive in-

depth training on these topics. Teacher education programs should not only cover PS and PP techniques but also provide practical examples of how these concepts can be applied in the classroom. Additionally, teachers should engage in hands-on exercises to develop these skills, which will help foster their ability to encourage creative PP in students. This type of training will enable teachers to lead more effective lessons and support students in developing their mathematical thinking skills.

It is noteworthy that no problems were posed in the learning domains of probability and DP. This results in an inadequate representation of these domains in mathematics instruction. Geçici and Türnüklü (2020) also concluded in their thematic analysis that only a few theses were written related to the DP learning domain and suggested that PP studies related to this field be conducted. I found that most of the problems were related to the NO-learning domain. The reasons for this bias should be investigated further, possibly through conducting interviews with PSM<sup>2</sup>Ts. I also suggest that there is a need for activities and studies into PP related to other learning domains. My other suggestion is to diversify PP activities in teacher training programs to ensure that PSTs gain sufficient knowledge and experience across all learning domains. In particular, more problems related to DP and probability should be incorporated to address the existing content gaps in these areas. By doing so, teachers will be better equipped to adopt a balanced approach to teaching and provide a more comprehensive mathematical education.

If teachers are only setting easy, medium difficulty, and routine problems, then the teaching of mathematics will be similarly limited. PP is a process of higher-level mental actions that includes PS, and metacognition should be employed for success (Bayazit & Kırnay-Dönmez, 2017). Thus, I recommend conducting more difficult and nonroutine PP studies to provide a broader range of success assessment, prepare students for high-level thinking, and develop their logical reasoning skills. Education faculties need to increase focus on this issue so that PSTs are more competent when starting their careers. Moreover, nonroutine problem examples should be given more place in mathematics textbooks, and both teachers and students should be faced with such question solutions.

Teacher education should also stress the teaching of PS strategies, considering the evident effect of PS on success. At this point, it is recommended to examine all levels, since the contribution of PS strategies to PS success is at different levels. This recommendation was made almost 20 years ago but the problem has persisted to the present, at all levels of the teaching of mathematics (Altun et al., 2007).

Some of the PSTs were unable to correctly draw geometric shapes when designing their problem. I suggest that PSTs should encounter dynamic geometry software more often during their education. Similarly, there are smart boards in our schools. Using them should enable the creation of neat drawings of related figures and objects. One of the reasons why the PSTs were unable to draw correctly may have been that they are used to using software or smart boards to help them and so drawing free hand was challenging. I conjecture that deficiencies in the text parts of the posed problems may be related to PSTs reading habits, it is recommended to conduct a study to test this idea. For example, PP and PS skills can be examined according to the frequency and type of

book read and the text produced by readers could be compared to the text produced by non-readers.

### Limitations

The posed problems were analyzed according to the evaluation path which was based on the existing literature. However, expert opinion was that the problems should also be evaluated linguistically. Although these findings are included in the study, the evaluation path used can be seen as limited in this aspect. To eliminate this limitation, it is recommended to conduct analyses according to different evaluation paths. The study was limited to 46 PSM<sup>2</sup>Ts. Since it is a qualitative study, this number was sufficient, but it would be beneficial to repeat the study with larger samples. Thus, for example, it is possible to see whether there are any problems related to learning domains where no problems are posed. The research can be seen as limited in the context of the rubric used to evaluate the solutions. Use of different rubrics may have produced different results so the optimal rubric for assessment should be investigated.

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## Genişletilmiş Türkçe Özet

Matematik öğretmenleri, matematiğin temellerini atacak kişilerdir. Bu nedenle, matematiğin kalbinin problem, problem çözme ve kurma fikri olduğunu göz önünde bulundurursak, öğretmenlerin problemin doğru tanımını ve problem çözme ile kurma tekniklerini bilmeleri önemlidir. Öğretmenlerin hem problem çözme hem de problem kurma konularında bilgi sahibi olmaları, öğretmen adayları iken kazanmaları gereken bir durumdur. Henüz mesleğe başlamamış olan adayların yeteneklerini test etmek ve geliştirmek, matematik derslerinin kalitesini artırmak ve bu konuları etkili bir şekilde uygulayabilmek ve öğretmek için öğretmen yetiştirme sürecinde alınması gereken önlemleri anlamak açısından önemlidir. Bu sebeple bu çalışmanın birinci amacı, 'problem' kavramına yönelik algıları ortaya koymaktır. İkinci amaç ise kurulan ve çözülen problemleri incelemektir. Bu hedeflere ulaşmak için aşağıdaki araştırma soruları (AS) cevaplanmaya çalışılmıştır:

**AS1.** Öğretmen adaylarının problem kavramına yönelik algıları nelerdir?

**AS2.** Öğretmen adaylarının problem kurma durumları nasıldır?

**AS3.** Öğretmen adaylarının problem çözme durumları nasıldır?

Çalışma, temel nitel araştırma ilkelerine göre tasarlanmıştır. Nitel araştırmalarda veriler olarak kelimeler kullanıldığından (Braun & Clarke, 2013), bu çalışmada problem kavramının anlamı, katılımcıların düşünceleri ve ifadeleri üzerinden incelenmiştir. Ayrıca, tüm nitel araştırmalar bireylerin dünyalarını ve yaşamlarını nasıl anlamlandırdıklarına ve anlamın nasıl inşa edildiğine odaklanır. Temel nitel araştırmanın birincil amacı, bu anlamları ortaya koymak ve yorumlamaktır. Bu amaç doğrultusunda veriler; gözlemler, görüşmeler veya doküman analizi yoluyla toplanır (Merriam & Tisdell, 2016). Bu çalışmada, problem kavramının anlamı, problem çözme ve kurma durumları, toplanan belgeler aracılığıyla incelenmiştir. Çalışma grubu, Türkiye'deki bir devlet üniversitesinin Eğitim Fakültesinde son sınıf öğrencisi olan 46 ortaokul matematik öğretmeni adayından oluşmaktadır. Veriler, 'Problem, Problem Kurma ve -Çözme Formu (PPKÇF)' ile toplanmıştır. PPKÇF iki bölümden oluşmaktadır. İlk bölümde, öğretmen adaylarının problem kavramına yönelik algılarını belirlemek amacıyla 'Problem nedir?' sorusu yer almaktadır. İkinci bölümde ise katılımcılardan ortaokul seviyesinde bir problem kurmaları ve kurdukları bu probleme çözüm sunmaları istenmiştir. 'Problem' kavramına ilişkin veriler, içerik analizi yöntemiyle değerlendirilmiştir. Kurulan problemler, bir değerlendirme yol haritası kullanılarak analiz edilmiştir. Çözülen problemler ise bir rubrik kullanılarak değerlendirilmiştir.

Sonuçlar, 'problem' kavramının, bireyin karşılaştığında hoşlanmadığı, analiz ve mantık gerektiren ve ayrıca çözülmesi gereken bir soru olarak algılandığını göstermiştir. Kurulan problemler matematiksel ve çözülebilir niteliktedir. Veri işleme ve olasılık öğrenme alanlarına ilişkin problem kurulmamıştır. Genellikle beşinci sınıf seviyesinde, kolay ve orta zorlukta problemler oluşturulmuştur. Problemlerin neredeyse tamamı (%93) rutin

problemlerdir. Sonuç olarak, öğretmen adayları çözülebilir rutin matematiksel problemler kurmuşlardır. Benzer şekilde, bu problemlerde matematiksel terminoloji kullanımı ve problem metni oluşturma konusunda eksiklikler bulunmaktadır. Problem çözme sürecinde ise, öğretmen adaylarının yarısından fazlası problemi anlamaya odaklanmamış, hiçbir problem çözmede stratejisi seçilmemiş ve yalnızca problemlerin kısmi mantıklı değerlendirmeleri yapılmıştır. Özetle, problem çözme aşamaları dikkate alınmadan sonuca yönelik çözümler yaygın bir şekilde görülmüştür.

Kurulan problemler, mevcut literatüre dayalı bir değerlendirme yol haritasına göre analiz edilmiştir. Ancak, uzman görüşleri, problemlerin dilsel açıdan da değerlendirilmesi gerektiği yönündedir. Bu bulgular çalışmada yer almış olsa da kullanılan değerlendirme yol haritası açısından bu çalışma sınırlı olarak görülebilir. Bu sınırlılığı ortadan kaldırmak için farklı değerlendirme yol haritaları kullanılarak benzer yapıda bir çalışmanın yürütülmesi önerilmektedir. Çalışma, 46 öğretmen adayı ile sınırlıdır. Nitel bir çalışma olduğu için bu sayı yeterli olmuş olsa da daha geniş örneklerle çalışmanın tekrarlanması faydalı olacaktır. Böylece, örneğin, hiç problem oluşturulmayan öğrenme alanlarına ilişkin herhangi bir problem yazılıp yazılmayacağı görülebilir. Araştırma, çözümleri değerlendirmek için kullanılan rubrik açısından da sınırlı olarak değerlendirilebilir. Farklı rubriklerin kullanılması farklı sonuçlar doğurabilir, bu nedenle değerlendirme için farklı rubriklerin kullanılması önerilmektedir.

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