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Baş Editörden

“Eğitim Programları ve Öğretim” alanının öncü dergisi olan “IJOCIS”in 14. Cilt 2. Sayısında eğitim-öğretim ve öğretim programlarıyla ilgili birbirinden değerli çalışmalar yer almaktadır. Sayımıza katkıda bulunan tüm yazarlarımızı çalışmalarından dolayı tebrik ediyor ve başarılarının devamını diliyorum. Ayrıca değerlendirme tekliflerimizi geri çevirmeyip, makaleleri titizlikle inceleyen alanlarında uzman akademisyenlerimize, çalışma ekibimize ve editörler kuruluna dergimizin yayımlanması için yapmış oldukları özverili katkılarından dolayı çok teşekkür ederim. Çalışma ekibimize katılan İstatistik Editörümüz Doç. Dr. Cennet Göloğlu Demir’e içten teşekkürlerimi sunarım.

2024 yılının son sayısını yayımladığımız dergimizde çeşitli konu alanlarında çözüm getiren bakış açısıyla değerlendirme yapılan birbirinden değerli makaleler yer almaktadır. “Ortaokul Öğrencilerinde Okula Bağlılık ve Öğrenme Sorumluluğu”, “Lisans Öğrencilerinin Sorgulama Becerileri ve Yordayıcıları”, “Sınıf Öğretmenlerinin Mesleki Gelişiminde Üniversite-Okul İş birliği Modeli” ve “Türkiye Yüzyılı Maarif Modeli Ortaokul Matematik Dersi Öğretim Programının SOLO Taksonomisine Göre Analizi” konularında çalışmalara yer verilmiştir.

Dergimizin diğer uluslararası veri tabanlarında da dizinlenmesi için titizlik, ciddiyet ve tutarlılıkla çalışmaya devam ediyor, Eğitim Programları ve Öğretim alanında çalışan ülkemizdeki ve dünyadaki tüm eğitimcileri dergimize bilimsel niteliği yüksek ve özgün çalışmalar göndermeleri için çağrıda bulunuyoruz.

Esenlik dileklerimle...

Doç. Dr. Aslıhan Selcen BİNGÖL

From the Editor-in-Chief

Volume 14, Issue 2 of "IJOCIS", the leading journal in the field of "Curriculum and Instruction", contains remarkable studies on education and curriculum and instruction. I would like to congratulate all the authors who contributed to our issue for their work and wish them continued success. I would also like to thank our expert academicians, editorial team, and the editorial board for their devoted contributions to the publication of our journal. I would like to express my sincere thanks to our Statistical Editor Assoc. Prof. Dr. Cennet Göloğlu Demir for joining our team.

In the last issue of 2024 of the "International Journal of Educational Curriculum and Instructional Studies", there are valuable manuscripts that cover a wide range of topics and evaluate solution-oriented perspectives. Studies on “School Engagement and Learning Responsibility of Middle School Students”, “Undergraduate Students' Inquiry Skills and Determining Predictors”, “University-School Cooperation Model for The Professional Development of Primary School Teachers”, and “Analysis of Türkiye Century Maarif Model Secondary School Mathematics Curriculum According to SOLO Taxonomy” are included in this issue.

We continue to work with diligence, seriousness, and consistency without expecting anything in return for IJOCIS to be indexed in other reputable and global citation databases. As always, we invite all educators working in the field of Curriculum and Instruction to submit original and high-quality studies that align with the focus of the journal.

With my best regards.

Assoc. Prof. Dr. Aslıhan Selcen BİNGÖL

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University-School Cooperation Model for the Professional Development of Primary School Teachers*

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Abstract

The aim of the study is to increase primary school teachers' attitudes regarding professional development through the university-school cooperation method, support their professional development, and create a university-school cooperation model. The study was carried out via embedded experimental design among mixed research methods. In total, 49 primary school teachers in the study working at the primary schools in three different settlement areas, i.e., village, district and city, that have a disadvantageous position in Eskişehir province. As for the locations and socio-economic status of the schools where the attendant primary school teachers work, it can be stated that these schools are disadvantageous with regard to participation in professional development activities. Within the study, a professional development attitude scale and an in-service attitude scale were applied to the teachers at the beginning and end of the training process in the data collection stage. Then, the teachers' opinions about the professional development trainings were obtained and the training diaries, which were kept in this process by the teachers, were used. At the end of the study, it was found out the fact that there was a positive difference in the attitudes of the primary school teachers regarding the Professional development and in-service training thanks to the professional development activities performed. It was further found out the fact that the teachers considered the performed activities useful, productive and efficient and a model was revealed for professional development carried out within the scope of university-school cooperation.

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Introduction

A qualified educational system and the teachers who will operate such a system are required in order to be a developed country and be able to compete with the other countries in the globalizing world. No matter how the physical conditions of the schools, curriculum, lesson tools and materials and the environmental conditions for the students are enhanced today, the educators agree that the changes carried out do not create the requested effect on the quality of the training without the qualified teachers who can constantly refresh their knowledge, and that this is one of the major problems of the educational system in our country, in particular. Therefore, teachers need training to monitor technology and recent approaches and improve themselves constantly as well as increase their competencies in their fields (Bayram, 2010). Furthermore, the training received by the teachers before their service loses its actuality within a very short time or based on the actual developments, the teachers need different knowledge and skills, which are not taught during their undergraduate study (Ministry of National Education [MoNE], 2017). The teachers are in need of professional training due to the changes in the expectations regarding the quality of education, social requirements, the paradigms in learning and teaching and the student profiles, the developments in information and communication technologies as well as the impacts of such developments on teaching and learning activities (Odabaşı, 2009).

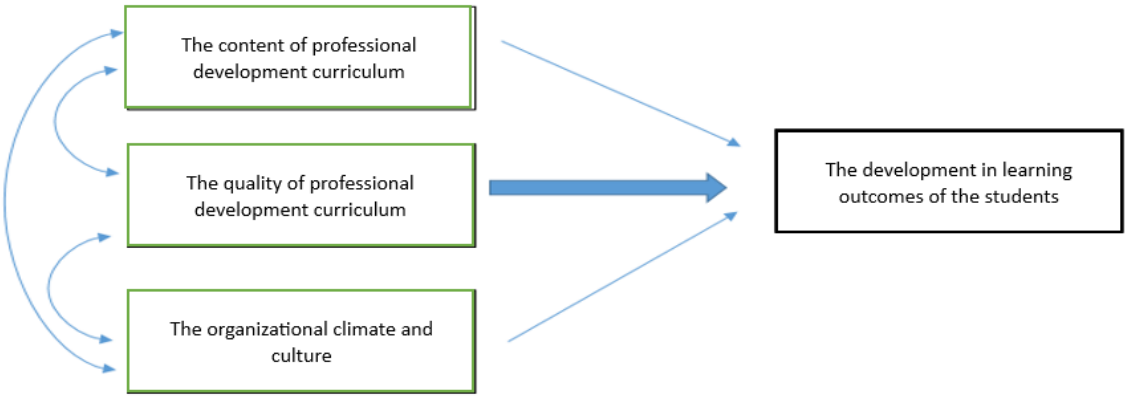
Professional development is encountered as a roof concept of lifelong learning. Professional development is an umbrella concept that contains following concepts such as in-service training, career development, personnel development and human resources development (Elçiçek, 2016; Bümen et al., 2012). Professional development concept is identified in different ways by the different organizations and the researchers. Accordingly, some of the definitions can be listed as follows:

- The sum of natural learning experiences and the conscious and planned activities that intend to provide direct or indirect benefit to the individuals, group and the school and that will contribute to the quality of the training within the classroom (MoNE, 2017).
- Maintenance of learning processes by the teachers throughout their careers (Broad & Evans, 2006).
- Conscious and planned learning experiences by the teachers, either directly or indirectly, to increase the qualifications of the students and the school (Day, 1999).
- Constant monitoring of the developments by the individual regarding his/her profession once the individuals start their service and adapting to such developments (Hamarat, 2002).
- Systematic efforts to make amendments to the classroom activities, attitudes and beliefs of the teachers and the learning outcomes of the students (Guskey, 2002).
- The process includes activities such as courses, seminars etc., which are organized to train the teachers during the in-service training process (Adey, 2004).

Considering these definitions for the professional development of the teachers, it can be said that definitions of professional development emphasize being planned, increasing in the qualities of learning and self-development of the teachers in their fields. The fundamental objective of professional development is to make positive changes in the learning outcomes of the students. The factors considered significant in the professional development for the fulfillment of this objective by Guskey and Sparks (1991, p.73) are presented in Figure 1.

Figure 1

Significant Factors for Professional Development (Guskey & Sparks, 1991, p.73)



As can be seen in Figure 1, professional development incorporates the content of the professional development curriculum, the quality of the professional development curriculum, organizational climate and culture, as well as the development of learning outcomes of the students. Accordingly, the content of the professional curriculum should respond to the training requirements of the teachers. The quality of the professional development curriculum is closely related to the presentation style of the curriculum. Organizational climate and culture are identified through the confidence and support provided for the teachers in this process. All these processes are interrelated and they have a direct impact on the learning outcomes of the students. The learning outcomes considered in this process incorporate the entire cognitive, emotional and psychomotor behaviors of the students (Guskey & Sparks, 1991).

Professional development activities help to increase student success by improving the qualifications of the teachers, increasing the business satisfaction and creating a positive classroom climate. In many studies conducted, it is put forward that the professional development of the teachers is the leading factor that determines the learning outcomes and performance of the students among the intramural factors (Caena, 2011). Guskey (2002) identified the change of the teacher in the professional development process as the change in the classroom activities of the teacher, the change in the learning outcomes of the students and the change in the beliefs and attitudes of the teacher. These activities must be intentional, constant and systematic so that professional development activities could make a mark. Accordingly, the characteristics can be described as follows (Guskey, 1999):

- Professional development as an intentional process: Professional development is not a series of random and irrelevant activities without a concrete direction or intention. The intentions in the professional development ensure the selection of the content and the materials, design of the process and the identification of the measurement and assessment procedures. It is essential to start with the description of the open target, make sure that the targets are valuable and determine how to evaluate the targets so that professional development processes are intentional.
- Professional development as a constant process: The extension of the knowledge base in the educational field, how individuals learn and the increase in insight regarding the structures and procedures that contribute to the effective learning environments require the teachers to follow this recent knowledge and approaches very closely.

Therefore, educators must be constant learners, analyze the efficiency of their service all the time, think about the current practices, make adaptations when things do not go well and discover new alternatives and improvement opportunities all the time.

- Professional development as a systematic process: True professional development is a systematic process that pays attention to the change for a long time and that considers all levels of the organization. According to the systematic approach, professional development is for all individuals that affect the learning process of the student.

Requirements, content, implementation and assessment stages in the professional development models are the keystone of all models. It is essential to plan professional development activities rather regardfully and systematically so that the same could meet the current requirements, be useful for any training stakeholders and that the influence of the issues that prevent professional development could be minimized. Odabaşı (2009) describes the planning of professional development in four stages i.e., identification of the requirements, configuration of the content, designing the implementation and assessment. In the stage regarding the identification of the professional development requirements of the teachers, training requirements are identified regarding the areal, pedagogical, administrative and personal professional development fields of the teachers. A requirement identification study is carried out to determine the learning and professional requirements of the students and the teachers (MoNE, 2007). In the Teachers Strategy Document by the Ministry of National Education, identification of the requirements is emphasized as follows: "…to carry out a performance assessment system which will be performed periodically in order to determine the developmental needs of the teachers and increase the quality of personal and professional development activities since the beginning of the probationary period" (MoNE, 2017, p. 10). Considering these sub-goals, it is underlined that professional development studies must be designed by looking directly at the teacher requirements. Moreover, intermural cooperation is also needed in professional development activities. This is further stated in 2023 Vision Document. In this context, it is anticipated to create a new understanding, system and model of professional development, thereby supporting the professional development activities of the teachers and school directors by means of faculties of education. In this respect, it is cited that professional development is planned to be reconfigured through the following steps such as (MoNE, 2018):

- the establishment of face-to-face, formal and/or distance learning cooperation with the universities and NGO's to constantly support the professional developments of the teachers and school directors,
- launch of specialization program for teaching profession, transformation of in-service training activities into the accredited certification programs by means of the universities; and
- the launch of sub-branch programs at postgraduate level for the teachers in the required fields.

Despite all these planning activities, it seems impossible to talk about the existence of efficient professional development activities considering the in-service training requirements for the primary school teachers. In fact, the research findings indicate that serious problems are encountered in the current system regarding the primary school teachers' professional development. The problems experienced by the primary school teachers during the in-service training process are listed by Sıcak and Parmaksız (2016) as follows:

- Not to be informed to what and how to create the contents of the in-service training curriculum,
- Failure to elicit the ideas from the teachers in the needs analysis process,
- Inadequacy of the methods and techniques used in in-service training and the failure to arouse interest,
- Failure to make assessment following the in-service training activity,
- Lack of incentive elements such as participation certificates, rewarding etc., after the in-service training activity.

The in-service training of the primary school teachers, who carry out a major function of the educational system, are just as important as their pre-service training. The primary school teachers, who ensure development of the children not only academically but also socially, emotionally and psychologically and that contribute to the versatile development of the same, are required to improve themselves constantly, either personally or professionally. This is possible only through constant and efficient professional development. With this study, it is considered significant to make contribution to the professional development of the primary school teachers.

In the study, it is anticipated to increase the attitudes of primary school teachers regarding professional development through university-school cooperation, to support their professional developments and create and maintain environments for their professional development and disseminate the university-school cooperation model following the study and pave the way for the pursuit of recent models. In this context, it will be possible to increase the awareness of the primary school teachers about the professional development through the seminars to be organized within the scope of professional development, to satisfy their educational needs regarding the issues they need, to ensure that they acquire new and current knowledge and skills and pave the way for them to make efforts about constant professional development. This is why we studied in the research with the primary school teachers who work in the disadvantageous territories in terms of working conditions and access to professional development opportunities in the villages, districts and cities. In this manner, it is anticipated that primary school teachers make use of university environment, take part in professional development activities, raise awareness about professional development, acquire Professional knowledge and skills and create insights for their professional development. Thanks to this study, it will be possible for the teachers who take part in the training to provide added value for their environments as much as themselves. Because, it is anticipated that the teachers who work in the rural areas also improve their environments while they enhance their schools.

In this respect, the aim of the study is to increase the primary school teachers' attitudes towards professional development through university-school cooperation, support their professional development and create a university-school cooperation model. In this regard, these questions are intended to be responded:

1. What is the impact of professional development curriculum prepared for primary school teachers on the teachers' attitudes regarding the professional development?
2. What is the impact of professional development curriculum prepared for primary school teachers on the teachers' attitudes regarding in-service training?
3. What are the primary school teachers' opinions about the prepared professional development curriculum?

4. What kind of a model can be designed that will enable university-school cooperation in the primary school teachers' professional development?

Method

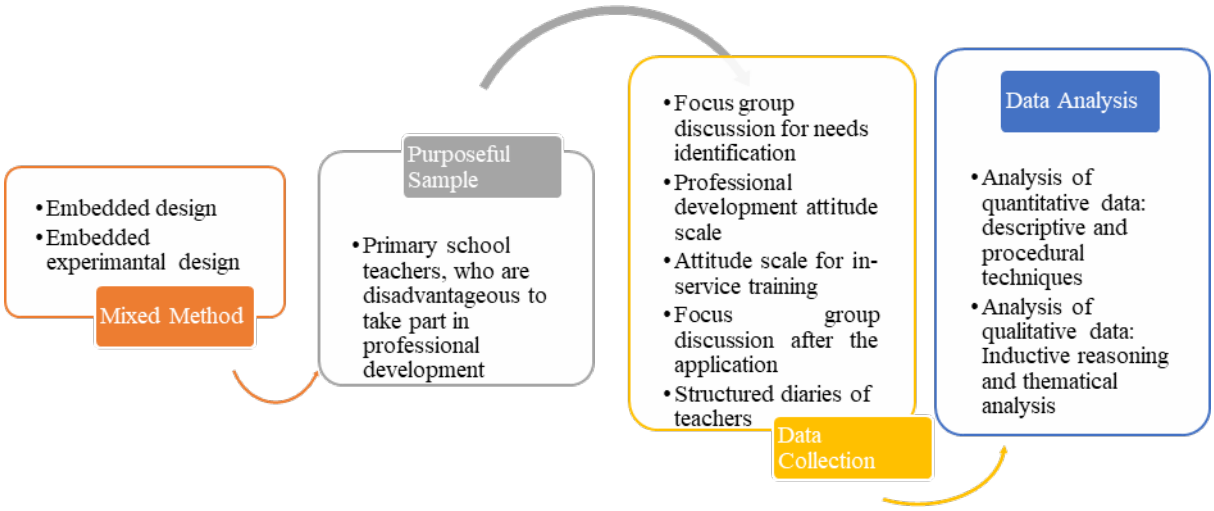
In the context of this section, the research design, participants, needs identification process, and experimental process are addressed. In addition, data collection instruments are introduced in this section. The data analysis section is also explained in detail.

Research Design

In the study, embedded experimental design was used among mixed research methods. In the embedded mixed design, the researcher initially creates a quantitative or qualitative data set, and then makes use of the other quantitative or qualitative data set that supports the previous data set (Creswell and Plano Clark, 2007). In this study, embedded experimental design was used as part of embedded mixed design. The research design adopted in the study is indicated in Figure-2.

Figure 2

Research Design



Participants

Criterion sampling method, which is one of the purposive sampling types, was used to determine the participants. In this context, being a classroom teacher and serving in a disadvantageous position in the village, district and city center were decided as the criteria so as to identify the participants in the study. Accordingly, the characteristics of the participants are shown in Table 1.

Table 1

Characteristics of the participants

Characteristics of the participants	*f*
Gender	
Female	39
Male	10
Work place	
Village	16
District	16
City center	17
Seniority	
0-10 years	24
11-25 years	25
Graduation Degree	
Bachelor's	44
Postgraduate	5

As seen in Table 1, in total 49 primary school teachers (39 females and 10 males) took part in the study. Sixteen primary school teachers work in the villages, 16 teachers work in the district and 17 of them work in the city center. Twenty-five primary school teachers in the study have a length of service for 11-25 years. Once again, 44 attending teachers have bachelor's degree. Thirty-nine teachers took part in the study due to teachers who failed to take part in the study during the implementation of the tests.

Needs Analysis

A needs analysis process was designed in order to determine the subjects in which primary school teachers need professional development training and when they would like to receive such training. In this respect, a focus group discussion was carried out with seven primary school teachers. Teachers participating in the focus group interview work in village, district and city schools as easily accessible sampling.

As well as the questions regarding the contributions of the in-service training to the teachers, the opinions of the teachers regarding teaching profession and the professional development, educational needs of the teachers, the problems encountered in the previous training received by the teachers and the solution suggestions regarding the same were included in the focus group discussion performed thereof. Following the inductive analysis, the perceptions of teachers regarding the professional development within the scope of the opinions of the teachers about the professional development, assessment of the professional development activities and the suggestion themes were elicited. The teachers identify the professional development as keeping up with the times, following the current developments and the literature. The teachers who underline the fact that the teachers, who take part in the developmental training must be strictly evaluated and their ideas must be elicited, emphasize that an assessment should be made based on the theme of the training through the preparation of a lesson plan, performance of a small Project regarding the training, responding to a survey, participation to written exams and alternative assessment techniques and the opinions of the teachers should be elicited. As part of the suggestions thereof, the teachers recommend that the trainings they took part should have value. In their opinion, the value

expectation, which may take the form of a certificate, participation document etc., should be in the form of progress in the profession and scoring points. Considering the opinions about subjects in which the teachers need in-service training, it was revealed that the teachers need training much more in artistic training, games, developing materials, technology, drama, communication with the family, classroom management and philosophy for the children. The problems encountered by the teachers about the professional development are gathered under the themes of problems about the profession and the problems regarding the professional development. Teachers address the problems in the profession as the insufficient salary, working conditions and low status. According to the teachers, failure to design the professional development activities by considering the needs of the teachers is the leading problem. As such, it is revealed that participation in the training against signature, which isnot directly needed by the teacher, adversely affects the enrollment motivation of the teachers. The teachers further stated that the quality of the training is weak in general, the trainers are not specialists in the relevant field in some cases and that this also reduces the quality. Some of the teachers informed that they had problems to get permission from the managers in some special cases, such as postgraduate education, and that they lack the sufficient financial return to take part in scientific activities and congresses. It was further emphasized that the multidisciplinary structure of primary school teaching increases the fields of themes requiring training and this makes the professional development process difficult for this reason.

Considering the analysis results of the data from the focus group discussion and the results of the studies conducted in the literature in this respect, a training need identification form was created. The personal information about the teachers, training subjects, the time and place of the training, the problems encountered, open and-closed-ended questions regarding the teachers' expectations from the in-service training activities are included in this form. This form was applied to the teachers in the professional development training before starting the research.

The data obtained by means of the training needs identification form was analyzed via the descriptive statistical methods, and interpreted by means of the frequency tables. In the light of the outcomes obtained thereof, a curriculum outline was created by revealing the subjects in which the primary school teachers need professional development training and when they would like to receive such training. Accordingly, it was found out that 38 teachers wanted to receive the training in the afternoon on weekdays, 10 teachers wanted to receive the same in the seminar period, and one teacher wanted to have the same in the morning on weekdays, at the weekend and mid-term breaks. It was observed that 31 teachers had problems with the compulsory nature of the in-service training and 34 teachers had the similar problems with gathering signatures for participation to the training. 31 teachers stated that they had problems due to the failure of the trainer to be an expert in their fields, 26 teachers stated to have problems since the training was not useful, efficient and entertaining and 25 teachers informed to have partial problems due to the failure to determine the contents of the training regarding the requirements. It was observed that the training topics, which are mostly preferred by the teachers, are the following themes such as the use of artistic activities in the lessons, STEM-STEMA implementations, the use of game activities in the courses, child psychology and drama. Moreover, it was found out that village teachers want to receive training most about mind and intelligence games, district teachers wanted to receive training about mind and intelligence games, scientific and experimental implementations and coding and the city

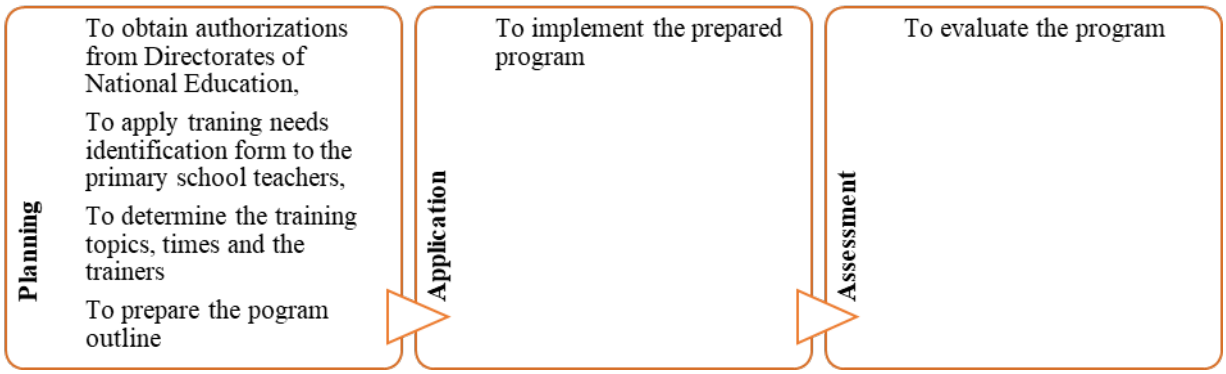
teachers wanted to have training about music (Orff) and story-telling. While the choices of the teachers are reflected in the training curriculum of the study; arrangements were made according to the choices of the teachers who serve in the village, district and city schools and individual and joint training environments were designed accordingly. Opportunities regarding the access to the leading experts are also considered while identifying the training topics to be addressed in the sessions.

Experimental Process

Thanks to the data collected from the teachers via training needs identifications form, the subjects in which the teachers need training were identified and a curriculum outline was prepared. Accordingly, the professional development model anticipated under the study is indicated in Figure 3.

Figure 3

Professional Development Model



As seen in Figure 3, the anticipated professional development model was carried out considering the planning, application and assessment stages. Initially, the training activities were prepared considering the needs of the primary school teachers once the required authorizations were obtained at the planning stage. Then, the leading expert training staff to carry out the training activities were identified and a program was created to carry out the training activities at the time zones suitable for the teachers. Experts in the fields of primary education teaching, drama, mathematics teaching, science education, curriculum and instruction provided training in line with the needs of primary education teachers. The curriculum which was prepared at the application stage was put into practice on the determined days and at the times in the universities or the schools. Finally, the efficiency of the implemented curriculum was evaluated at the assessment stage. The total of these trainings was three hours each. The training was conducted by an expert in the field. The curriculum which was prepared in this respect is included in Table 2.

Table 2

Training Activities

Location of the school	*Name of the training activity*	*Place of training*	*Number of participants*
Village	Learning obstacles	University	16
Village	Active Learning Techniques	School	16
District	Drama at primary school	School	16
District	Mind and Intelligence Games	University	16
City center	Music, Movement, Statement based on Orff Approach	University	17
City center	STEM-STEMA Applications	School	17
Joint activities	Teacher's qualifications in the changing society and professional development of the teachers	University	44
	The use of artistic activities at the primary schools	University	39
	Learning through games at the primary schools: Let's play together	University	39

Data Collection

Within the research process, the data were collected through the personal information form, focus group discussion form for the identification of the needs, training needs recognition form, professional development attitude scale, in-service training attitude scale, teachers' diaries and post-application focus group discussion. In this context, while the focus group discussion form regarding the identification of the needs and the training needs identification form were used to plan the training activities, the professional development attitude scale and in-service training attitude scale were used as pretest and posttest. The diaries of the teachers and post-application focus group discussion were used to disclose the teachers' opinions and assessment about the professional development training.

Data Collection Instruments

Various data collection instruments within the scope of quantitative and qualitative research methods were used to collect the data of the study. Personal information form, focus group interview form, training needs identification form, professional development attitude scale, attitude scale for in-service training, structured diaries of the teachers, and post-application focus group interview form were used in this study. The data collection instruments, which were used to collect the data, can be described as follows:

Personal Information Form

This form was used to identify the demographic information of the teachers who took part in the study. Closed-ended questions were included in the form. These questions were related to gender, place of duty, length of service and educational background.

Focus Group Interview Form for the Identification of the Needs

First, a draft interview form was created and this form was presented to three experts. The form was finalized according to the opinions of the experts. Focus group interview form

consists of eight semi-structured questions and the sub-questions are included under these questions.

Training Needs Identification Form

Designed both in accordance with the data obtained from the focus group discussion for the identification of the needs and the data obtained from the literature, the draft training needs identification form was presented to three experts and it was finalized according to their opinions. Incorporating 43 questions, the form consists of two sections; i.e., a) personal information and b) in-service training information. In the in-service training information section, open-ended, Likert-type and ordinal questions are included about which day and what time the teachers will participate in the training, the problems encountered in the training which the teachers have participated up to now, the required training topics and the expectations regarding the training to be provided as part of the study.

Professional Development Attitude Scale

Professional Development Attitude Scale was used as a pretest and posttest to detect the primary school teachers' attitudes regarding the professional development. The scale employed in the study was developed by Özer and Beycioğlu (2010). Developed as 5-point Likert scale, this scale contains a single factor and 6 items. The total reliability coefficient of the scale is .78. The reliability coefficient was found as .75 in this study.

Attitude Scale for In-Service Training

As part of the study, an In-Service Training Attitude Scale was used as a pretest-posttest to determine the attitudes of the primary school teachers regarding the in-service training. This scale used in the study was developed by Yaman and Tekin (2010). Developed as 5-point Likert scale, this scale consists of 29 items and four factors i.e., "attitude towards inefficiency, attitude towards expectation, attitude towards efficiency and attitude towards valuation." The scale stands for the 51.68% of the total variation. The reliability coefficient of the scale regarding the first factor, the second factor, the fourth factor and the fourth factor is respectively .89, .88, .80 and .93. The total reliability factor of the scale was found as .93. The total reliability coefficient was found as .88 in this study.

Structured Diaries of The Teachers

The diaries kept by the teachers, who took part in the professional development training, in which the teachers reflected the research process and the experiences they had during the research process, are identified as the diaries of the teachers. In the diaries provided to them at the end of each training within the scope of the study, the teachers included their feelings, thoughts and experiences regarding the activities performed for that day.

Post-Application Focus Group Interview Form

A focus group interview form was developed in order to reveal the primary school teachers' opinions and assessments regarding the professional development training conducted within the scope of the study. The draft form developed was submitted to three experts' opinions and it was finalized once the essential adjustments had been made. The form consists of five semi-structured main questions and the inspection questions included under these questions. Several questions with respect to past experiences regarding the professional development training, the opinions about the trainings within the scope of the study, the reflections of the

applied curriculum in the professional development and the suggestions are included in the form, which was applied to eight primary school teachers who work in the village, district and city center and that took part in the discussion voluntarily.

Data Analysis

In the study, the quantitative data were collected by means of personal information form, attitude scale for professional development and the attitude scale for in-service training. Among descriptive statistical techniques, frequency was used to analyze the personal information form. Skewness and Kurtosis values for normality were considered for the analysis of the scales. It was concluded that such values were .37 and .74 (Büyüköztürk, 2013). Therefore, among the parametric tests, the t test was used for the dependent samples for the analysis of the scales used in the study.

The data of the focus group discussion, the structured diaries of the teachers and post-application focus group discussion data carried out for needs identification were analyzed through thematic analysis. In the thematic analysis process, the stages of transforming the researcher into data, samples of the initial codes, searching for themes, examining the themes, examining and naming the themes, and writing reports (Braun and Clark, 2006) were used. In this way, the research data was first read, codes were extracted from the data, themes were created by bringing the codes together, then the relationship between the codes and themes was reviewed, the themes were given their final form and the research was reported. In order to ensure the validity and reliability of qualitative data in the research, different data collection tools were used together, participant confirmation was obtained, the findings were compared with the literature, and qualitative and quantitative data collection tools were used together in the research (Erlandson vd., 1993). Following the analyses, the findings were presented through direct quotations. The code names, which were allocated by the teachers on their own, were used to submit such quotations.

Results

In this chapter, the findings revealed during the research process are included in accordance with the sub-goals.

Attitudes of the Primary School Teachers about the Professional Development

As part of the study, the findings concerning whether or not there is a significant difference in the primary school teachers' professional development were obtained through the implementation of the professional development attitude scale as a pretest-posttest. As such, the results of the t test concerning the teachers' attitudes to the professional development are included in Table 3.

Table 3

The Results of the t Test for the Independent Groups Regarding the Attitude Scale for the Professional Development

	N	x̄	ss	t	p
Pretest	39	25.02	3.95	-2.362	.023
Posttest	39	26.89	2.97		

As is seen in the Table 3, while the average score of primary school teachers for the pretest regarding their professional development is 25.02, the average score for the posttest is 26.89. When it is tested with the t test if the difference between these obtained averages is significant, it was revealed that the difference is significant at .05 level (p=.023). Accordingly, it was found out that the training activities performed have a positive impact on the attitudes of the teachers regarding professional development. Eta square value was used to calculate the size of the effect. In this context, eta square was calculated as (η2= 0.12). According to Cohen (1988) (0.10 small, 0.30 medium and 0.50 large), it was concluded that the effect of the performed training activities was small.

Attitudes of the Primary School Teachers regarding in-Service Training

The findings about whether there is a significant difference in the attitudes of the primary school teachers regarding the in-service training, were obtained through the implementation of the attitude scale for in-service training as a pretest-posttest. As such, the results of the t test regarding the attitudes towards the in-service training are indicated in Table 4.

Table 4

The Results of the t Test for The Dependent Groups Regarding the Attitude Scale for The In-Service Training

	N	x̄	ss	t	p
Pretest	39	118.79	10.54	-3.106	.004
Posttest	39	126.58	10.99		

As is seen in Table 4, while the average score of primary school teachers for the pretest regarding in-service training is 118.79, the average score for the post-test is 126.58. When it is tested with the t test if the difference between these obtained averages is significant, it was revealed that the difference is significant at .05 level (p=.004). Accordingly, it was found that the training activities performed have a positive impact on the attitudes of the teachers regarding in-service training. Et square value was used to calculate the size of the effect. Following this calculation, et square was calculated as (η2= 0.23). Once again, it was concluded that this effect is small.

Opinions of the Primary School Teachers regarding the Training Processes

The primary school teachers who attended the professional development training completed the structured diaries regarding the training processes at the end of each training. The findings obtained from the diaries were collected under the following themes such as the assessment of the training in terms of professional development, opinions about the training, opinions about the trainers and recommendations.

The primary school teachers' opinions regarding the assessment of the training in regards to professional development was presented under the following sub-themes of knowledge, skill, raising awareness, emotional characteristics and implementation. These sub-themes and the codes created there are indicated in Table 5.

Table 5

The Opinions of The Teachers Regarding the Assessment of The Training in Terms of Professional Development

Information
Learning the methods and techniques
Interdisciplinary approach
Joint problems
Learning by practicing and experience
Refreshing knowledge
Being informed about the efficient teaching of lessons
Skill
Decision-making
Creative thinking
Group cooperation
Raising Awareness
Emphasis on the teaching profession
Breaking down the prejudices
The importance of learning by joy
The importance of the games
Emotional characteristics
Positive perceptions about the profession
Feeling valuable
Ensuring motivation
Implementation
Using the activities in the classes
Meeting in different projects

Among the teachers, Nesli who stated that her prejudices were broken down following the trainings she received and that she learnt different methods and techniques, reported her opinions under STEM activity as follows:

> *"I took part in a training regarding STEM for the first time. Everything was told very clearly. It was efficient and enjoyable. The word ''STEM'' was difficult and complex for me. In fact, I understood that it is easily applicable in the class. My prejudices about the issue were broken down."*

Furthermore, among the teachers, Emel, who stated that she found the activities in training enjoyable and that she learned by practice and experience, reported her opinions as follows: *"It was an enjoyable and at the same time a didactic activity. We learne where we can use these activities by doing so many activities."* One of the teachers who remarked the importance of refreshing the knowledge addressed the issue as follows: *"It was good to remember what I already knew about learning obstacles."* Another teacher whose code is 1453 and who stated that he will make use of the activities in his classes, emphasized the importance of the artistic

activities and delivered his opinion as follows: *"The activity which I attended helped us to have a different perspective about the importance of the artistic activities. I believe that I will use the artistic activities much more efficiently in my classes following this activity."* Once again, the same teacher built on cooperation with the group and creative thinking further including the following statements in his opinions:

> "*In the activity, in which I took part, I saw that much more creative ideas were generated in the group work. I realized at the end of this activity, which I initially thought to be a simple one, that there were very good sharing opportunities thanks to the combination of different ideas and that effective projects were carried out."*

Accordingly, the teachers pointed out that the training they received improved themselves professionally, and they helped them to acquire different perspectives. The teachers considered these trainings useful and functional. The opinions of the primary school teachers regarding the training they received are indicated in Table 6.

Table 6

The Opinions of The Primary School Teachers Regarding the Trainings

Opinions about the trainings
Arousing interest
Enjoyable
Functional
Applicable
Share-based
Not suitable for the levels of the students

As is seen in Table 6, the teachers construed the activities as arousing interest, enjoyable, functional, applicable, share-based and not suitable for the levels of the students. The teachers delivered negative opinions only about the suitability for the levels of the students. While Ekinoks teacher, who considered the activities enjoyable, delivered his opinion as follows: "*I found the activities enjoyable";* another teacher delivered his opinion as follows:

> *"I have not taken part in this kind of training for a long time. However, this was at another dimension. I just took another step to discover myself in my body. I am leaving here with a smile on my face. It was very special to make something intentionally."*

And the teacher, who delivered a negative opinion in this respect, and pointed out that the activities are not suitable for the primary school students, delivered his opinion as follows: *"Enjoyable, but I think that they address the adults. They are not applicable in the classes. However, they can be carried out in the free activities lessons."* Accordingly, it can be said that the teachers considered the activities productive. The opinions of the primary school teachers regarding the training are indicated in Table 7.

Table 7

The Opinions of The Teachers Regarding the Trainings

Professional characteristics
Subject matter knowledge
Effective classroom management
Fluent use of language
Giving current samples
Efficient use of time
Effective communicative skills
Personal characteristics
Funny
Merciful
Cheerful
Patient
Interested
Sympathetic

The opinions of the primary school teachers about the trainers in the training received are gathered under two main themes i.e., professional and personal characteristics. Whereas the professional theme consists of the following codes in the form of *"having subject matter knowledge, effective classroom management, fluent use of language, giving current samples, efficient use of time and effective communicative skills''*, the personal characteristics theme consists of the following codes in the form of *"being funny, merciful, cheerful, patient, interested and sympathetic.''* Accordingly, stating her opinions as follows; *"he has a concerned and enjoyable narration. It is very nice that he has a good command of the subject and he could transfer the same."* Seda26 expressed that the trainers are the leading experts, they are patient, concerned, funny and they delivered current examples. The recommendations of the primary school teachers for more functional trainings are included in Table 8.

Table 8

The Recommendations of The Primary School Teachers for More Functional Training

Suggestions
to increase the implementation period
to give more examples
to have more activities carried out
to add music toactivities
to make time adjustments
to share the activities with the teachers

As is seen in Table 8, the primary school teachers delivered their suggestions so that the training they took part would be more functional. Under this theme, the following codes are included in the form of *"increasing the implementation period, including more examples, having more activities carried out, adding music to the activities, performing time adjustments, sharing the activities with the teachers."* Accordingly, Filuk teacher emphasized the extension of musical part and addition of music by stating her opinion as follows: *"It was rather functional. We learned by practice. I think the practicing section could be longer. More activities would have been carried out. Music should have been included in the activities."*

Opinions of the Primary School Teachers regarding University-School Cooperation Model in Professional Development

At the end of the study, a focus group discussion was held with the primary school teachers who took part in professional development training. The themes obtained following this discussion are indicated in Table 9.

Table 9

The Themes and Sub-Themes Regarding the Opinions of The Teachers Following the Practice

Opinions of the Teachers Following the Practice
General findings regarding professional development training
Previous experiences regarding the professional development training
Professional development experiences regarding the training
-Experiences about the training sessions
-Experiences about the teachers
-Experiences about the general qualification of the training
-Experiences regarding the planning and timing of training sessions
-Experiences related to the university-school cooperation
Suggestions

With reference to the opinions of the teachers following the training received thereof, general findings regarding the professional development training, previous experiences regarding the professional development training, professional development experiences about the trainings and the suggestions' themes were obtained.

When the findings of the teachers regarding the professional development training are considered, it is seen that according to the teachers, there are some identifiers that affect the nature of the training and the learning outcomes obtained from this training. Most of the teachers emphasized that the content structure of the professional development training and the suitability of this structure to the field of primary school teaching is a very significant marker. The teachers think that the training in which they are able to reflect the acquired knowledge and skills in the classroom, are more effective, enjoyable and functional. Accordingly, Öznur Teacher delivered her opinions as follows: *"I am able to include the children much more into the practice as much as I am included in the same. It is more useful for me when I am more active rather than theoretical information."* At the same time, the teachers stated that the competence of the trainer providing the training in their fields is also an important determiner. Ayşe Teacher stated her opinions in this respect as follows:

> *"Whether these seminars are listened to or not, took participation or not, is related to both the content of the training and the command of the trainer, I believe that we all have the same opinion. That is to say, if the content of the training attracts your attention a little bit more, and we take part in the activities, and become active, they are more enjoyable and productive. At the same time, if the trainer, who provides the training, is able to keep us active with a good command of the subject matter, then I think that the seminars become more efficient."*

According to the findings of the teachers, it was revealed that the trainers who do not have a good command of the subject matter failed to deliver good examples. Then the teachers

carry out a fluent presentation. According to the teachers the trainings were ineffective and inefficient as a consequence.

Another theme created following the research refers to the previous experiences regarding the training on professional development. Most of the teachers stated they had negative experiences in many trainings they took part, mainly the ones organized by MoNE. Stating that the previous trainings, which they had received before these trainings they received as part of this study, were inefficient and ineffective in general, some teachers pointed out that this unfavorable situation stems from several reasons. According to them, the failure of the presented training content to meet the requirements directly is the leading among these reasons. Musa Teacher, who is one of the above-mentioned teachers, stated his experience regarding the content that fails to satisfy his needs as follows:

> *"I had just attended an in-service training yesterday. It was once again a search and rescue training which was enrolled ex officio... Well, the content was not suitable. Why? I am not obliged to know the types of concrete. What should I do in search and rescue as a teacher? This must be told to me. Well, you should not expect any feedback from a teacher by loading information on a teacher at an engineering level."*

The teachers emphasized that some trainings are provided by trainers who are not competent in the subject matter, and these trainings are mostly trainer-centered, they do not involve the learner in the process and they are carried out theoretically. Some teachers expressed that the training in which they are assigned ex officio and the participation is compulsory, are generally theoretical and that even the question-answer technique is not used since the trainers are not competent in the subject matter. Buket teacher delivered her opinions as follows: *"...as my friends also expressed, the in-service training for which are theoretical, well the training is all about a presentation from the projector. Our questions remain unanswered, the other teacher colleagues have a better command of the subject matter."* The teachers also stated that some of the trainings organized by MoNE are effective and efficient. They emphasized that learner and activity centered trainings are effective. Moreover, the teachers, who stated that the training which they participated voluntarily and in which the trainers are competent, increased their professional development motivations, implied that they were able to reflect in the classroom the gains acquired from such training.

The theme of professional development experiences regarding the training received by the teachers in the research process was categorized into sub-themes such as experiences regarding the training sessions, experiences about the trainers, experiences regarding the general quality of the training, experiences regarding the planning and timing of the training sessions, experiences about the university-school cooperation and the reflections in the teaching profession.

Most of the teachers pointed out that the professional development training they received as part of the study was effective and efficient, and they further stated that the fact that the training was generally enjoyable and learner-centered had a contribution to this situation. Furthermore, they emphasized that preparation of the training topic and content according to their needs in a professional manner ensures that the content is suitable both for them and their students. As such, Gülseren Teacher, who emphasized that the training was enjoyable and efficient, delivered her opinions as follows: *"...the activities were very good. This is why we came*

here with joy; I mean we came here happily...Well, the teachers were very productive and the communication was very good." The teachers specified that teaching with games training, Orff training and art training came to the forefront for them among these trainings. Stating that teaching with games training is effective, the teachers remarked that they had the chance to practice by engaging in this training process actively and that they would be able to reflect on what they learned more easily in the classroom since they have experienced the exercises one-to-one. Öznur Teacher delivered her opinions regarding the same as follows:

> *"Especially in the activities in which we took part personally, I particularly… at let's play together part, both enjoyed the activity and definitely used many things, i.e., within the curriculum, in a way to apply the same to my students at the practicing stage. Well; I can make use of the same for mathematics as well. I can adapt them to any lessons."*

Some teachers further pointed out that the training regarding art training presented effective practicing samples and that the training gained them a reflective experience in this way. Some other teachers emphasized that Orff training was enjoyable for them, that they would be able to visit the world of the children very comfortably thanks to this training and that the newspaper exercise performed as part of this training was rather efficient. However, the teachers who considered both the training related to the art training and the Orff training effective, stated that the single-session trainings are short and that they should be extended for a couple of sessions. In consideration of all these findings, it can be alleged that the trainings which are actively participated by the teachers, that are learner-centered and enjoyable, are more permanent.

Teachers delivered important opinions about the planning and timing of the training sessions too. Most of the teachers pointed out that training sessions started and ended in time as it was informed to them and that they had no problems with the starting and ending times and the trainings were maintained within the scope of the program as planned. Especially, they considered it a professional and planned step to plan the topics and contents of the training according to the lists of needs obtained from them based on their schools. Delivered her opinions in this respect, Yasemin's opinions are as follows:

> *"The seminars started in time and generally ended in time. Well, I can say that this time it was taken more seriously. More like it, the content was good, the narrators had a good command of the subject matter, the training were more serious and therefore, we came here voluntarily. To tell the truth, we talked to each other about how nice the seminars of the university are..."*

Some teachers remarked that the performance of the training immediately after their own classes at the school increased their fatigue, and that this had an adverse impact on their motivation to participate inthe training. Although transportation opportunities were available for the teachers, especially the teachers, who come from village schools, voiced criticism in this respect.

The teachers stated that they were able to meet with the trainers at any time during their trainings that they could ask any questions whatsoever and that they could receive satisfactory responses for their questions. In this context, it can be said that the establishment of an open contact channel between the trainers and the teachers motivated them to the process.

Addressing the emphatic relation between the trainer and the teachers, Gülseren Teacher expressed her opinions as follows:

> "*For instance … the classes were rather a conversation and they were like a therapy. We had a talk with the university teacher... It made us relaxed to talk to someone, who understands our problems, who knows what we want, what kind of problems we have, what they are and that he understands our problems, knows our needs and even contact him in that manner."*

The teachers shared their opinions as part of university-school cooperation model as well. The fact that training is carried out both jointly under the umbrella of the training faculty, and separately at different schools in a way that brings together the teachers of more than one school was considered to be a positive step in terms of the teachers. Most of the teachers emphasized that the established university-school cooperation brought the academics and the teachers together, and that it increased the cooperation among the teachers and the experience-sharing opportunities, thereby motivating the teachers at different schools in line with the same purpose. Stipulating that once again they met up at the academy, from which they remained separate for a long time, thanks to the university-school cooperation model, some teachers expressed that they had the chance to learn the recent methods and techniques thanks to the leading experts, they had access to the latest information thanks to this model and that this increased their professional self-confidence. Esin Teacher delivered her opinions concerning the issue as follows:

> *"For me, it was very efficient... Anyway, here is where this work has its origins... As a result, we all graduated from the universities. It was much better for us to have training here again; it was something like we returned to ourselves again and we exchanged ideas with our colleagues here. Well, it further enabled us to see our deficient points."*

Musa Teacher distinctively remarked the university- MoNE cooperation issue, which is included in 2023 Training Vision and expressed that university-school cooperation does not only make professional contribution to the teacher, but it also enables the academics to meet with the field of practice. Musa Teacher's relevant statements are as follows:

> *"In fact, what I want to express here is.. well there was an explanation in the vision of ministry for 2023. As a matter of fact, I believe that a very good step has been taken. Because, the fact that our ministry gets support from the source of the work about in-service training indicates that they are on the right track... Well, it will be an advantage for both sides when the personnel and the onsite experiences of the institution which trains us, the teachers, come together. Because it is a serious problem if the academics at the university has never experienced classroom teaching. That is to say, what is written in theory and what we encounter in practice may be very different for the students. Well, in my opinion, it was a good project since both parties could exchange their experiences."*

In consideration of their previous experiences, general findings regarding the training and the training based on university-school cooperation, which they experienced during the study, the teachers delivered their suggestions about how professional development training should be. The teachers recommended that the content of the training sessions should be created following a needs identification process. Emphasizing that observation should also be engaged

in the needs identification process as well as the technique to elicit ideas, Musa Teacher delivered his opinion as follows: *"I think that the academics or the lecturers can organize the training in the fields which we really need thereby making observations at our schools. We can utter this verbally; however, there may be some deficiencies which I am not aware of, as a teacher..."* At the same time, all teachers suggested that professional development trainings should also be learner-centered, applied and enjoyable within the scope of the latest and current issues just as these trainings, and that this is only possible thanks to the trainers who are leading experts in their fields. Moreover, the teachers also offered that the videos or the information manuals regarding the training should be distributed in order to increase the permanence and reflection of the same in the classroom. Those, who consider the single-session training to be short and that criticize the performance of the training after school, suggested based on such experiences that training should be extended over a period of time and carried out minimum as couple of sessions and that they would be registered as officially permitted on the days when the trainings will be held. Besides, the teachers emphasized that the training based on university-school cooperation should be maintained, this cooperation should be set at the trivet of MoNE -university-school by engaging the central organization of MoNE and that it will be effective to increase the academic-teacher meetings in the seminar periods in this manner.

Model Suggestion Created as Part of the Research

The aim of the University-School Cooperation Model regarding the primary school teachers' professional development is to provide functional, sustainable and generalized professional development with the aim of increasing the professional qualities of primary school teachers employed in the educational system. In line with this objective, University-School Cooperation Model in the professional development of primary school teachers should be applied regarding the following principles:

This model should be;

1. implemented to develop the teachers' professional knowledge and skills, ensure equality of opportunity and chances and in accordance with the generality, equality and volunteerism, and validity principles.
2. carried out in cooperation with the training faculties or the relevant departments of the universities (continuing education centers etc.) and the Provincial Directorates of National Education.
3. devoted to primary school teachers initially and then disseminated to the branch teachers.
4. enable online performance of the professional training curriculum; and
5. the professional training curriculum prepared as part of the model should be based on the needs analysis.
6. the professional training curriculum prepared as part of the model should be prepared in compliance with the certificate basis; the credits of the lessons/topics to be included in the curriculum should be determined accordingly.
7. the professional training curriculum prepared as part of the model should be organized regularly every year.

University-School Cooperation Model regarding the professional development of primary school teachers should be carried out in cooperation with the education faculties or the relevant departments of the universities (continuing education centers etc.) and the Provincial Directorates of National Education. At the universities, a "Education Faculty Lifelong Teacher Training Center" must be established within the training faculty for the professional development of the teachers. At the same time, with the Lifelong Teacher Training Center to be established within the Training Faculties of the Universities, it must be ensured that both the School Experience, Teaching Application and Seminar courses carried out as part of the undergraduate study and the candidate teacher training as well as the lifelong in-service training requirements of teachers be fulfilled.

In the University-School Cooperation Model regarding the professional development of the primary school teachers, the manager of the Faculty of Education, Lifelong Teacher Training Center must be responsible for the operation on the part of the faculty and the Assistant Principal of National Education, who serves as the school coordinator of the practice school, must be responsible for the part of the Directorate of National Education. In this context, the duties and responsibilities of the organizations are as follows: Accordingly, Lifelong Teacher Training Center should determine the needs regarding the professional development, prepare the professional training curriculum, and carry out the implementation and the assessment and cooperate with the Directorate of National Education. The Directorate of National Education should support the needs identification process, determine the teachers who would take part in the training and make cooperation with the Lifelong Teacher Training Center. Operation in the University-School Cooperation Model regarding the primary school teachers' professional development consists of planning, implementation and assessment stages. The operation of the Model is indicated in Table 10.

Table 10

Operation in University School Cooperation Model

Step 1 Planning
Identification of the needs
Preparation of the professional development program based on the training needs
Step 2 Implementation
Implementation at the determined days, hours and places
Step 3 Assessment
Assessment of the applied programs

As is seen in Table 10, the Professional Development Model envisaged in the study is carried out in consideration of planning, implementation and assessment stages. The planning stage consists of the following stages; i.e., identification of the training needs of the teachers, Preparation of the professional development curriculum based on the training needs and identification of the participants. In the preparation stage of the professional development curriculum, the topics, time of the training, training environments and the trainers are determined. Furthermore at this stage; ultimate attention must be shown in that professional development curriculum should be suitable for the working hours of the teachers and they must be easily accessible, they should be practice-based as much as possible, they must be carried out in the locations that comply with the characteristics of subjects, they must be

organized so as to take place both at the school and the university and that the trainers should have a good command of the subject matter and be experienced in adult training. At the implementation stage; professional development curriculum, which was prepared in advance, is applied on the determined day, the specified hour and locations. At the assessment stage; the evaluation of the implemented professional training curriculum is performed. In this context, it is essential to carry out the assessment through the suitable methods, techniques and instruments so that the efficiency of the professional development curriculum could be determined.

Discussion

According to the results of this study, the primary school teachers consider professional development as a contributory process in terms of monitoring the developments of the current age. The studies conducted in the literature support this finding of the research. In the study conducted by Gültekin and Çubukçu (2008), it is revealed that teachers consider professional development as a contributory activity both personally and institutionally; and in the study conducted by Yalçın İncik and Akbay (2018), it is found out that the teachers consider professional development activities as a productive process that enables them to update their knowledge and share their experiences.

Primary school teachers think that their enrollment in the professional development activities should be evaluated and that the professional development activities should be planned by eliciting the ideas of the teachers. Moreover, the teachers indicate that there must a return of participation to the professional development activities. The teachers emphasize that the trainers who are assigned to professional development activities must have a good command of the subject matter and that they should have effective communication skills, they should value the teachers and develop empathy with the teachers. Primary school teachers point out that the training should be useful, efficient, enjoyable and based on the needs, they must be applicable on-site, they should be permanent, and they should be carried out at the proper locations and times, they should not be compulsory and that the training and the performance of the participants should be evaluated through suitable methods and techniques. The studies in the literature have parallels with these findings of the research. In the study performed by Yalçın İncik and Akbay (2018), the teachers state that the trainers should have a good command of the subject matter of the training, they should have effective communication skills, be informed about teaching principles and methods and they should be academics so that the professional development activities could be successful. According to the results of the study conducted by Kahyaoğlu and Karataş (2019), the teachers state that it is possible to succeed in the professional development activities if the activities are designed as learner-based. The teachers further remark that the training should be determined according to their needs, and that the learning activities, which are based on rich content and that are carried out through practices, are permanent and enjoyable (Aykal, 2018).

With respect to their professions, the primary school teachers have problems with insufficient salaries, difficult working conditions and low status of the job; as for professional development, they have the following problems such as the failure to design the professional development activities in consideration of the needs of the teachers, compulsory participation to the activities against signature, useless, inefficient and unenjoyable training, failure of the trainers to have a good command of the subject matter, mostly trainer-centered and

theoretical training. According to the research findings, this has a negative impact on the motivation of the teachers regarding the professional development activities. Primary school teachers think that the quality of the professional development activities is low and insufficient, they think that the trainers are not leading experts, they encounter with bureaucratic obstacles regarding the professional development and they have financial difficulties. The teachers also think that the multidisciplinary structure of the classroom teaching field aggravates the professional development process in that it extends the scope of the professional development activities. The results of the studies in the literature also support these findings. As a matter of fact, in the study conducted by Kahyaoğlu and Karataş (2019), the teachers criticize the professional development activities organized for them in that they are rote, theoretical and red tape practices on paper, they are not practical, the seminars are not provided by the experts and the professionals of the subject matter, interesting issues are not included in the, the training locations are not suitable, the teachers participate the training compulsorily, seminar periods are long, the state pays unnecessary extra class payments, a lot of meetings are held and that the studies are not audited. According to the findings of the research conducted by Sprott (2019), the hierarchical obligations and the structural obstacles in front of the cooperation are the leading factors preventing professional development of the teachers. According to the findings of the research conducted by Yirci (2017), it is revealed that the teachers have financial difficulties throughout the professional development process.

According to the research findings, the in-service training needs of the primary school teachers are identified as art training, games, material development, technology, drama, family communication, classroom management and philosophy for children; and the training subjects, which are mostly preferred by the teachers, are the use of artistic activities in the lessons, STEM-STEMA practices, the use of the game activities in the courses, child psychology and drama. The teachers in the villages wanted to have training most about mind and intelligence games, the teachers in the districts wanted to have training most about mind and intelligence games, scientific and experimental practices as well as coding and the teachers in the cities wanted to have training most about music (orff) and story-telling. These findings of the research have partial similarities with the studies in the literature. In the research conducted by Uştu et al. (2016), it was observed that the teachers need training about communication, information technologies, teaching methods and techniques, student psychology and body language; and in the study carried out by Şahin (2013), it was further revealed that the teachers need training about creative drama, early childhood training, physical training and game teaching, science and technology laboratory applications, child literature, first aid and music.

The quantitative results of the research indicate that the training activities carried out through university-school cooperation increase the attitudes of the teachers towards professional development. These results are rather significant for the literature. Because, nearly in all definitions of the professional development concept; it is stated that one of the main objectives of the professional development activities is to increase the attitudes of the teachers towards professional development (Guskey, 2002). In this context, it can be said that the training activities carried out throughout the research process met the objective. Thus, although many factors play a role in that professional development activities meet the objectives, the most important ones among these factors are the professional development requirements of the teachers, the subjects they are interested in and their attitudes (Özer, 2004). The fact that the attitude towards the professional development is a significant variable

that can be used to describe the occupational professionalism increases the importance of the findings of the research (Eroğlu et al., 2018). In addition, this finding of the research shows parallelism with the studies conducted in the literature. The studies indicate that the professional development activities in which the content is prepared so as to respond to the needs, and that are functional, elaborate and sustainable are effective in increasing the attitudes of the teachers regarding professional development, develop their beliefs and classroom practices, and that this development is reflected positively in the learning outcomes of the students and the teachers delivered positive opinions in general about this kind of professional development activities (Babinski et al., 2018; Canaran, 2017; Erdaş, 2015; ÖRAV, 2009; Piper et al., 2018; Yılmaz, 2020). It is considered that the following factors such as the selection of the applied training activities according to the needs of the teachers, voluntary participation of the teachers in the process, delivery of the training by the leading experts and in cooperation with the university, are important in that this result of the research is revealed.

The study indicates that the training activities carried out through university-school cooperation increase the attitudes of the teachers regarding in-service training. This finding of the research is significant in that the studies conducted in the literature indicate that teachers have negative perceptions and attitudes towards in-service training (Karasolak, Tanrıseven & Yavuz Konokman, 2013; Özoğlu, 2010a, 2010b). In the study carried out by Gökdere and Çepni (2005) in order to implement and evaluate the in-service training curriculum, which was prepared for the science teachers of gifted children, it was found through the data of the attitude survey conducted following the curriculum that there is a positive increase regarding the attitudes of the teachers against the curriculum, who took part in-service training seminar. In addition, the studies in the literature indicate that the professional development activities and the in-service trainings provided for the teachers had a positive contribution for the teachers (Drewes et al., 2018; Ma, Xin & Du, 2018; Mellom, et al., 2018). Çelen, Köşterelioğlu and Akın Köşterelioğlu (2016) point out that the participation levels regarding the engagement with the in-service training will increase if the training is suitable for the requirements of the teachers, the training arouses their interest, the time when the training will be carried out is suitable and provided that the person who will give the training is a leading expert in this field, and it will have an indirect impact on them to develop a positive attitude.

The research findings indicate that the professional development activities carried out in the study improved the primary school teachers in terms of knowledge, skill, creating awareness, emotional characteristics and applicaiton dimensions. This finding of the research overlaps with the studies in the literature. According to the findings of the research carried out by Prast et al. (2018), it was observed that the professional development curriculum, which was prepared based on the needs, increased the knowledge and skills of the teachers and they further made contributions to the teachers in terms of classroom practices. The results of the study carried out by Desimone et al. (2002), indicate that the professional development curriculum, which focuses on certain teaching practices, increases the teachers' application level to use such exercises in the classroom.

The professional development activities within the scope of the research are considered to be interesting, enjoyable, functional, practicable and shared by the primary school teachers and some of the activities are considered not to be suitable for the students' levels. According to the research findings in the literature, the teachers deliver positive opinions about the professional development curriculum that is prepared as planned in a certain field of subject,

and based on needs (Baykan, 2015; Kefeli, 2013; Yiğit, 2016). Moreover, the specialists in the trainings carried out, were considered by the teachers to be efficient and productive in terms of their professional and personal characteristics, the open and barrier-free communication established by the experts with the attendants was appreciated by the participants. When the results of the study are considered, it was observed that the teachers think that the training is maintained as planned and programmed. The primary school teachers emphasized that the preparation of the contents of the activities within the scope of the study in a planned and professional manner based on their needs ensured that the content is suitable both for them and their students and they further stated that this increased their motivation for engagement. The fact that the teachers talked mostly about the activities such as art training, drama and learning through games especially in the post-exercise discussions indicated that the applied training with suitable content created a permanent effect. The findings of the studies in the literature also support this finding of the research. Thus, in the findings of the research conducted by Gökdere and Çepni (2005), it is revealed that the professional development curriculum, which is designed according to the needs of the teachers contributed to the teachers not only in terms of the cognitive area but also emotionally.

Emphasizing that the performance of the activities as joint and independent activities and establishment of university-school cooperation increased the cooperation and sharing opportunities among the teachers, the primary school teachers stated that the activities were rather effective in that they could stay up to date in the educational area and that they could increase their self-confidence regarding the profession. According to the findings of the study conducted by Altun and Cengiz (2012), it was observed that the cooperation among the teachers played a significant role for the efficiency of the professional development. As for the negative opinions of the primary school teachers about the training activities; they stated that these activities are not continuous, the performance of the training immediately after their own school lessons increased their fatigue, and that transportation is problematic especially for the teachers who come from the village.

With respect to the professional development activities, the teachers generally suggested that the content should be created following a needs identification process, the training should be learner-centered, applied and enjoyable within the scope of contemporary and current subjects, the training should be given by the leading experts, they will be considered as officially permitted on the days when the trainings will be carried out, the trainings should be maintained based on university-school cooperation and thus they should be built on MoNE-university-school trivet. According to the findings of the research conducted by Uştu et al. (2016), the teachers state that they want to be supported by the universities about their professional development. In accordance with the findings of the study carried out by Süngü (2012), it is revealed that the teachers think that the professional development curriculum should be organized under the cooperation of MoNE and the university.

Conclusion and Implications

Following the professional development training, primary school teachers' attitudes to professional development and attitudes to in-service training were positively affected. In other words, as a result of the research, primary school teachers' attitudes to professional development and attitudes to in-service training showed a significant difference. Additionally, primary school teachers found the training contributive in terms of professional development.

Accordingly, primary school teachers emphasized learning by doing and experiencing, interdisciplinary approach, learning methods and techniques in the training process. In addition, they found it productive in terms of cooperation, creative thinking and decision-making. Primary school teachers emphasized positive professional perception and motivation with these activities. Teachers found the training fun and functional. Teachers' views on the implementation process were expressed under the headings of general determinations regarding professional development training, past experiences regarding professional development training, professional development experiences regarding training and suggestions. The functioning of the University-School Cooperation Model obtained as a result of the research consists of planning, implementation and assessment stages.

Recommendations

In consideration of the entire findings obtained within the scope of the study, the following recommendations can be delivered for the scholars and the decision-makers:

- Learner-centered, applied, enjoyable training curricula, which are easily reflected in the classrooms, should be designed and implemented in accordance with the needs of the teachers.
- The impact of the professional development activities based on university-school cooperation model on the branch teachers can be analyzed.
- A longitudinal professional development research based on university-school cooperation model can be fulfilled and the long-term reflection of the activities on the teachers can be revealed.
- As part of the university school cooperation model developed, a training curriculum, which brings the leading experts and the teachers together and increases cooperation and experience sharing among the stakeholders, should be designed and implemented.

Author Contributions

The authors contributed equally to the article.

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Sınıf Öğretmenlerinin Mesleki Gelişiminde Üniversite-Okul İş Birliği Modeli

Giriş

Araştırma ile üniversite-okul iş birliği yoluyla sınıf öğretmenlerinin mesleki gelişim konusundaki tutumlarının artırılması, mesleki gelişimlerinin desteklenmesi ve mesleki gelişimlerine yönelik yapabilecekleri ve bunu sürdürebilecekleri ortamlar oluşturulması ve araştırmanın ardından öngörülen üniversite-okul iş birliği modelinin yaygınlaştırılması ve yeni model arayışlarının önünün açılması beklenmektedir. Bu kapsamda mesleki gelişim kapsamında gerçekleştirilecek seminerler yoluyla sınıf öğretmenlerinin mesleki gelişim konusundaki duyarlılıklarının artırılması, ihtiyaç duydukları konularda eğitim ihtiyaçlarının giderilmesi, yeni ve güncel bilgi ve beceriler edinmelerinin sağlanması ve sürekli mesleki gelişim konusunda çaba göstermelerinin yolunun açılması mümkün olacaktır. Bunun için araştırmada köy, ilçe ve şehirde çalışma koşulları ve mesleki gelişim olanaklarına ulaşma bakımından dezavantajlı bölgelerde çalışan sınıf öğretmenleriyle çalışılmıştır. Bu yolla sınıf öğretmenlerinin üniversite ortamından yararlanmaları, mesleki gelişim etkinliklerine katılmaları, mesleki gelişim konusunda farkındalık oluşturmaları, mesleki bilgi ve beceri kazanmaları ve mesleki gelişimleri için öngörüler oluşturmaları beklenmektedir. Bu araştırma yoluyla eğitime katılan öğretmenlerin kendileri kadar, çevrelerine de katma değer sağlamaları mümkün olacaktır. Çünkü kırsal yörelerde görev yapan öğretmenlerin okullarını geliştirirken çevrelerini de geliştirmeleri beklenmektedir.

Bu doğrultuda araştırmanın amacı, üniversite-okul iş birliği yoluyla sınıf öğretmenlerinin mesleki gelişim konusundaki tutumlarını artırmak, onların mesleki gelişimlerini desteklemek ve üniversite-okul iş birliğine dayalı bir model oluşturmaktır. Bu kapsamda şu sorulara yanıt aranmıştır:

1. Sınıf öğretmenlerine yönelik hazırlanan mesleki gelişim programının öğretmenlerin mesleki gelişime yönelik tutumlarına etkisi nedir?
2. Sınıf öğretmenlerine yönelik hazırlanan mesleki gelişim programının öğretmenlerin hizmet içi eğitime yönelik tutumlarına etkisi nedir?
3. Sınıf öğretmenleri hazırlanan mesleki gelişim programındaki sürece ilişkin görüşlerini öğrenme günlüklerine nasıl yansıtmıştır?
4. Sınıf öğretmenlerinin hazırlanan mesleki gelişim programına ilişkin görüşleri nelerdir?
5. Sınıf öğretmenlerinin mesleki gelişiminde üniversite-okul iş birliğini sağlayacak nasıl bir model geliştirilebilir?

Yöntem

Araştırmada, karma araştırma desenlerinden gömülü karma desen kullanılmıştır. Bu araştırmada gömülü karma desen kapsamında gömülü deneysel desenden yararlanılmıştır. Araştırmaya testlerin uygulanması sırasında yer almayan öğretmenlerden kaynaklı olarak 39 kişi katılmıştır. Sınıf öğretmenlerinin hangi konularda mesleki gelişim eğitimine ihtiyaç duydukları ve söz konusu eğitimleri hangi zaman diliminde almak istediklerine ilişkin bir ihtiyaç belirleme süreci tasarlanmıştır. Bu süreçte veriler odak grup görüşmesi ve görüşmeye dayalı olarak eğitim ihtiyaçları belirleme formuyla toplanmıştır. Bu ihtiyaçlar doğrultusunda hazırlanan program uygulamaya geçirilmiştir. Programda "Öğrenme Engelleri, Etkin Öğrenme Teknikleri, İlkokulda Drama, Akıl Ve Zekâ Oyunları, Orff Yaklaşımına Dayalı Müzik, Hareket, Söz, STEM-STEMA Uygulamaları, Değişen Toplumda Öğretmen Nitelikleri Ve Öğretmenlerin Mesleki Gelişimi, İlkokulda Sanat Etkinliklerinin Kullanımı, İlkokulda Oyunla Öğrenme: Gelin Birlikte Oynayalım" başlıkları ile eğitimler tasarlanmıştır. Araştırma sürecinde, veriler kişisel bilgi formu, ihtiyaç belirlemeye ilişkin odak grup görüşmesi formu, eğitim ihtiyacı belirleme formu, mesleki gelişim tutum ölçeği, hizmet içi eğitime yönelik tutum ölçeği, öğretmen günlükleri ve uygulama sonu odak grup görüşmesi aracılığıyla toplanmıştır. Araştırmada nicel verilerin analizinde parametrik testlerden yararlanılmış, nitel verilerin analizinde tümevarımsal analiz kullanılmıştır.

Bulgular

Yapılan eğitim etkinliklerinin öğretmenlerin mesleki gelişime yönelik ve hizmet içi eğitime yönelik tutumlarını olumlu yönde etkilediği bulunmuştur. Sınıf öğretmenlerinin eğitimlerin mesleki gelişim açısından değerlendirilmesine ilişkin görüşleri bilgi, beceri, farkındalık oluşturma, duyuşsal özellikler ve uygulama temaları altında toplanmıştır. Öğretmenlerin aldıkları eğitimler sonucunda görüşlerinden yola çıkarak mesleki gelişim eğitimlerine ilişkin genel saptamalar, mesleki gelişim eğitimlerine ilişkin geçmiş deneyimler, eğitimlere ilişkin mesleki gelişim deneyimleri ve öneriler temalarına ulaşılmıştır. Araştırmada öngörülen Mesleki Gelişim Modeli planlama, uygulama ve değerlendirme aşamaları dikkate alınarak gerçekleştirilmektedir.

Tartışma

Sınıf öğretmenleri; eğitimlerin ihtiyaca yönelik olması, yararlı, verimli ve eğlenceli olması, sahada uygulanabilir olması, sürekli olması, uygun yer ve zamanda yapılması, zorunlu olmaması ile eğitim ve katılımcıların performansının uygun yöntem ve tekniklerle değerlendirilmesi gerektiğini ifade etmektedirler. Yalçın İncik ve Akbay (2018) tarafından gerçekleştirilen araştırmada öğretmenler, mesleki gelişim faaliyetlerinin başarıya ulaşabilmesi için eğitimcinin eğitim verdiği konuda uzmanlığının olması, etkili iletişim becerisine sahip olması, öğretim ilke ve yöntemleri bilgisine sahip olması ve akademisyen olması gerektiğini belirtmişlerdir. Öğretmenler, eğitimlerin kendi ihtiyaçlarına göre belirlenmesi gerektiğini, zengin içeriğe dayalı uygulamalı gerçekleştirilen öğrenmenin kalıcı ve eğlenceli olduğunu belirtmektedir (Aykal, 2018). Sınıf öğretmenleri, meslekleriyle ilgili maaş yetersizliği, çalışma koşullarının zorluğu ve mesleğin statü düşüklüğü; mesleki gelişim ile ilgili ise mesleki gelişim etkinliklerinin öğretmenlerin ihtiyaçları göz önüne alınarak tasarlanmaması, etkinliklere zorunlu bir şekilde ve imza karşılığı katılmaları, eğitimlerin yararlı, verimli ve eğlenceli olmaması, eğitmenlerin alanlarında uzman olmaması, çoğunlukla eğitmen merkezli olması, kuramsal bir şekilde

gerçekleşmesi açısından sorun yaşamaktadırlar. Nitekim Kahyaoğlu ve Karataş (2019) tarafından gerçekleştirilen araştırmada, öğretmenler kendilerine yönelik mesleki gelişim etkinliklerini; ezberci, teorik ve kâğıt üstünde formalite uygulamalar olması, pratiğe dönük olmaması, seminerin uzmanlar ve konunun profesyonellerince verilmemesi, ilgi çekici konuların programda yer almaması, eğitim ortamlarının uygun olmaması ve öğretmenlerin zoraki katılımı, seminer süresinin uzun olması, devletin gereksiz yere ek ders ödemesi, çok toplantı yapılması ve yapılan çalışmaların denetlenmemesi yönlerinden eleştirmektedir. Araştırma sonuçlarına göre sınıf öğretmenlerinin hizmet içi eğitim ihtiyaçları; sanat eğitimi, oyun, materyal geliştirme, teknoloji, drama, aile ile iletişim, sınıf yönetimi, çocuklar için felsefe olarak belirlenmiş; en çok tercih ettikleri eğitim konuları ise derslerde sanat etkinliklerinin kullanımı, STEM-STEMA uygulamaları, derslerde oyun etkinliklerinin kullanımı, çocuk psikolojisi ve drama olmuştur. Mentiş Taş ve Sever (2016) tarafından gerçekleştirilen araştırmada öğretmenlerin iletişim, bilişim teknolojileri, öğretim yöntem ve teknikleri, öğrenci psikolojisi ve beden dili alanlarında; Şahin (2013) tarafından gerçekleştirilen araştırmada ise yaratıcı drama, erken çocukluk eğitimi, beden eğitimi ve oyun öğretimi, fen ve teknoloji laboratuvar uygulamaları, çocuk edebiyatı, ilk yardım ve müzik alanlarında eğitime ihtiyaç duydukları görülmüştür.

Sonuç ve Öneriler

Yapılan eğitim etkinliklerinin öğretmenlerin mesleki gelişime yönelik ve hizmet içi eğitime yönelik tutumlarını olumlu yönde etkilediği sonucuna ulaşılmıştır. Sınıf öğretmenleri mesleki gelişim etkinlilerini işlevsel, yararlı ve uygulamaya yönelik olarak değerlendirmişlerdir. Kendi eğitim ihtiyaçları doğrultusunda hazırlanması onların görüşlerini olumlu yönde etkilemiştir. Araştırmada öngörülen Mesleki Gelişim Modeli planlama, uygulama ve değerlendirme aşamaları dikkate alınarak gerçekleştirilmektedir.

Araştırma kapsamında ulaşılan tüm bu sonuçlar göz önüne alındığında, araştırmacılara ve karar vericilere şu öneriler getirilebilir:

- Öğretmenlerin ihtiyaçları doğrultusunda; öğrenen merkezli, uygulamalı, eğlenceli ve sınıf içine kolaylıkla yansıtılabilir eğitim programları tasarlanmalı ve uygulanmalıdır.
- Üniversite-Okul İş Birliği Modeli'ne dayalı mesleki gelişim etkinliklerinin branş öğretmenleri üzerindeki etkisi incelenebilir.
- Üniversite-Okul İş Birliği Modeli'ne dayalı boylamsal bir mesleki gelişim araştırması gerçekleştirilip, etkinliklerin öğretmenler üzerindeki uzun soluklu yansıması ortaya çıkarılabilir.
- Geliştirilen Üniversite-Okul İş Birliği Modeli kapsamında, alan uzmanları ile öğretmenleri bir araya getiren, paydaşlar arasında iş birliği ve deneyim paylaşımını artıran eğitim programları tasarlanıp uygulanmalıdır.

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Examining Undergraduate Students' Inquiry Skills and Determining Predictors[1]

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Abstract

Developing students' research skills not only increases their academic success but also equips them with essential abilities to interact with society and meet challenges in life. This study aims to investigate the inquiry skills of undergraduate students and identify the factors influencing these skills. Employing a relational research design, a quantitative approach was employed, with a sample of 554 undergraduate students. Data were gathered through the administration of the "Inquiry Skills Scale." Statistical analyses, including independent t-tests, one-way analysis of variance, and stepwise multiple regression, were conducted. Results revealed that participating students demonstrated a high level of inquiry skills. Moreover, those who perceived themselves as academically successful exhibited higher inquiry skills compared to their less successful counterparts. Students not considering post-graduate education showed lower inquiry skills than those aiming for it or undecided students. The primary predictors of students' inquiry skills were identified as their perception of academic success, followed by their perception of partial success, and their level of willingness in their chosen departments. Based on these findings, it is recommended that targeted interventions be implemented, both within the classroom and through extracurricular activities, to support students with lower levels of questioning skills.

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Introduction

Inquiry skills are essential for students for various important reasons, namely for their intellectual and personal development, academic success, and ability to engage with and contribute to the broader society. Moreover, developing students' inquiry skills in education enhances their critical thinking and problem-solving skills and guides their decision-making processes. Students may be unable to find a definitive answer to the problems they often encounter. Open-ended problems may have their own unique solutions (such as developing an artificial intelligence algorithm). This makes the concept of inquiry more important for students. Miftakhurrohmah et al. (2023) demonstrated that students who utilize inquiry skills can more easily conduct scientific research and solve the problems they encounter using scientific methods. As Wenning claimed (2007), scientific inquiry requires a high level of imagination and creativity. Universities should not be institutions where information is simply transmitted and students are passive listeners, but rather institutions where inquiry and creativity are fostered, and life-long learning skills are instilled (Polat & Odabaş, 2008). This is because when one considers the astonishing pace of development in science and technology, it does not seem possible for students to keep up with the speed solely by learning specific course content. In other words, it is difficult to keep up with this rapid change with a subject-based teaching approach. Hence, it is crucial for students to prioritize lifelong learning and develop higher-order thinking skills referred to as 21st-century skills (scientific inquiry, problem-solving, critical thinking, and creativity) to solve real-life problems they will encounter in the future. Scientific inquiry skills are transferable to various domains of knowledge. They empower students to approach any subject with a mindset of curiosity, critical analysis, and a commitment to seeking evidence-based answers. In this context, the rapidly advancing information age and associated societal changes necessitate cultivating individuals who can question and think critically. Given this, the present study argues the importance of examining the extent to which university students possess inquiry skills in scientific research . The current study aimed to examine the inquiry skills of university students and identify their predictors.

Several studies have found that inquiry-based teaching leads to better development of scientific inquiry skills, such as formulating hypotheses, designing experiments, collecting and analyzing data, and drawing conclusions (Farooq, 2023; Kutlu et al., 2022; Kruit et al., 2018). Inquiry-based approaches encourage students to actively engage in the learning process, which helps them acquire essential process skills (Verawati et al., 2022; Aslan, 2017). At the end of the inquiry process, it is aimed for students to question new situations they encounter by using their prior knowledge and to utilize the information and skills they acquire through inquiry in subsequent learning experiences (National Research Council, 2000). Definitions related to the concept of inquiry emphasize asking questions for a specific purpose and conducting research through questions to advance thinking and learning (Güneş, 2016). Inquiry in education relies on children assuming an active role in changing their understandings by following questions or addressing issues that draw their attention (Harlen, 2014). Palmer (2009) defines inquiry skills as proposing researchable questions, observing, explaining, and reporting. Skills such as accessing accurate information, interpreting, analyzing, questioning, and making inferences are becoming sought-after characteristics in individuals of all ages (Öz, 2020). Thus, having inquiry skills is one of the steps of lifelong learning. Inquiry is a high-level strategy that develops students' reasoning skills (Hunter & Arthur, 2016). That is to say, inquiry is associated

with the higher-order cognitive domain (Bloom, 1956), such as analysis, synthesis, and evaluation, rather than the basic understanding of fundamental knowledge at lower levels. Several studies have found that higher-order thinking skills, as defined by the upper levels of Bloom's Taxonomy, are crucial for developing critical thinking, problem-solving, and other necessary 21st-century competencies (Crowe et al., 2008; Voinohovska, 2024). These skills enable students to go beyond mere memorization and engage in deeper, more meaningful learning (Adams, 2015; Baransi & Burbara, 2019). Therefore, when monitoring students' thinking processes, it is important to assess their capacity to ask questions and inquire. While the extent to which teaching thinking is possible is debated, one of the best ways to develop thinking (De Bono, 2008) is to be curious and ask questions (Boghossian, 2012). In summary, inquiry skills are not only useful for academic success but are also essential for personal development, informed citizenship, and meaningful contributions to society in the context of lifelong learning.

The literature shows that research on the concept of inquiry has concentrated on teachers and science courses. In similar studies measuring inquiry skills, Okumuş (2020) examined the inquiry skills of middle school students and found that inquiry skills were higher in lower grades. The researcher associated this result with the transition of activities in lower grades to knowledge and exams in upper grades. In studies conducted with teacher candidates regarding inquiry skills (Acar Şeşen, et al., 2020; Alkış Küçükaydın, 2020; Aldan Karademir & Saracaloğlu, 2017; Balbağ & Aynur, 2020; Sarıkaya & Şakiroğlu, 2021), it was revealed that the inquiry skills of teacher candidates inquiry skills were above average. Yang and Heh (2007) compared the effects of laboratory use in applied courses on high school students' inquiry skills and found that students who used laboratories achieved significantly higher scores than their peers.

The following three research questions were formulated to guide the present research study:

RQ1: What is the level of university students' inquiry skills?

RQ2: Do university students' inquiry skills show a significant difference based on their;

1) Gender,

2) Desire to pursue graduate education,

3) Perceived academic achievement,

4) Level of willingness to enroll in their department?

RQ3: To what extent do gender, desire to pursue graduate education, perceived academic achievement and willingness to be enrolled in their department predict university students' inquiry skills?

Method

Study Design

Aiming to measure the inquiry skills of university students according to various variables and to determine their predictors, the study employed the correlational research design. In correlational research, the relationship between two or more variables is investigated without any intervention and manipulation of the variables (Fraenkel & Wallen, 2009).

Population and Sample

The sample size was determined as 372 using Raosoft sample size calculator (http://www.raosoft.com/samplesize.html?nosurvey) with a confidence level of 95% and a confidence interval of 5%. The data in the study were collected through convenience sampling, one of the non-probability sampling methods. In convenience sampling, the researcher forms the sample from the most accessible respondents (Cohen, Manion and Morrison, 2018). As a result, 554 volunteer university students from engineering faculty were reached.

The variables in the study were students' gender, desire to pursue graduate education, perceived academic achievement, and their level of willingness to be enrolled in their department. Numerical information regarding the demographic characteristics of the students participating in the study is presented in Table 1 below.

Table 1

Some Demographic Characteristics of the Participants

Variables	*Groups*	*Frequency*	*%*
Gender	Female	162	29.2
	Male	392	70.8
Desire to pursue graduate education	Yes	226	40.8
	No	90	16.2
	Undecided	128	31.4
Perceived academic achievement	Unsuccessful	60	10.8
	Partially successful	167	30.1
	Successful	327	59.0
Level of willingness to be enrolled in their department	Unwilling	62	11.2
	Partially willing	81	14.6
	Willing	411	74.2

As seen in Table 1, the students in the study group do not exhibit a balanced distribution among the groups. In terms of gender, 70.8% of the students were male. While 40.8% of the students wanted to pursue graduate education, 31.4% did not plan to pursue graduate education. While 59% of the students considered themselves academically successful, 10.8% considered themselves unsuccessful, and 30.1% partially successful. Finally, 74% of the students stated that they selected their department willingly.

Data Collection Tool

The data for the study were collected using the 'Inquiry Skills Scale' developed by Aldan Karademir and Saracaloğlu (2013). An Exploratory Factor Analysis (EFA) yielded a three-factor structure consisting of 14 items, and each factor was named. "Information Acquisition", "Information Control", and "Self-Confidence", respectively, according to the theoretical framework. Confirmatory Factor Analysis (CFA) results indicated that the model fit was acceptable, $\chi 2 = 336.86$, $\chi 2 /df = 4.55$, RMSEA= 0.06, GFI= 0.954, AGFI= 0.935, CFI= 0.928, and

NNFI= 0.911. Cronbach's alpha (α) values were calculated for each factor in the scale and the whole scale. The Cronbach's alpha (α) reliability coefficients were .76 for Information Acquisition, .66 for Information Control, and .82 for Self-Confidence, and .82 for the whole scale. Thus, the scale's validity and reliability were established, with the lowest score being 14 and the highest being 70. In the current study, Cronbach's alpha(α) reliability values were calculated for the entire scale and its factors. The Cronbach's alpha (α) coefficient for the overall scale was found to be .80, whereas it was .63 for Information Acquisition, .63 for Information Control, and .85 for Self-Confidence. According to DeVellis (2012), Cronbach's Alpha (α) coefficient is expected to be above .70. Lower Cronbach alpha values can be obtained in scales with fewer than 10 items. In such cases, an average inter-item correlation ranging from .2 to .4 is recommended (Briggs & Cheek, 1986, as cited in Pallant, 2016). In the present study, the mean inter-item correlation was found to be .234 for Information Acquisition and .331 for Information Control.

Data Analysis

Prior to the main analysis of the data from the Inquiry Skills Scale, the Kolmogorov-Smirnov test was run to test the assumption of normality, and skewness and kurtosis coefficients were examined to understand whether the variables showed a normal distribution. The values from the calculations are presented in Table 2 below.

Table 2

Values Regarding the Inquiry Skills Scale and its Factors

Scale Factors	*Kolmogorov-Smirnov*			*Skewness*	*Kurtosis*
	Statistic	*df*	*Sig.*		
Factor1: Information Acquisition	.097	536	.000	-.404	-.008
Factor 2: Information Control	.089	536	.000	-.168	-.248
Factor 3: Self-Confidence	.083	536	.000	-.153	-.564
Whole Scale: Inquiry Skills	.049	536	.003	-.143	-.249

As seen in Table 2, the results of the Kolmogorov-Smirnov test indicate that the scale does not exhibit a normal distribution ($p<.05$). However, the skewness and kurtosis values for the overall scale and all its factors range between -1 and +1. Skewness and kurtosis coefficients within the range of -1 to +1 can be considered as a measure of the normality assumption (Morgan, Leech, Gloeckner, & Barrett, 2004). Accordingly, it can be stated that the data were normally distributed.

When interpreting the mean values of the Inquiry Skills Scale, its sub-dimensions, and the overall scale, the minimum and maximum values obtained from the overall scale and its sub-dimensions are classified according to a five-point scale. This classification is presented in Table 3.

Table 3

Value Ranges for the Overall Scale and its Sub-Dimensions

Sub-dimension	*Never*	*Seldom*	*Sometimes*	*Often*	*Always*
Information Acquisition (6 items)	6.00-10.80	10.81-15.60	15.61-20.40	20.41-25.20	25.21-30.00
Information Control (5 items)	5.00-9.00	9.01-13.00	13.01-17.00	17.01-21.00	21.01-25.00
Self-Confidence (3 items)	3.00-5.40	5.41-7.80	7.81-10.20	10.21-12.60	12.61-15.00
Overall Scale	14.00-25.20	25.21-36.40	36.41-47.60	47.61-58.80	58.81-70.00

In the data analysis, independent samples t-tests were run to determine whether there were differences between the mean scores of the Inquiry Skills Scale and the mean scores of the scale sub-dimensions according to gender. One-Way Analysis of Variance (ANOVA) was utilized to ascertain whether the scores varied based on the participant students' desire to pursue graduate education, perceived academic achievement, and their level of willingness to be enrolled in the department. The analyses were interpreted by including the percentage, frequency, mean and standard deviation values of the variables at the .05 significance level. The Cohen's d statistic, calculated to assess the effect size of the standardized difference between the means, was reported. The ETA squared value obtained in the analysis was interpreted as .01=small effect, .06=medium effect, and .14=large effect (Cohen, 1988).

Stepwise regression, an appropriate statistical technique for prediction studies, was used. While the discrete variables in the study were included in the regression analysis by coding them as dummy variables, continuous variables were included in the analysis with their original values. Information on the dummy coding of all variables included in the analysis is provided in Table 4.

Table 4

Coding of Dummy Variables

Discrete Variables	*Level*	*Dummy Variable*	*Coding*	*Excluded Category*
Gender	1. Male 2. Female	Gender	Female: 0 Male: 1	Female
Desire to pursue graduate education	1. Yes 2. Undecided 3. No	Yes Undecided	Yes: 1 Undecided: 0 Yes: 0 Undecided:1	No
Perceived academic achievement	1. Unsuccessful 2. Partially successful 3. Successful	Unsuccessful Partially Successful	Successful: 1 Partially Successful: 0 Partially Successful: 0 Successful: 1	Unsuccessful
Level of willingness to be enrolled in their department	1. Unwilling 2. Partially willing 3. Willing	Unwilling Partially Willing	Willing: 1 Partially willing: 0 Willing: 0 Partially willing: 1	Unwilling

Since multiple regression analysis is highly sensitive to outliers (Pallant, 2016), 18 outlier data points were excluded from the analysis. Assumptions of multiple linear regression analysis

were tested, including normal distribution, linearity, constant variance, absence of autocorrelation and absence of multicollinearity among independent variables (Kalaycı, 2009). Relationships between standardized predicted values and standardized error values were examined with graphs to assess assumptions of normality and linearity (Figure 1 and Figure 2). According to Figure 1, the histogram and normal distribution curves generated for the standardized predicted values demonstrate a distribution close to normal, and according to Figure 2, it can be suggested that there is a linear and positive relationship between the variables.

Figure 1

Histogram and Normality Curve Regarding Inquiry Skills

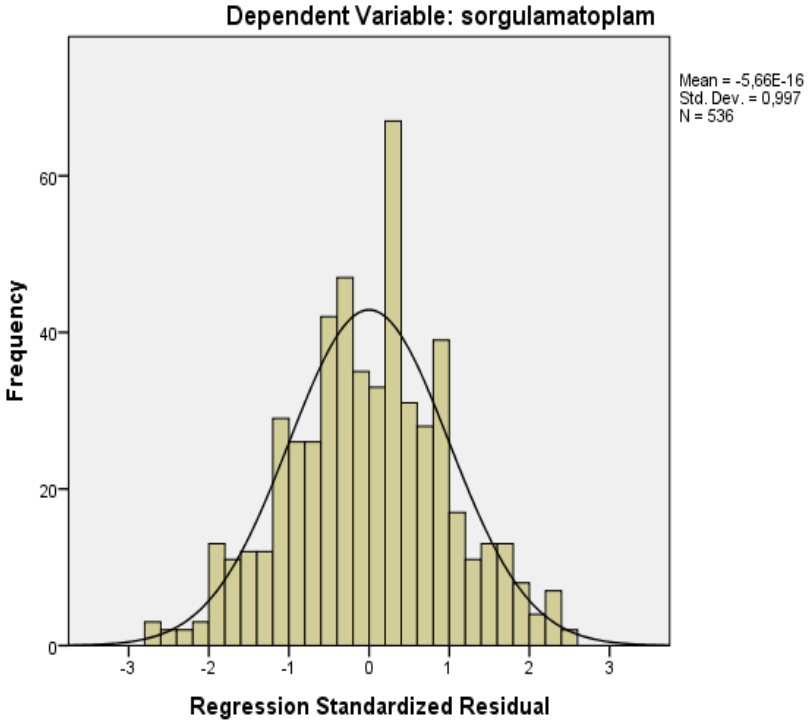
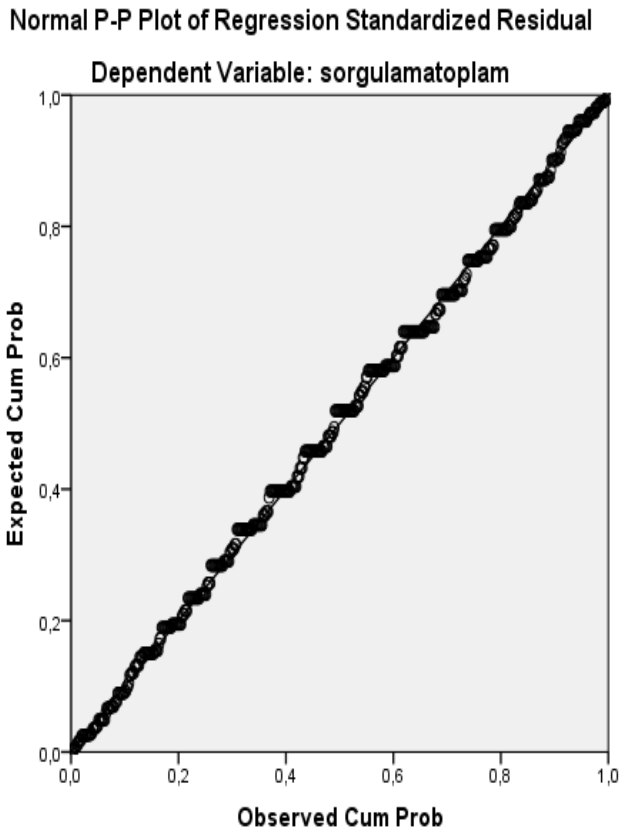


Figure 2

Linearity Distribution Regarding Inquiry Skills



The examination of the multicollinearity indicators among the predictor variables showed that the tolerance values ranged between 0.352 and 1.00, the Variance Inflation Factor (VIF) values ranged between 1.00 and 2.836, and the highest condition index (CI) value was 6.199. According to Pallant (2016), to avoid multicollinearity in the analysis, the VIF value should be less than 10, and the tolerance value should be greater than 0.10. In this case, it can be concluded that there is no multicollinearity problem. The Durbin-Watson statistic, used to test autocorrelation, indicates that values less than 1 and greater than 3 suggest errors among the residuals. A value close to 2- is preferred (Field, 2009, p. 236). In this study, a Durbin-Watson value of 1.80 indicated an absence of autocorrelation. The standardized residual value ranged between -2.73 and 2.53. Tabachnick and Fidell (2013) suggest that these values should fall between +3.3 and -3.3. The Mahalanobis distance values varied between .794 and 14.416. This value is below the threshold of 24.32, established for a minimum number of independent variables, which is seven (Pallant, 2016). The maximum value for Cook's Distance is 0.034. The fact that this value was below 1 indicated that the data were fit for regression (Tabachnick & Fidell, 2013).

Findings

In this section, the findings obtained in the present study are presented in line with the sub-problems.

Level of University Students' Inquiry Skills

The descriptive statistics for the inquiry skills scores of the scale sub-dimensions and the overall scale are presented in Table 5.

Table 5

Descriptive Statistics for Inquiry Skills

Scale Factors	*N*	*Min.*	*Max*	$\bar{x}$	*Sd*
Factor 1: Information Acquisition	536	15.00	30.00	24.15	2.90
Factor 2: Information Control	536	9.00	25.00	17.88	3.16
Factor 3: Self-Confidence	536	3.00	15.00	9.91	3.02
Whole Scale: Inquiry Skills	536	34.00	69.00	51.95	6.88

As seen in Table 5, students' mean scores for Information Acquisition, Information Control, and the overall scale were at the "often" level. The Self-Confidence scores were found to be at the "seldom" level.

Examination of Inquiry Skills according to Sex Variable

Independent samples t-tests were conducted to determine whether there was a significant difference in the inquiry skills for the gender variable. The results of the analysis are presented in Table 6.

Table 6

Results of T-test Analysis According to Gender

	Gender	*N*	$\bar{x}$	*Sd*	*df*	*t*	*p*
Factor 1: Information Acquisition	Female	160	24.53	3.02	534	1.936	.053
	Male	376	23.99	2.85			
Factor 2: Information Control	Female	160	17.89	3.30	534	.036	.971
	Male	376	17.88	3.11			
Factor 3: Self-Confidence	Female	160	10.03	3.15	534	.585	.559
	Male	376	9.86	2.97			
Whole Scale: Inquiry Skills	Female	160	52.45	7.57	534	1.090	.276
	Male	376	51.74	6.57			

As can be seen in Table 6, no significant difference is observed between university students' scores on the sub-dimensions of Information Acquisition ($t=1.936$, $p>.05$), Information Control ($t=.036$, $p>.05$), Self-Confidence ($t=.585$, $p>.05$), and the total scores of Inquiry Skills ($t=1.090$, $p>.05$) of university students based on gender.

Examination of Inquiry Skills According to the Students' Desire to Pursue Graduate Education Variable

The arithmetic means and standard deviations of the scores on the Inquiry Skills Scale according to the variable of the desire to pursue graduate education were calculated. These results are presented in Table 7.

Table 7

Frequency, Mean Score, and Standard Deviation Values According to Students' Desire to Pursue Graduate Education

Desire to pursue graduate education	*N*	*Information Acquisition*		*Information Control*		*Self-Confidence*		Inquiry Skills	
		x̄	*Sd*	*x̄*	*Sd*	*x̄*	Sd	x̄	Sd
1. Yes	220	24,34	2,79	18.30	3.04	9.94	3.11	52.60	6.80
2. No	84	23.52	3.09	16.95	3.46	9.19	2.96	49.66	7.07
3. Undecided	232	24.19	2.91	17.82	3.09	10.14	2.92	52.16	6.74

Table 7 demonstrates that the scores of Inquiry Skills vary according to students' desire to pursue graduate education. ANOVA was performed to determine whether the scores showed a significant difference, and the analysis results are presented in Table 8.

Table 8

ANOVA Test Results Based on Students' Desire to Pursue Graduate Education

		Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*	*Sig. Dif. (Scheffe)*	*Eta Squared*
AInformation Acquisition	Between Groups	41.878	2	20.93	2.487	.084	-	-
	Within Groups	4487.577	533	8.41				
	Total	4529.455	535					
CInformation Control	Between Groups	113.512	2	56.75	5.764	.003	2<1	.02
	Within Groups	5248.546	533	9.84				
	Total	5362.058	535					
Self-Confidence	Between Groups	56.737	2	28.36	3.132	.044	2<3	.01
	Within Groups	4827.315	533	9.057				
	Total	4884.052	535					
Inquiry Skills	Between Groups	541.923	2	270.96	5.824	.003	2<1 2<3	.02
	Within Groups	24795,911	533	46,52				
	Total	25337,834	535					

In Table 8, it is observed that there is a statistically significant difference in the scores of inquiry skills in the sub-dimensions of Information Control (F (2,535)=5.764, p<.05), Self-Confidence (F(2,535)=3.132, p<.05), and the overall scale (F(2,535)=5.824, p<.05) based on the desire to pursue graduate education. In contrast, the difference between the scores in the sub-dimension of Information Acquisition was not significant. Following this process, complementary post-hoc analysis techniques were conducted to determine which groups accounted for the significant differences identified after ANOVA.

To decide which post-hoc multiple comparison technique to use after ANOVA, the hypothesis of whether the variances of the group distributions were homogeneous or not was first tested using Levene's test. When the variances were found homogeneous, the Scheffe multiple comparison method was employed, whereas Games-Howell technique was utilized when the variances were found to be non-homogeneous. Accordingly, it was observed that the scores for inquiry skills, based on the desire to pursue graduate education, were lower for students who did not desire to pursue graduate education were lower than those who did. Similarly, the self-confidence skills and inquiry skills of students who did not want to pursue graduate education were lower than those of students who were undecided about pursuing graduate education. Also, the eta-squared values were small.

Examination of Inquiry Skills According to the Perceived Academic Achievement Variable

The arithmetic means and standard deviations of the Inquiry Skills Scale scores were calculated according to the variable of perceived academic achievement. The results are presented in Table 9.

Table 9

Frequency, mean score, and standard deviation values according to the academic perceived achievement variable

Perceived Academic achievement	*N*	*Information Acquisition*		*Information Control*		*Self-Confidence*		*Inquiry Skills*	
		$\bar{x}$	*Sd*	$\bar{x}$	*Sd*	$\bar{x}$	*Sd*	$\bar{x}$	*Sd*
1. Unsuccessful	53	21.51	3.32	15.75	3.34	8.58	3.20	45.85	7.34
2. Partially successful	163	24.06	2.76	17.48	3.22	9.59	3.05	51.13	6.50
3. Successful	320	24.64	2.67	18.45	2.92	10.30	2.90	53.38	6.37

As can be seen in Table 9, the inquiry skills scores vary according to students' perceived academic achievement. ANOVA was performed to determine whether the scores showed a significant difference based on perceived academic achievement. The results of the analysis are provided in Table 10.

Table 10

ANOVA test results according to the perceived academic achievement variable

		Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*	*Sig. Dif. (Scheffe)*	*Eta Squared*
AInformation Acquisition	Between Groups	446.873	2	223.437	29.171	.000	2>1 3>1	
	Within Groups	4082.582	533	7.660				.099
	Total	4529.455	535					
CInformation Control	Between Groups	368.475	2	184.237	19.665	.000	3>1 3>2 2>1	
	Within Groups	4993.583	533	9.369				.069
	Total	5362.058	535					
Self-Confidence	Between Groups	158.524	2	79.262	8.940	.000	3>1 3>2	
	Within Groups	4725.528	533	8.866				.032
	Total	4884.052	535					
Inquiry Skills	Between Groups	2741.025	2	1370.513	32.327	.000	3>1 3>2 2>1	
	Within Groups	22596,809	533	42.396				.108
	Total	25337,834	535					

As observed in Table 10, there is a statistical difference between the scores in the sub-dimensions of the Inquiry Skills Scale: Information Acquisition ($F(2,535)=29.171$, $p<.05$), Information Control ($F(2,535)=19.665$, $p<.05$), Self-Confidence ($F(2,535)=8.940$, $p<.05$), and the overall scale ($F(2,535)=32.320$, $p<.05$). After confirming that the variances of group distributions were homogeneous using the Levene's test, Scheffe's method of multiple comparison was used. Accordingly, students who perceived themselves as academically unsuccessful had lower Information Acquisition scores than those who perceived themselves as successful and partially successful. The eta squared value was .09, which indicates a moderate level. The scores of students who perceived themselves as academically successful in controlling information were higher than those who perceived themselves as academically unsuccessful and partially successful. Similarly, the scores of students who perceived themselves as partially successful were higher than those who perceived themselves as academically unsuccessful in controlling information. The eta squared value was .06, indicating a moderate level. In the Self-Confidence sub-dimension, the scores of students who perceived themselves as academically successful were higher than those who perceived themselves as academically unsuccessful and partially successful. The effect size was .03, indicating a small level. Finally, the scores of the inquiry skills for students who perceived themselves as academically successful were higher than those who perceived themselves as academically unsuccessful and partially successful. Similarly, the scores of the inquiry skills for the students who perceived themselves as partially successful were higher than those who perceived themselves as unsuccessful. The eta squared value was .108, indicating a moderate level.

Examination of Inquiry Skills According to the Variable of Willingness to be enrolled in their Department

The arithmetic means and standard deviations of the Inquiry Skills Scale scores were calculated according to the variable of willingness to be enrolled in their department. The results are presented in Table 11.

Table 11

Frequency, Mean Score, and Standard Deviation Values According to The Level of Willingness to be Enrolled in Their Department

Being Enrolled in their department	*N*	*Information Acquisition*		*Information Control*		*Self-Confidence*		*Inquiry Skills*	
		$\bar{x}$	*Sd*	$\bar{x}$	*Sd*	$\bar{x}$	*Sd*	$\bar{x}$	*Sd*
1. Unwilling	56	23.46	3.60	16.61	3.64	9.27	3.71	49.34	8.29
2. Partially willing	78	23.33	3.03	17.01	2.88	9.14	2.65	49.49	6.79
3. Willing	402	24.41	2.74	18.23	3.08	10.15	2.95	52.80	6.49

As observed in Table 11, the inquiry skills scores vary according to the variable of willingness to be enrolled in their department. ANOVA was performed to determine whether the scores showed a significant difference according to the level of willingness to be enrolled in their department, and the analysis results are presented in Table 12.

Table 12

ANOVA Test Results According to the Level of Willingness to be Enrolled in Their Department

		Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*	*Sig. Dif. - Howell)*	*Eta Squared*
Information Acquisition	Between Groups	105.099	2	52.549	6.331	.002	3>2	.023
	Within Groups	4424.356	533	8.301				
	Total	4529.455	535					
Information Control	Between Groups	199.694	2	99.847	10.309	.000	3>1 3>2 2<1	.037
	Within Groups	5162.364	533	9.685				
	Total	5362.058	535					
Self-Confidence	Between Groups	93.184	2	46.592	5.183	.006	3>2	.019
	Within Groups	4790.869	533	8.988				
	Total	4884.052	535					
Inquiry Skills	Between Groups	1142.520	2	571.260	12.584	.000	3>2	.045
	Within Groups	24195.314	533	45.395				
	Total	25337.834	535					

In Table 12, it is observed that there is a significant difference between the scores in the sub-dimensions of the Inquiry Skills Scale: Information Acquisition ($F(2,535)=6.331$, $p<.05$),

Information Control (F(2,535)=10.339, p<.05), Self-Confidence (F(2,535)=5.183, p<.05), and the overall scale (F(2,535)=12.584, p<.05) according to the variable of willingness to be enrolled in their department. After it was determined that the variances of the group distributions were not homogeneous using Levene's test, the Games-Howell multiple comparison technique was utilized. Accordingly, it was found that students who chose the department willingly had higher scores in Information Acquisition compared to those who were enrolled in their department partially willingly. The eta squared value was .02, indicating a small level of effect. The Information Control scores of the students who were enrolled willingly in the department were higher than those who were enrolled in the department partially willingly and unwillingly. Partially willing students had lower scores than unwilling students. The eta squared value was .03, indicating a small effect size. Finally, regarding the Self-Confidence sub-dimension and overall inquiry skills, it was found that the scores of the students who were enrolled willingly in the department were higher than the scores of the students who were enrolled partially willingly in the department. The effect size was found to be small.

Examination of the Predictors of Inquiry Skills

The results of the multiple regression analysis performed using the stepwise model on the data regarding the variables of gender, desire to pursue graduate education, perceived academic achievement, and willingness to be enrolled in their department, which are all regarded as factors affecting the inquiry skills scores, are presented in Table 13. As presented in Table 13, the stepwise regression analysis excludes the variables regarding gender and graduate education in the analysis since they did not predict inquiry skills significantly.

Table 13

Results of Stepwise Multiple Regression Analysis Predicting Inquiry Skills

	Model-Predictor variables	*B*	*Std. Error*	*Beta*	*t*	*sig*	*Partial (r)*	*Part (R)*	*R*	R^2	*F*	*p*
Model 1	Constant	49.833	.453		109.910	.00			.253	.064	36,621	.000
	Successful	3.551	.587	.253	6.052	.00	.253	.253				
Model 2	Constant	45.849	.894		51.264	.00			.329	.108	32.327	.000
	Successful	7.535	.966	.538	7.804	.00	.320	.319				
	Partially Successful	5.280	1.030	.353	5.128	.00	.217	.210				
Model 3	Constant	46.314	.900		51.474	.00			.352	.124	25.116	.000
	Successful	7.371	.959	.526	7.683	.00	.316	.312				
	Partially Successful	5.253	1.021	.351	5.143	,00	.218	.209				
	Partially Willing	-2.465	.794	-.126	-3.106	.00	-.133	-.26				

As observed in Table 13, according to the regression analysis, three models were formed when the predictor variables were gradually added. While "successful" was the predictor variable in the first model, "partially successful" variable was added to the second model. In the third model, it was noticed that 12% (R^2= .214) of the variance in the predictor variable of being enrolled in their department partially willingly was explained by these three variables.

Upon examining the bivariate and partial correlations, it is noted that there is a positive correlation with low-level inquiry skills for both successful ????a positive correlation with a low-level inquiry skills for both successful (r=-.32) and partially successful (r=.22) perceptions. A low-level negative correlation (r=-.13) was observed between being enrolled in the department partially willing and inquiry skills.

The model created to explain the inquiry skills score was significant at α=.05 level (F=25.116 p<.05). According to the standardized regression coefficient in the third model, which explains the largest variance in the predictor variable, it was observed that the variable accounting for the largest variance in inquiry skills scores among the predictor variables was perceiving oneself to be academically successful (β=.52), followed by the variable perceiving oneself partially successful (β=.35) and being enrolled in the department partially willingly (β=-.12). According to the third model of the stepwise multiple regression analysis, the regression equation for the prediction of inquiry skills was as follows:

Inquiry Skills =46.314+7.371*Successful+5.253*Partially Successful-2.465*Partially Willing

Discussion and Recommendations

The present study aimed to examine the inquiry skills of university students according to the variables of gender, desire to pursue graduate education, perceived academic achievement, and being enrolled willingly in their department.

1. According to the study results, the inquiry skills of university students were at a high level across the scale. When the sub-factors were analyzed, the mean scores of the students for Information Acquisition, Information Control, and the overall scale were at the “often” level, whereas Self-Confidence scores were at the “sometimes” level. In similar studies on inquiry skills conducted with university students (Alkış Küçükaydın, 2020; Balbağ & Aynur, 2020), the researchers found that students' inquiry skills were above average.
   The examination of the scores of the scale sub-dimensions and the overall scale did not reveal a significant difference according to the gender variable. Similar studies conducted with preservice teachers (Bedir & Duman, 2017; Elmalı & Yıldız, 2017) concluded that the gender variable did not determine inquiry skills. That gender is not determinative of inquiry skills, which are intellectual skills, is a significant result.
2. When inquiry skills were analyzed according to the variable of students' perceived academic achievement, it was observed that students who considered themselves as partially successful and successful received higher average scores in all sub-dimensions of the scale and the overall scale compared to students who perceived themselves as unsuccessful, and they differed significantly. The literature has reported a significant positive relationship between university students' inquiry and self-directed learning skills (Öztürk et al., 2017). Varlı and Sağır (2019) and Balım (2009) concluded that inquiry-based learning increases student achievement. These results suggest that the high academic achievement of students with high-level inquiry skills may be related to students' learning skills in this study.
3. The study results showed that the inquiry skills of students who did not want to pursue graduate education were lower than those who wanted to pursue graduate education and undecided students. The participating students who did not want to pursue graduate

education were also students possessing a low level of perceived academic achievement. Therefore, this result can be interpreted as students with low academic achievement may also have low inquiry skills. This result is also consistent with the studies of Varlı and Sağır (2019) and Balım (2009), which argued that inquiry-based learning increases student achievement.

4. The students who were enrolled in their department willingly had higher scores in Information Acquisition, Information Control, Self-Confidence, and the overall scale compared to the students who were enrolled in their department partially willingly. In order for students to be successful and contribute to their fields, they must first have a predisposition to that field and be interested in their fields. When students are happy and enjoy working on academic subjects, their academic success increases. This explains the higher level of inquiry skills of students who major in the field they like or want.

Inquiry skills showed a moderate positive relationship with those who perceived themselves as academically successful and a low positive relationship with those who perceived themselves as partially successful. In the study, perceived academic achievement of being successful or partially successful was determined to be a predictor of inquiry skills. These results revealed again that students with a high level of perceived academic achievement also have high inquiry skills.

The study also revealed a low level and negative relationship between being enrolled in their department partially willingly and inquiry skills and that being enrolled in their department partially voluntarily is a predictor of inquiry skills. This result shows that the inquiry skills of the students enrolled in their department partially willingly were low.

Conclusion

In the present study, where we examined the inquiry skills of university students according to various variables, we obtained significant results. The scores of the participant students' inquiry skills were found to be at a high level. The scale used in the study, which was a self-assessment scale and is vital to note, revealed positive relationships between students' inquiry skills and the variables of perceived academic achievement, being enrolled in the department willingly, and their desire to pursue graduate education.

These students are likely to be those who are interested in their departments, possess predispositions, and thus have positive attitudes towards learning. The study results revealed the importance of students' selecting their majors based on their interests and, in this context, the importance of proper guidance, especially during K12. The interest of students currently continuing their education in the department may increase over time. Planned in-class and out-of-class (out of school) activities can be arranged within the department for this purpose. Thus, increasing students' interest and attitudes towards the department can also improve their inquiry skills. In addition, promoting inquiry-based teaching in university education also supports the development of inquiry skills. One effective way to strengthen higher education institutions is by helping students develop advanced skills that will prepare them to navigate the uncertainties they may face in the future. Finally, more in-depth research should be conducted on whether the increase in academic achievement directly affects inquiry skills. Researchers can explore the role of teacher knowledge, beliefs, and practices in facilitating the development of students' inquiry skills.

Declarations

Ethical Approval and Informed Consent

This study was approved by Bandırma Onyedi Eylül University Institutional Ethical Review Board. All procedures in this study were conducted in accordance with Bandırma Onyedi Eylül University Institutional Review Board's approved protocols. Written informed consent was obtained from the participants for their anonymized information to be published in this article.

Supplemental Material

There are no supplemental materials for this paper.

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TÜRKÇE GENİŞ ÖZET
Lisans Öğrencilerinin Sorgulama Becerilerinin İncelenmesi ve Yordayıcılarının Belirlenmesi

Giriş

Sorgulama becerileri; öğrencilerin entelektüel ve kişisel gelişimi, akademik başarısı ve topluma katkı sağlamaları açısından hayati öneme sahiptir. Bu beceriler; eleştirel düşünme, problem çözme ve karar verme süreçlerini geliştirir. Öğrenciler sıklıkla kesin cevapları olmayan açık uçlu sorunlarla karşılaşırlar, bu da sorgulamayı önemli kılar. Üniversiteler, bilgi aktaran ve öğrencilerin pasif dinleyiciler olduğu kurumlar yerine, sorgulama ve yaratıcılığı teşvik eden ve yaşam boyu öğrenme becerilerini aşılayan kurumlar olmalıdır (Polat & Odabaş, 2008). Bilim ve teknolojideki hızlı gelişmeler, geleneksel konu temelli öğretimle bu değişimlere ayak uydurmayı zorlaştırır. Bu nedenle, öğrencilerin yaşam boyu öğrenme ve üst düzey düşünme, sorgulama, problem çözme, eleştirel düşünme becerilerini ve yaratıcılıklarını geliştirmeleri gerekmektedir.

Sorgulama becerileri, çeşitli bilgi alanlarına aktarılabilir ve merak, eleştirel analiz ve kanıta dayalı cevapların arayışını teşvik eder. Sorgulama, belirli bir amaç için sorular sormayı, düşünmeyi, öğrenmeyi ilerletmek için araştırma yapmayı içerir (Güneş, 2016) ve dikkati çeken soruları aktif olarak takip etmeyi gerektirir (Harlen, 2014). Palmer (2009), sorgulama becerilerini araştırılabilir sorular önerme, gözlem yapma, açıklama ve raporlama olarak tanımlar. Sorgulama becerileri, yaşam boyu öğrenme için kritiktir ve öğrencilerin akıl yürütme yeteneklerini geliştirir (Hunter & Arthur, 2016); analiz, sentez ve değerlendirme gibi yüksek düzeyde bilişsel alanlarla uyumludur (Bloom, 1956). Öğrencilerin soru sorma ve sorgulama kapasitelerini değerlendirmek önemlidir. Merak ve soru sormak, düşünmeyi geliştirmenin anahtarıdır (De Bono, 2008; Boghossian, 2012). Özetle, sorgulama becerileri sadece akademik başarı için değil, aynı zamanda kişisel gelişim, bilinçli vatandaşlık ve topluma anlamlı katkılar sağlama açısından da hayati öneme sahiptir. Bu araştırma çalışmasını yönlendirmek için şu üç araştırma sorusu formüle edilmiştir:

1. Üniversite öğrencilerinin sorgulama beceri düzeyi nedir?
2. Üniversite öğrencilerinin sorgulama becerileri;
    a) Cinsiyete,
    b) Lisansüstü eğitim alma isteğine,
    c) Algılanan akademik başarıya,
    d) Bölümü isteyerek seçme düzeylerine göre, anlamlı bir farklılık gösteriyor mu?
3. Cinsiyet, lisansüstü eğitim alma isteği, algılanan akademik başarı ve bölümü isteyerek seçme, üniversite öğrencilerinin sorgulama becerilerini ne derecede yordamaktadır?

Yöntem

Üniversite öğrencilerinin sorgulama becerilerini çeşitli değişkenlere göre ölçmeyi ve bu becerilerin yordayıcılarını tespit etmeyi amaçlayan bu çalışma, ilişkisel araştırma tasarımı kullanılarak gerçekleştirilmiştir. Örneklem büyüklüğü, %95 güven düzeyi ve %5 güven aralığı ile Raosoft örneklem büyüklüğü hesaplayıcısı (http://www.raosoft.com/samplesize.html?nosurvey) kullanılarak 372 olarak belirlenmiştir. Veriler Türkiye'deki üç farklı devlet üniversitesinden toplanmıştır. Çalışmadaki veriler, olasılıksız örnekleme yöntemlerinden biri olan kolayda örnekleme yoluyla toplanmıştır. Kolayda örneklemede, araştırmacı en erişilebilir katılımcılardan başlayarak örneklemi oluşturur (Cohen, Manion ve Morrison, 2018). Sonuç olarak, 554 gönüllü mühendislik fakültesi öğrencisine ulaşılmıştır.

Çalışmanın verileri, Aldan Karademir ve Saracaloğlu (2013) tarafından geliştirilen 'Sorgulama Becerileri Ölçeği' kullanılarak toplanmıştır. Açıklayıcı faktör analizi (AFA), 14 maddeden oluşan üç faktörlü bir yapı ortaya koymuş ve her bir faktör teorik çerçeveye göre sırasıyla "bilgi edinme", "bilgiyi kontrol etme" ve "özgüven" olarak adlandırılmıştır. Analize geçmeden önce, Sorgulama Becerileri Ölçeği'nden elde edilen verilerin normallik varsayımını test etmek için Kolmogorov-Smirnov testi uygulanmış, değişkenlerin normal dağılım gösterip göstermediğini anlamak için çarpıklık ve basıklık katsayıları incelenmiş ve verilerin normal dağılım gösterdiği sonucuna varılmıştır.

Bulgular

Yapılan analizler sonucunda öğrencilerin "bilgi edinme", "bilgiyi kontrol etme" ve genel ölçek için sorgulama becerileri ortalama puanları "sıklıkla" düzeyinde, "özgüven" puanları ise "nadiren" düzeyinde bulunmuştur. Cinsiyetin öğrencilerin sorgulama becerileri üzerinde anlamlı bir farklılık yaratmadığı görülmüştür. Sorgulama becerileri puanlarının, öğrencilerin lisansüstü eğitim alma isteğine göre değişip değişmediğini belirlemek için ANOVA testi yapılmıştır. Buna göre, lisansüstü eğitim alma isteğine göre sorgulama becerileri puanlarının, lisansüstü eğitim almak istemeyen öğrenciler için, lisansüstü eğitim almak isteyen öğrencilere göre daha düşük olduğu gözlemlenmiştir. Sorgulama becerileri puanlarının öğrencilerin algılanan akademik başarılarına göre değişip değişmediğini belirlemek için ANOVA testi yapılmıştır. Buna göre kendilerini kısmen başarılı ve başarılı olarak değerlendiren öğrencilerin, kendilerini başarısız olarak değerlendiren öğrencilere göre ölçeğin tüm alt boyutlarında ve genel ölçek ortalama puanlarında daha yüksek puanlar aldıkları ve anlamlı bir şekilde farklılaştıkları gözlemlenmiştir. Çalışma ayrıca, bölümlerini kısmen isteyerek seçme ile sorgulama becerileri arasında düşük düzeyde ve negatif bir ilişki olduğunu ve bölümlerini kısmen isteyerek seçmenin sorgulama becerilerinin bir yordayıcısı olduğunu ortaya koymuştur.

Tartışma

Çalışma sonuçlarına göre, üniversite öğrencilerinin sorgulama becerileri genel olarak yüksek düzeydedir. Üniversite öğrencileriyle yapılan benzer sorgulama becerileri çalışmalarında (Alkış Küçükaydın, 2020; Balbağ & Aynur, 2020), araştırmacılar öğrencilerin sorgulama becerilerinin ortalamanın üzerinde olduğunu bulmuşlardır.

Öğrencilerin algılanan akademik başarı değişkenine göre sorgulama becerileri incelendiğinde, kendilerini kısmen başarılı ve başarılı olarak değerlendiren öğrencilerin, kendilerini başarısız olarak değerlendiren öğrencilere göre ölçeğin tüm alt boyutlarında ve genel ölçek ortalama puanlarında daha yüksek puanlar aldıkları ve anlamlı bir şekilde

farklılaştıkları gözlemlenmiştir. Literatürde, üniversite öğrencilerinin sorgulama becerileri ile kendi kendine öğrenme becerileri arasında anlamlı pozitif bir ilişki olduğu bildirilmiştir (Öztürk ve ark., 2017). Varlı ve Sağır (2019) ve Balım (2009), sorgulamaya dayalı öğrenmenin öğrenci başarısını artırdığını belirtmişlerdir. Bu sonuçlar, yüksek sorgulama becerilerine sahip öğrencilerin yüksek akademik başarıları algılarının, öğrencilerin öğrenme becerileri ile ilişkili olabileceğini düşündürmektedir.

Çalışma sonuçları, lisansüstü eğitim almak istemeyen öğrencilerin sorgulama becerilerinin, lisansüstü eğitim almak isteyen ve kararsız olan öğrencilere göre daha düşük olduğunu göstermiştir. Lisansüstü eğitim almak istemeyen katılımcı öğrenciler, aynı zamanda algılanan akademik başarı düzeyi düşük olan öğrencilerdir. Bu nedenle, bu sonuç, düşük akademik başarıya sahip öğrencilerin aynı zamanda düşük sorgulama becerilerine sahip olabileceği şeklinde yorumlanabilir. Bu sonuç, sorgulamaya dayalı öğrenmenin öğrenci başarısını artırdığını savunan Varlı ve Sağır (2019) ve Balım (2009) çalışmalarının sonuçlarıyla da tutarlıdır.

Sorgulama becerileri, kendilerini akademik olarak başarılı algılayanlar ile orta düzeyde, kısmen başarılı algılayanlar ile düşük düzeyde pozitif ilişki göstermiştir. Çalışmada, algılanan akademik başarı algısı, başarılı veya kısmen başarılı olma değişkenlerinin, sorgulama becerilerinin bir yordayıcısı olduğu belirlenmiştir. Bu sonuçlar, yüksek akademik başarı algısına sahip öğrencilerin aynı zamanda yüksek sorgulama becerilerine sahip olduğunu yeniden ortaya koymuştur. Çalışma ayrıca, bölümlerine kısmen isteyerek seçme ile sorgulama becerileri arasında düşük düzeyde ve negatif bir ilişki olduğunu ve bölümlerini kısmen isteyerek seçmenin sorgulama becerilerinin bir yordayıcısı olduğunu ortaya koymuştur. Bu sonuç, bölümlerini kısmen isteyerek seçen öğrencilerin sorgulama becerilerinin düşük olduğunu göstermektedir.

Sonuç ve Öneriler

Bu çalışmada, katılımcı öğrencilerin sorgulama becerileri puanları yüksek düzeyde bulundu. Çalışmada kullanılan ve öz değerlendirme ölçeği olan bu ölçek, öğrencilerin sorgulama becerileri ile algılanan akademik başarı, bölümü isteyerek seçme ve lisansüstü eğitim alma isteği değişkenleri arasında pozitif ilişkiler ortaya koydu.

Bu öğrenciler muhtemelen bölümlerine ilgi duyan, yatkınlıkları olan ve dolayısıyla öğrenmeye karşı olumlu tutum sergileyen bireylerdir. Öğrencilerin başarılı olmaları ve alanlarına katkıda bulunmaları için öncelikle o alana yatkınlıkları olması ve alanlarına ilgi duymaları gerekir. Öğrenciler mutlu olduklarında ve akademik konularda çalışmaktan zevk aldıklarında, o alandaki başarıları artar. Bu durum sevdikleri veya istedikleri alanda uzmanlaşan öğrencilerin daha yüksek düzeyde sorgulama becerilerini açıklar. Çalışmanın sonuçları, öğrencilerin ilgi alanlarına göre bölümlerini seçmelerinin önemini ve bu bağlamda, özellikle K12 sürecinde doğru yönlendirmenin önemini ortaya koymuştur. Öğrenciler için planlanmış ders içi ve ders dışı etkinlikler düzenlenebilir. Böylece, öğrencilerin bölüme olan ilgisi ve tutumları artırılarak sorgulama becerileri de geliştirilebilir. Ayrıca, üniversite eğitiminde sorgulamaya dayalı öğretimin teşvik edilmesi de sorgulama becerilerinin gelişimini destekleyebilir. Yükseköğretim kurumlarını güçlendirmenin etkili bir yolu, öğrencilerin gelecekte karşılaşabilecekleri belirsizliklerle başa çıkabilmeleri için onları hazırlayacak ileri beceriler geliştirmelerine yardımcı olmaktır. Son olarak, akademik başarıdaki artışın doğrudan sorgulama becerilerini etkileyip etkilemediği konusunda daha derinlemesine araştırmalar yapılmalıdır. Araştırmacılar, öğrencilerin sorgulama becerilerinin gelişimini kolaylaştırmada öğretmen bilgisi, inançları ve uygulamalarının rolünü inceleyebilirler.

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Analysis of Maarif Model of Century of Türkiye Secondary School Mathematics Curriculum According to SOLO Taxonomy

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Abstract

Curricula are regularly updated to keep pace with social developments and scientific advancements. In this context, a new curriculum called the Maarif Model of Century of Türkiye was introduced into the Turkish Education System in 2024. Taxonomic approaches are often employed in the development of curricula; however, the specific taxonomic approach used in this curriculam has not been disclosed. The aim of this study is to analyze the secondary school Mathematics Course outcomes of the Maarif Model of Century of Türkiye Educational Program using the SOLO taxonomy. The study utilized document analysis, a qualitative research method. The outcomes were analyzed according to the SOLO taxonomy using software developed by the researchers. The results of the analysis were then reported and discussed.

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Introduction

In today's world, rapid technological transformations have been impacting societies in both positive and negative ways across various domains. These changes affect individuals at every level, from social life to personal existence. In response, governments are enacting numerous regulations to keep pace with these developments, with a primary focus on education systems. Curricula that prepare individuals for social life serve as essential tools for adapting to these changes and transforming technological advancements into economic value. To help individuals keep up with the evolving world, curricula must be innovative and dynamic. Consequently, policymakers must update educational policies and curricula to align with technological transformations and societal needs, which is vital for enhancing a country's future competitiveness.

In this context, as of 2024, Türkiye has implemented the "Maarif Model of Century of Türkiye" (MEB, 2024). The core approach of this curriculum is defined as building a national identity beyond ideologies and fostering a society that embodies this identity. It is known that previous curricula in Türkiye utilized Bloom's taxonomy of cognitive domains (Demirel, 2015). However the taxonomic approach applied in the Maarif Model of Century of Türkiye hasn't been specified in references. This lack of clarity creates significant uncertainty in evaluating the pedagogical foundations and learning outcomes of the curriculum.

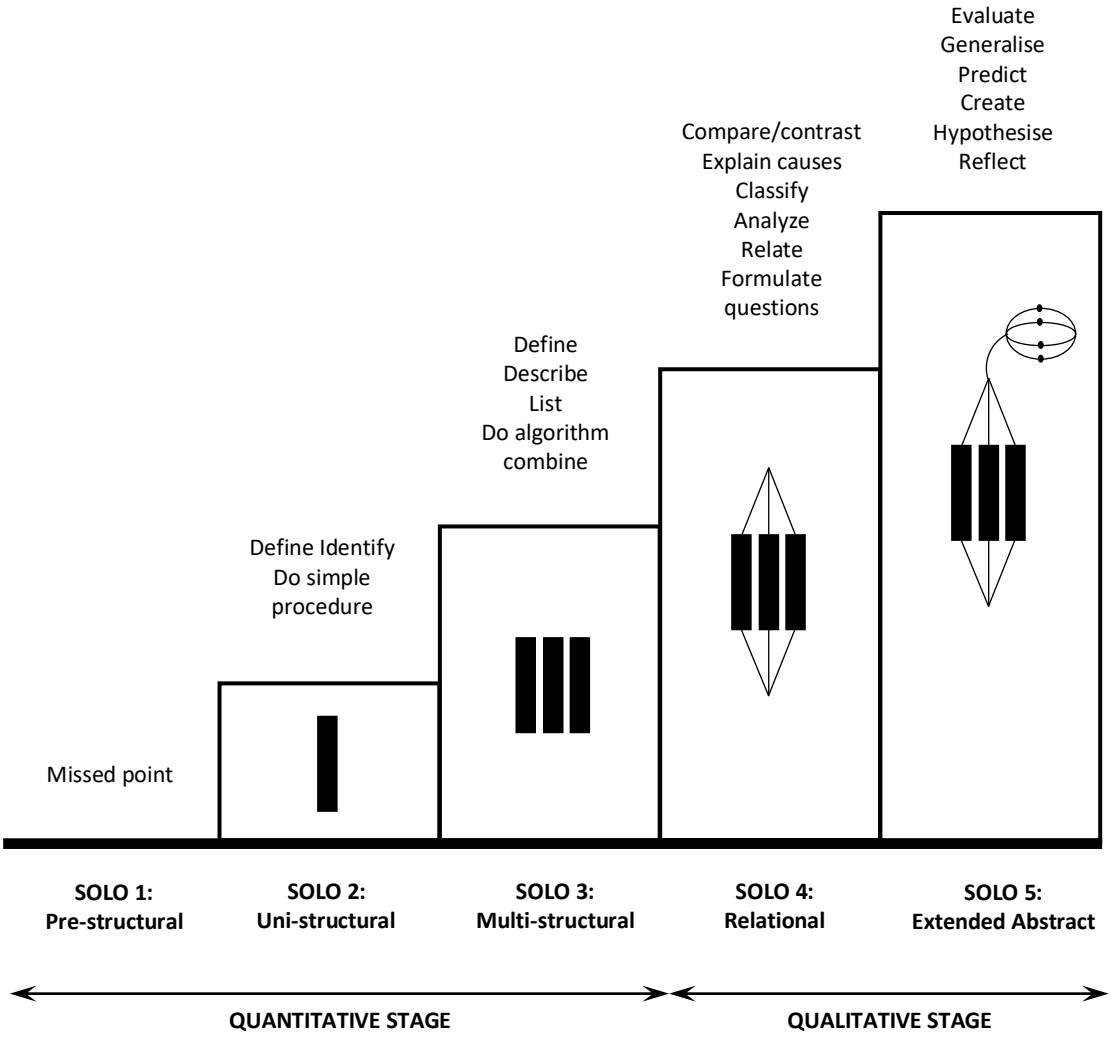
A curriculum comprises objectives, content, teaching-learning processes, and assessment activities. Objectives guide the implementation of educational activities within a structured plan and help achieve designated outcomes (Filiz & Yıldırım, 2019). Therefore, they are one of the most crucial components of curricula and are directly related to taxonomic approaches. Taxonomies are used to guide and facilitate the determination of objectives (Bümen, 2006). These approaches also provide references for identifying the cognitive learning performances required for objectives and the expected performance in assessment activities.

For many years, Bloom's taxonomy has been used in the Turkish educational system (Bümen, 2006; Demirel, 2019). However, there are numerous criticisms of Bloom's taxonomy in the literature (Ay, 2005; Furst, 1994; Krietzer & Madaus, 1994; Tutkun, 2012; Yüksel, 2007). Due to these criticisms, alternative approaches have been explored. Among them, the SOLO taxonomy is one of the most well-known and widely accepted internationally (Arı, 2013). The SOLO taxonomy addresses potential ambiguities in Bloom's taxonomy, particularly in determining cognitive levels (Hattie & Purdie, 1998). While Bloom's taxonomy was designed to select representative tasks for exams (Biggs & Collis, 1982), the SOLO taxonomy is used to assess the extent to which targeted learning outcomes are achieved and to evaluate teaching methods that support these outcomes (Brabrand & Dahl, 2009).

The SOLO taxonomy was developed by Biggs and Collis (1982, 1991). This taxonomy establishes a qualitative assessment system with a hierarchical structure to evaluate students' learning processes (Minogue & Jones, 2009). Due to its hierarchical integrity, each level incorporates the skills acquired at previous levels (Tomperi, 2016). The model is used to evaluate students' cognitive knowledge (Lian & Idris, 2006). According to the model, as the depth of learning increases, the structural complexity of the work produced by students as evidence of what they have learned also increases (Biggs & Collis, 1982).

Figure 1

Schematization of SOLO Taxonomy Levels (Biggs, 1999).



The explanation of the five-stage structure of the SOLO taxonomy is as follows (Brabrand & Dahl, 2009; Groth & Bergner, 2006; Hattie & Purdie, 1998; Minogue & Jones, 2009; Padiotis & Mikropoulos, 2010; Weyers, 2006):

- **Pre-structural Stage:** At this stage, the student is disengaged and lacks relevance to the topic. Meaningful learning does not occur; students rely on meaningless information and fail to grasp the essence of the issue. There is no meaningful connection between the students' questions and answers.
- **Uni-structural Stage:** In the unistructural stage, the student focuses on only one aspect of the content, such as conceptual structures or terminology. Due to this narrow focus, the level of understanding is low, and the student struggles to generate ideas about the relationship between the specific content and the overall concept.
- **Multi-structural Stage:** At the multistructural stage, the student can use one or more pieces of information to solve a problem but fails to establish connections

between them. A few meaningful yet independent attributes related to the topic are learned. However, since relational connections between these pieces of information are not made, the ideas generated are weak, and the statements lack consistency.

- **Relational Stage:** At the relational stage, the student begins to create meaningful wholes by integrating multiple points. The student achieves meaningful learning by establishing cause-and-effect relationships.
- **Extended Abstract Stage:** In the highest stage, the extended abstract stage, the student goes beyond the given information to develop theories, generalizations, creative ideas and can transfer this knowledge to new areas.

When examining the hierarchical structure of the SOLO taxonomy model, the abstract-qualitative stage is observed to correspond to early adulthood (Biggs & Collis, 2014). The SOLO taxonomy is believed to facilitate higher-level thinking, enhance academic performance, organize complex learning content, and support the completion of learning tasks (Aronshtam et al., 2021; Kaharuddin & Hajeniati, 2020). Studies comparing the SOLO taxonomy with other taxonomies are particularly noteworthy in the fields of mathematics, biology, and language teaching (Chan et al., 2002). In mathematics, the SOLO taxonomy is especially prominent, as it is widely used to interpret and assess the mathematical thinking skills of students at all levels (Vallecillos & Mareno, 2002).

According to Biggs and Collis (1982), SOLO taxonomy is different from Bloom's taxonomy which is widely used in the literature. Bloom's Taxonomy is criticized for the ambiguity of the differentiation between the levels of cognitive processes. SOLO taxonomy, on the other hand, focuses on the qualitative aspect of learning and offers a hierarchical distinction between the depth and complexity levels of students' conceptual understanding. It combines lower-order and higher-order thinking processes into a single framework, making it suitable for the assessment of learning outcomes in mathematics, where problem solving and conceptual understanding are crucial. The SOLO taxonomy provides evidence on the extent to which students achieve the intended learning outcomes. The taxonomy was used in this study because it is appropriate for the cognitive and hierarchical structure of the Maarif Model of Century of Türkiye . This study aims to analyze the middle school mathematics curriculum of the Maarif Model of Century of Türkiye using the SOLO taxonomy. The focus on mathematics stems from the widespread application of the SOLO taxonomy in subjects that require higher-order cognitive skills and practical application. Türkiye's educational policies and curricula are continuously evolving. In this context, the new educational approach known as the "Maarif Model of Century of Türkiye" has introduced significant innovations and changes to the middle school mathematics curriculum. Understanding how these changes impact students' learning levels and cognitive development is of great importance. The SOLO taxonomy, used to analyze the structure and complexity of students' learning outcomes, is considered an effective tool for evaluating curricula.

This study is significant as it analyzes the Maarif Model of Century of Türkiye's middle school mathematics curriculum through the lens of the SOLO taxonomy, revealing the curriculum's impact on students' learning processes and the quality of their outcomes. The analysis will provide valuable insights for institutions developing educational policies, as well as for teachers and educators, in identifying the strengths and weaknesses of the curriculum. Additionally, it will contribute to the development of pedagogical strategies necessary for increasing the

effectiveness and efficiency of mathematics teaching. Thus, the study aims to fill an important gap both theoretically and practically.

Method

This study utilizes document analysis, a qualitative research method involving the systematic examination of both printed and electronic materials (Bowen, 2009). Similar to other qualitative research techniques, document analysis entails reviewing and interpreting data to uncover meaning, gain insights into a topic, and draw conclusions (Corbin & Strauss, 2008). In this study, the middle school mathematics curriculum (grades 5-8) from the Maarif Model of Century of Türkiye, published online by the Board of Education and Discipline (TTK) under the Ministry of National Education (MEB), was analyzed.

To explore the relationship between learning outcomes and the SOLO taxonomy, researchers developed the "SOLO Taxonomic Analysis Algorithm." This software was employed to analyze the learning outcomes and determine their alignment with the SOLO taxonomy. The algorithm categorizes predicate structures of the SOLO taxonomy alongside those provided by the Ministry of National Education (MEB). It identifies connections with multiple categories, and researchers then reviewed outcomes with mismatched predicates to identify these categories. In the outputs analyzed with the algorithm, the outcomes that were compatible with more than one category predicate were determined by the researchers by determining which level they were at. As a result of the analysis, a collective report on the levels and outcomes was obtained and subjected to final control by the researchers.

Data Collection

Given that the study aims to examine the learning outcomes of the middle school mathematics curriculum, the mathematics curricula published by the Ministry of National Education (MEB, 2024) were utilized as the data collection tool. The published curriculum presents the middle school mathematics course comprehensively, addressing both learning and sub-learning areas, as well as unit structures. This holistic approach was chosen to align with the spiral nature of the mathematics curriculum.

Data Analysis

In this study, content analysis was employed to analyze qualitative data. Content analysis is a method used to examine and interpret the content of various data types, including visual and verbal information (Harwood & Garry, 2003). To facilitate a deeper analysis and interpretation, specific classifications were made according to the levels of the SOLO taxonomy, based on the document under examination by the researchers.

Validity and Reliability

In qualitative research, ensuring validity and reliability is crucial for enhancing the credibility of findings and the accuracy of results. Validity evaluates whether the research accurately measures what it intends to measure, while reliability ensures the consistency and reproducibility of results. These efforts contribute to the generalizability and internal consistency of the findings, thereby increasing the scientific value of the study. Strategies employed to ensure validity and reliability in qualitative research strengthen the

methodological rigor and boost readers' confidence in the findings (Creswell, 2013; Lincoln & Guba, 1985).

To enhance the internal validity of this study, all learning outcomes in the middle school mathematics curriculum were meticulously examined. The researchers conducted a thorough review of the entire curriculum to ensure its completeness, and this prolonged engagement helped to bolster the study's validity. To improve the external validity, the mathematics curriculum was clearly defined as the context of the study, with a solid theoretical foundation provided for the SOLO taxonomy. Furthermore, a comprehensive analysis was conducted, offering a reference point for future research. As to ensure reliability, a literature review was carried out, drawing on relevant studies in the field. This review helped to establish a sound foundation for the study, which was presented objectively, free from researcher bias.

Results

In analyzing the middle school mathematics curriculum of the Maarif Model of Century of Türkiye according to the SOLO taxonomy, the focus was placed on sub-achievement statements rather than the main sentences of the learning outcomes specified in the curriculum. During this analysis, the verb terms associated with different levels of the taxonomic approach were categorized, as illustrated in the table below.

Table 1

Verbs Used in SOLO taxonomic Analysis and Their Levels

Levels	Verbs
SOLO 2	Transfers, gathers information, notices, becomes aware, remembers, expresses, names, marks, counts, says, recognizes, describes, repeats, diagnoses, accesses data
SOLO 3	Explains, names, understands, differentiates, determines, combines, transforms, labels, calculates, examines, lists, creates a metaphor, clarifies, qualifies, numbers, exemplifies, plans, symbolizes, classifies, sequences, presents, defines, structures, places, applies methods
SOLO 4	Analyzes, distinguishes, combines, integrates, infers, solves, evaluates, modifies, obtains, justifies, observes, relates, expresses relationships, employs, accepts, decides, compares, categorizes, controls, uses, demonstrates, measures, proposes, finds patterns, selects, tests, classifies, questions, prepares questions, predicts, categorizes, provides justification, applies theory to the field, identifies, adapts, interprets
SOLO 5	Examines in depth, generalizes, hypothesizes, creates theory, develops strategies, predicts, discusses, designs, produces, makes assumptions, judges

Analysis of the Fifth-Grade Mathematics Curriculum

The fifth-grade mathematics curriculum comprises 23 learning outcomes and 108 achievement statements distributed across 6 themes. The number of achievement statements within each theme is as follows: Theme 1 (n=24), Theme 2 (n=18), Theme 3 (n=27), Theme 4 (n=20), Theme 5 (n=14), and Theme 6 (n=5). The analysis of these achievement statements according to the SOLO taxonomy is presented in Table 2.

Table 2

Analysis of Fifth-Grade Mathematics Achievements According to the SOLO Taxonomy

Learning Outcome	*SOLO 2*	*SOLO 3*	*SOLO 4*	*SOLO 5*	*Total*
5.1.1.	1	1	1	-	3
5.1.2.	-	4	4	2	10
5.1.3.	-	1	5	-	6
5.1.4.	-	2	1	2	5
5.2.1.	-	2	1	2	5
5.2.2.	-	2	1	-	3
5.2.3.	-	3	2	2	7
5.2.4.	1	2	-	-	3
5.3.1.	1	1	1	-	3
5.3.2.	-	-	3	-	3
5.3.3.	1	1	1	-	3
5.3.4.	-	3	1	1	5
5.3.5.	1	1	-	1	3
5.3.6.	-	-	3	-	3
5.3.7.	1	2	3	1	7
5.4.1.	-	2	-	1	3
5.4.2.	-	2	1	1	4
5.4.3.	1	2	-	-	3
5.4.4.	-	4	4	2	10
5.5.1.	2	3	5	1	11
5.5.2.	-	-	3	-	3
5.6.1.	1	2	-	-	3
5.6.2.	-	-	2	-	2
Total	10	40	42	16	108

Table 2 shows that the highest number of achievement statements are at Level 4 (n=42), while the lowest are at Level 2 (n=10). It is noteworthy that 14 out of the 23 learning outcomes contain no statements at Level 2. Additionally, 4 outcomes begin with statements directly at Level 4. Table 3 presents the analysis of the achievements according to the themes.

Table 3

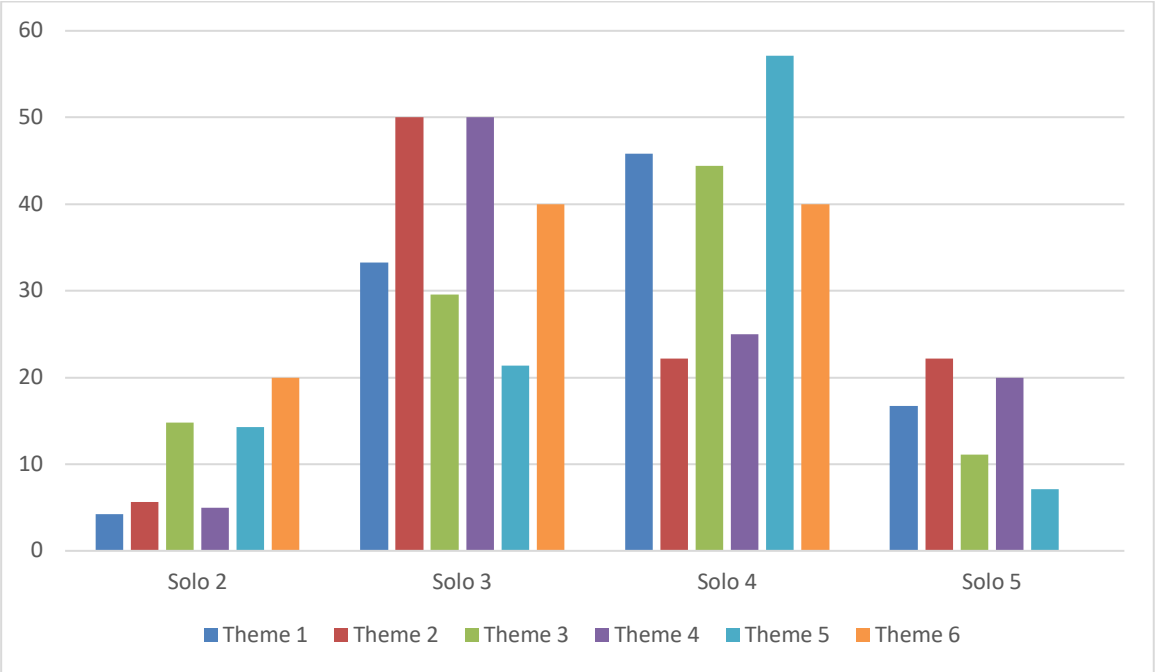
Analysis of Fifth-Grade Mathematics Achievements According to Themes

Theme	*SOLO 2*		*SOLO 3*		*SOLO 4*		*SOLO 5*		*Total*	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
5.1.	1	4,2	8	33,3	11	45,8	4	16,7	24	100,0
5.2.	1	5,6	9	50,0	4	22,2	4	22,2	18	100,0
5.3.	4	14,8	8	29,6	12	44,4	3	11,1	27	100,0
5.4.	1	5,0	10	50,0	5	25,0	4	20,0	20	100,0
5.5.	2	14,3	3	21,4	8	57,1	1	7,1	14	100,0
5.6.	1	20,0	2	40,0	2	40,0	-	-	5	100,0
Total	10	9,3	40	37,0	42	38,9	16	14,8	108	100,0

The analysis revealed that achievement statements are present at all levels in all themes except for the 5th and 6th themes. The percentage indicators show that the highest proportion of achievement statements are at Level 4 with 38.9%, followed by Level 3 with 37.0%. Figure 2 presents the percentage analysis of the themes according to the SOLO levels.

Figure 2

Percentage Analysis of Fifth-Grade Achievements According to SOLO Levels



The analysis reveals that fifth-grade achievements predominantly include Level 4 and Level 3 statements, with a nearly equal distribution between these levels.

Analysis of the Sixth-Grade Mathematics Curriculum

The sixth-grade mathematics curriculum comprises 24 learning outcomes and 125 achievement statements distributed across 6 themes. The number of achievement statements within each theme is as follows: Theme 1 (n=36), Theme 2 (n=15), Theme 3 (n=24), Theme 4 (n=33), Theme 5 (n=14), and Theme 6 (n=3). Table 4 presents the analysis of these achievement statements according to the SOLO taxonomy.

Table 4

Analysis of Sixth-Grade Mathematics Achievements According to the SOLO Taxonomy

Learning Outcomes	*SOLO 2*	*SOLO 3*	*SOLO 4*	*SOLO 5*	*Total*
6.1.1.	-	3	2	2	7
6.1.2.	-	1	2	2	5
6.1.3.	-	2	-	-	2
6.1.4.	1	2	-	-	3
6.1.5.	1	2	-	-	3
6.1.6.	-	1	1	1	3
6.1.7.	-	-	2	1	3
6.1.8.	-	3	5	2	10
6.2.1.	3	3	1	2	9
6.2.2.	2	1	-	-	3
6.2.3.	1	2	-	-	3
6.3.1.	-	3	1	-	4
6.3.2.	-	2	2	1	5
6.3.3.	-	2	2	1	5
6.3.4.	-	4	4	2	10
6.4.1.	-	-	3	-	3
6.4.2.	-	-	3	-	3
6.4.3.	-	4	4	2	10
6.4.4.	-	2	2	1	5
6.4.5.	-	4	3	2	9
6.4.6.	-	-	2	1	3
6.5.1.	2	3	5	1	11
6.5.2.	-	-	3	-	3
6.6.1.	-	-	2	1	3
Total	10	44	49	22	125

Table 4 shows that the highest number of achievement statements are at Level 4 (n=49), while the lowest are at Level 2 (n=10). Notably, only 6 out of the 24 learning outcomes contain statements at Level 2. Additionally, in 6 outcomes, the statements begin directly at Level 4. Table 5 presents the analysis of the achievements according to the themes.

Table 5

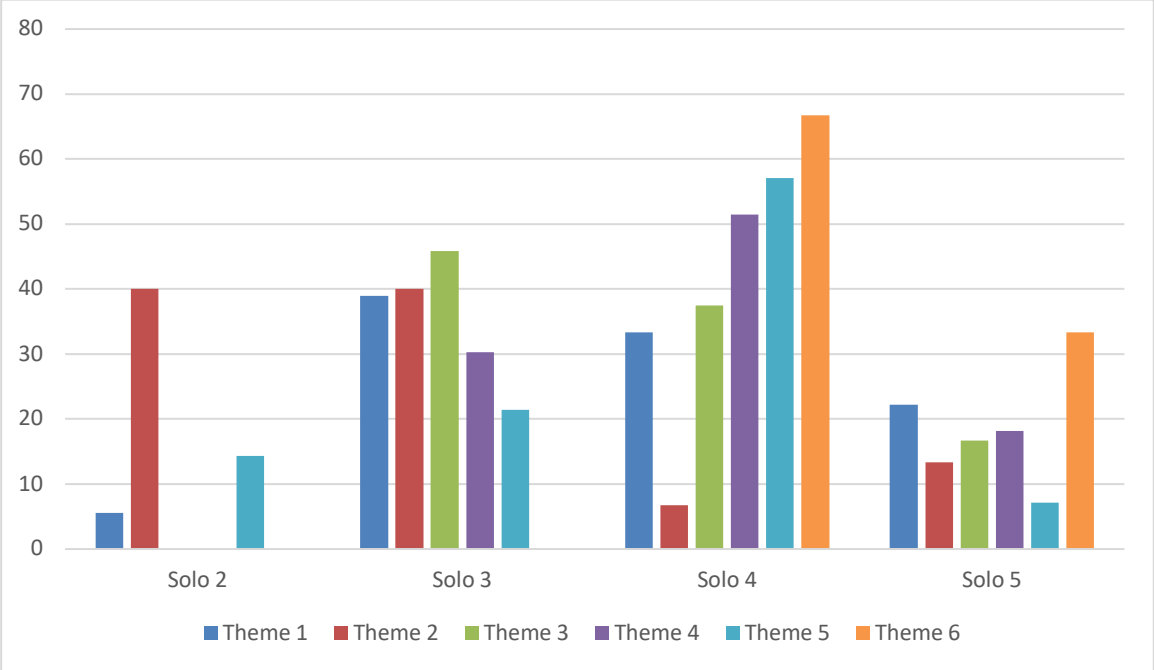
Analysis of Sixth-Grade Mathematics Achievements According to Themes

Theme	*SOLO 2*		*SOLO 3*		*SOLO 4*		*SOLO 5*		*Total*	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
6.1.	2	5,6	14	38,9	12	33,3	8	22,2	36	100,0
6.2.	6	40,0	6	40,0	1	6,7	2	13,3	15	100,0
6.3.	-	-	11	45,8	9	37,5	4	16,7	24	100,0
6.4.	-	-	10	30,3	17	51,5	6	18,2	33	100,0
6.5.	2	14,3	3	21,4	8	57,1	1	7,1	14	100,0
6.6.	-	-	-	-	2	66,7	1	33,3	3	100,0
Total	10	8,0	44	35,2	49	39,2	22	17,6	125	100,0

The analysis reveals that in 3 themes, there are no achievement statements at Level 2. Percentage indicators show that the highest proportion of achievement statements are at Level 4 with 39.2%, followed by Level 3 with 35.2%. The percentage analysis of the themes according to SOLO levels is presented in Figure 3.

Figure 3

Percentage Analysis of Sixth-Grade Achievements According to SOLO Levels



The analysis reveals that in 3 themes, there are no achievement statements at Level 2. The percentage indicators show that the highest proportion of achievement statements are at Level 4 with 39.2%, followed by Level 3 with 35.2%. Figure 3 presents the percentage analysis of the themes according to SOLO levels.

Analysis of the Seventh-Grade Mathematics Curriculum

The seventh-grade mathematics curriculum comprises 30 learning outcomes and 148 achievement statements distributed across 7 themes. The number of achievement statements within each theme is as follows: Theme 1 (n=41), Theme 2 (n=22), Theme 3 (n=8), Theme 4 (n=47), Theme 5 (n=5), Theme 6 (n=14), and Theme 7 (n=11). Table 6 presents the analysis of these achievement statements according to the SOLO taxonomy.

Table 6

Analysis of Seventh-Grade Mathematics Achievements According to the SOLO Taxonomy

Learning Outcome	*SOLO 2*	*SOLO 3*	*SOLO 4*	*SOLO 5*	*Total*
7.1.1.	-	3	-	-	3
7.1.2.	-	1	2	-	3
7.1.3.	1	2	-	-	3
7.1.4.	-	5	3	2	10
7.1.5.	1	4	2	2	9
7.1.6.	1	2	-	-	3
7.1.7.	1	4	3	2	10
7.2.1.	-	2	1	-	3
7.2.2.	2	3	4	1	10
7.2.3.	1	2	3	1	7
7.2.4.	-	1	-	1	2
7.3.1.	-	1	2	2	5
7.3.2.	-	-	3	-	3
7.4.1.	-	1	-	1	2
7.4.2.	1	2	-	-	3
7.4.3.	1	1	-	1	3
7.4.4.	2	1	1	-	4
7.4.5.	-	1	2	1	4
7.4.6.	-	4	4	2	10
7.4.7.	-	-	3	-	3
7.4.8.	-	-	3	-	3
7.4.9.	-	2	2	1	5
7.4.10.	-	4	4	2	10
7.5.1.	-	2	-	-	2
7.5.2.	-	-	3	-	3
7.6.1.	2	3	5	1	11
7.6.2.	-	-	3	-	3
7.7.1.	-	-	2	1	3
7.7.2.	-	2	1	1	4
7.7.3.	-	3	1	-	4
Total	13	56	57	22	148

An examination of Table 6 reveals that the majority of learning outcome statements are at Level 4 (n=57), while Level 2 has the fewest (n=13). It's noteworthy that only 10 out of the 30 learning outcomes include statements at Level 2. Additionally, 6 outcomes begin directly with Level 4 statements. The breakdown of learning outcomes by theme is presented in Table 7.

Table 7

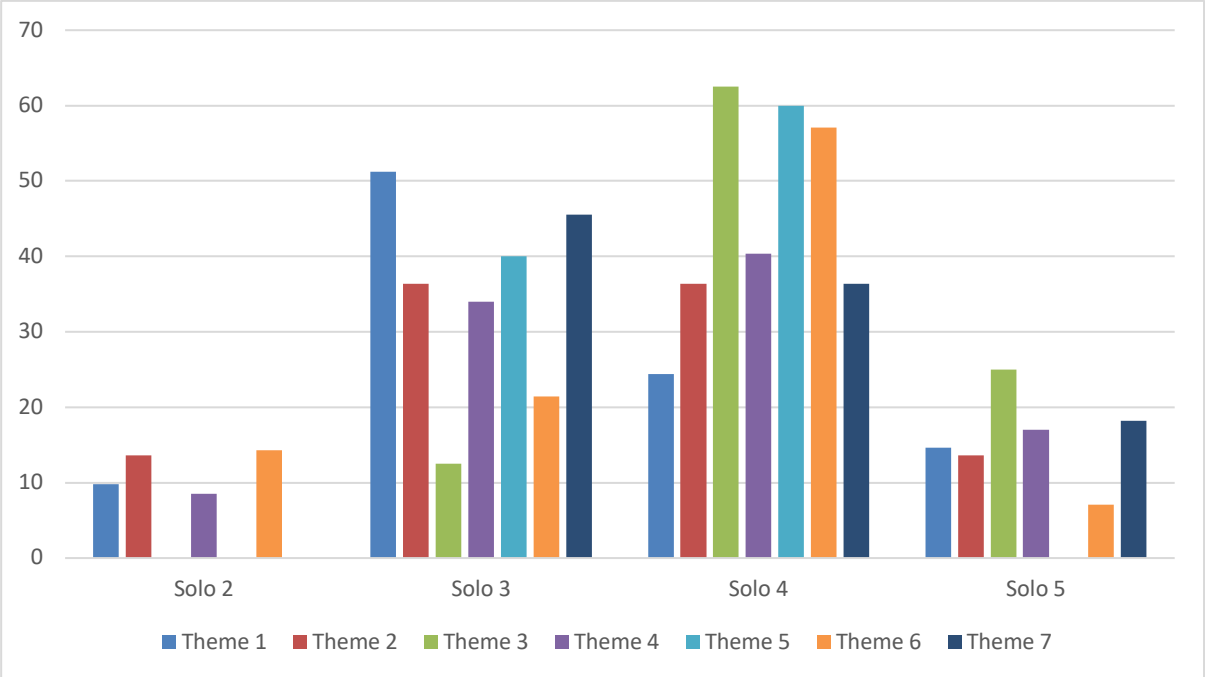
Analysis of Seventh-Grade Mathematics Achievements According to Themes

Theme	SOLO 2		SOLO 3		SOLO 4		SOLO 5		Total	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
7.1.	4	9,8	21	51,2	10	24,4	6	14,6	41	100,0
7.2.	3	13,6	8	36,4	8	36,4	3	13,6	22	100,0
7.3.	-	-	1	12,5	5	62,5	2	25,0	8	100,0
7.4.	4	8,5	16	34,0	19	40,4	8	17,0	47	100,0
7.5.	-	-	2	40,0	3	60,0	-	-	5	100,0
7.6.	2	14,3	3	21,4	8	57,1	1	7,1	14	100,0
7.7.	-	-	5	45,5	4	36,4	2	18,2	11	100,0
Total	13	8,8	56	37,8	57	38,5	22	14,9	148	100,0

The analysis indicates that in 3 themes, there are no achievement statements at Level 2. The percentage breakdown shows that Level 4 contains the highest proportion of achievement statements at 38.5%, followed closely by Level 3 at 37.8%. These findings are consistent with the patterns observed in the fifth and sixth grades. Figure 4 presents the percentage analysis of the themes according to SOLO levels.

Figure 4

Percentage Analysis of Seventh-Grade Achievements According to SOLO Levels



The analysis shows that seventh-grade achievements are predominantly composed of Level 4 and Level 3 statements, with Level 2 statements being quite limited at this grade level as well.

Analysis of the Eighth-Grade Mathematics Curriculum

The eighth-grade mathematics curriculum consists of 23 learning outcomes and 107 achievement statements distributed across 7 themes. The number of achievement statements within each theme is as follows: Theme 1 (n=16), Theme 2 (n=15), Theme 3 (n=31), Theme 4

(n=8), Theme 5 (n=17), Theme 6 (n=14), and Theme 7 (n=6). Table 8 presents the analysis of these achievement statements according to the SOLO taxonomy.

Table 8

Analysis of Eighth-Grade Mathematics Achievements According to the SOLO Taxonomy

Learning Outcome	*SOLO 2*	*SOLO 3*	*SOLO 4*	*SOLO 5*	*Total*
8.1.1.	1	1	1	2	5
8.1.2.	1	2	1	-	4
8.1.3.	-	1	2	1	4
8.1.4.	-	3	-	-	3
8.2.1.	-	2	-	-	2
8.2.2.	1	1	4	-	6
8.2.3.	-	1	2	2	5
8.2.4.	-	1	-	1	2
8.3.1.	1	2	-	-	3
8.3.2.	-	3	1	1	5
8.3.3.	-	1	2	2	5
8.3.4.	-	1	2	2	5
8.3.5.	1	2	-	-	3
8.3.6.	-	4	4	2	10
8.4.1.	-	2	-	-	2
8.4.2.	-	-	3	-	3
8.4.3.	-	1	2	-	3
8.5.1.	-	2	-	-	2
8.5.2.	-	1	2	2	5
8.5.3.	-	4	4	2	10
8.6.1.	2	3	5	1	11
8.6.2.	-	-	3	-	3
8.7.1.	1	1	2	2	6
Total	8	39	40	20	107

An examination of Table 8 reveals that the majority of achievement statements are at Level 4 (n=40), while the fewest are at Level 2 (n=8). It's noteworthy that only 7 out of the 23 learning outcomes include statements at Level 2. The breakdown of achievements according to the themes is presented in Table 9.

Table 9

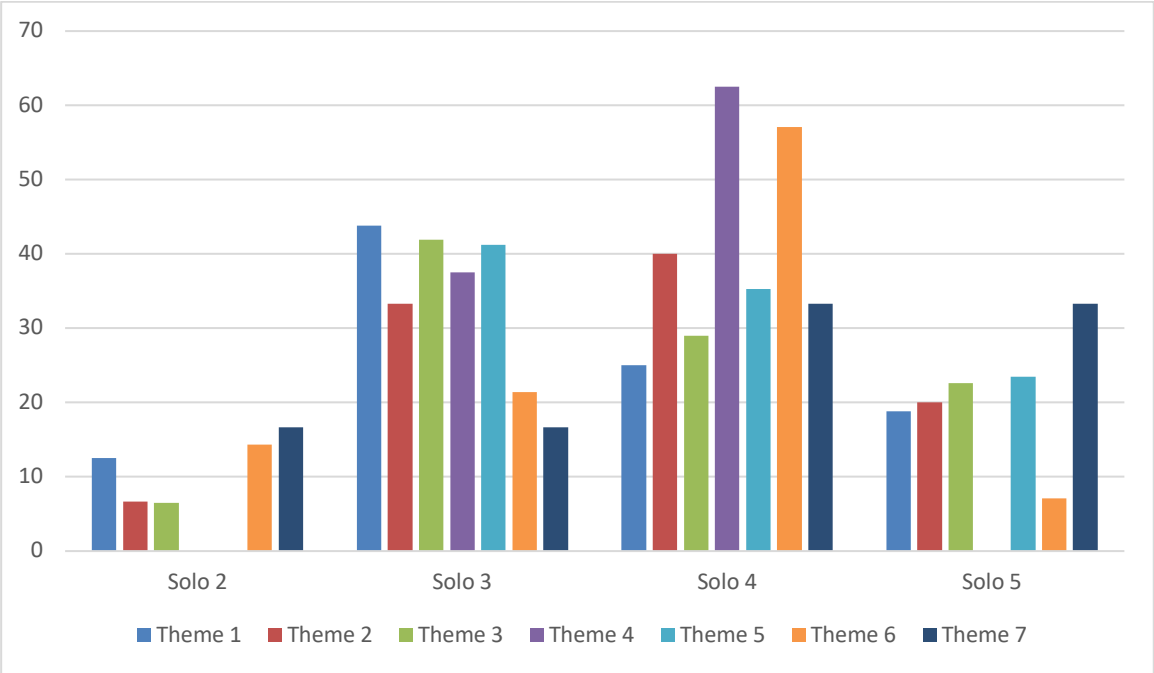
Analysis of Eighth-Grade Mathematics Achievements According to Themes

Theme	*SOLO 2*		*SOLO 3*		*SOLO 4*		*SOLO 5*		*Total*	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
8.1.	2	12,5	7	43,8	4	25,0	3	18,8	16	100,0
8.2.	1	6,7	5	33,3	6	40,0	3	20,0	15	100,0
8.3.	2	6,5	13	41,9	9	29,0	7	22,6	31	100,0
8.4.	-	-	3	37,5	5	62,5	-	-	8	100,0
8.5.	-	-	7	41,2	6	35,3	4	23,5	17	100,0
8.6.	2	14,3	3	21,4	8	57,1	1	7,1	14	100,0
8.7.	1	16,7	1	16,7	2	33,3	2	33,3	6	100,0
Total	8	7,5	39	36,4	40	37,4	20	18,7	107	100,0

The analysis reveals that in 2 themes, there are no achievement statements at Level 2, with only 7.5% of Level 2 achievements present across all themes. The percentage breakdown indicates that the highest proportion of achievement statements are at Level 4 with 37.4%, followed by Level 3 with 36.4%. These findings are consistent across the entire secondary education curriculum. Figure 5 presents the percentage analysis of the themes according to SOLO levels.

Figure 5

Percentage Analysis of Eighth-Grade Achievements According to SOLO Levels



The analysis shows that eighth-grade achievements predominantly include Level 4 and Level 3 statements, with Level 2 statements remaining very limited at this grade level as well.

Comparative Analysis of the Middle School Mathematics Curriculum

In the analysis of the Maarif Model of Century of Türkiye middle school mathematics curriculum according to the SOLO taxonomy, a total of 488 achievement statements from the fifth, sixth, seventh, and eighth grades were examined. The results of the class-based analysis are presented in Table 10.

Table 10

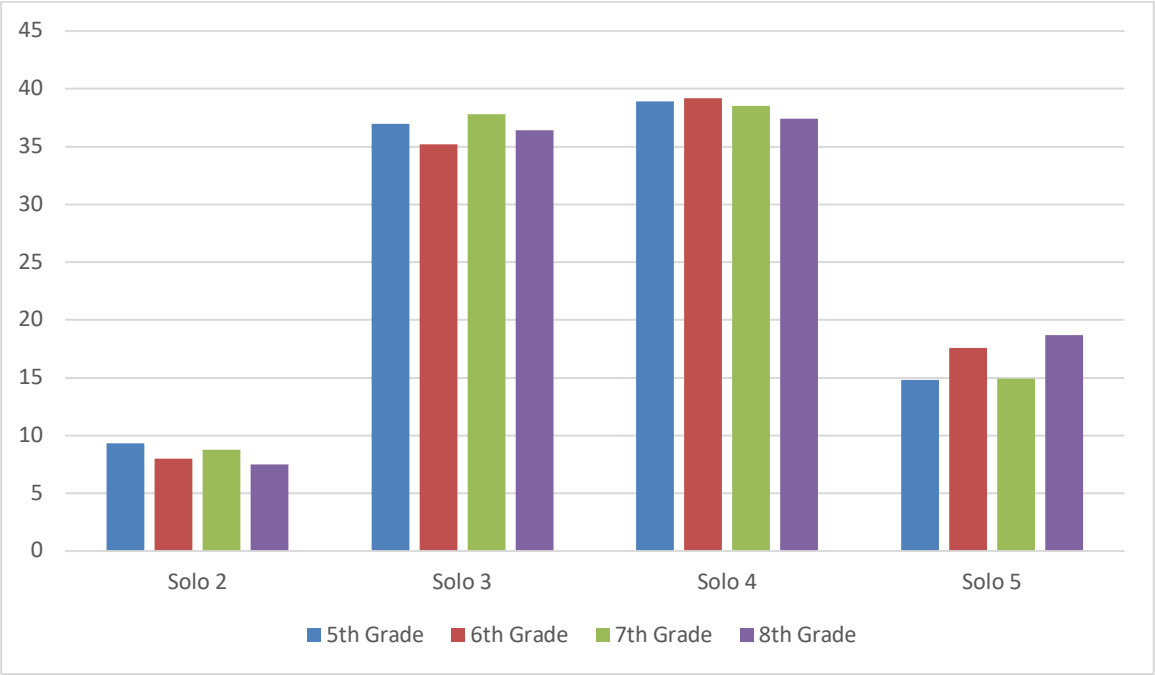
Analysis of Middle School Mathematics Achievements According to SOLO Taxonomy

Grade	*SOLO 2*		*SOLO 3*		*SOLO 4*		*SOLO 5*		*Total*	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
5th grade	10	9,3	40	37,0	42	38,9	16	14,8	108	100,0
6th grade	10	8,0	44	35,2	49	39,2	22	17,6	125	100,0
7th grade	13	8,8	56	37,8	57	38,5	22	14,9	148	100,0
8th grade	8	7,5	39	36,4	40	37,4	20	18,7	107	100,0
Total	41	8,4	179	36,7	188	38,5	80	16,4	488	100,0

The analysis reveals a consistent distribution of achievement statements across different grade levels according to SOLO levels. For all grade levels, the highest number of achievement statements are distributed as follows: Level 4 (n=188), Level 3 (n=179), Level 5 (n=80), and Level 2 (n=41). The ranking of achievement levels remains consistent across all grades, indicating a uniform distribution pattern. Figure 6 presents the graphical representation of achievements by level.

Figure 6

Percentage Analysis of Middle School Mathematics Achievements According to SOLO Levels



As shown in the figure, the distribution of achievements across all grade levels is similar, with a notable concentration at Levels 4 and 3. In contrast, achievements at Level 2 are significantly lower.

Discussion, Conclusion and Implications

Examining the Maarif Model of Century of Türkiye's middle school mathematics curriculum across all grade levels reveals that the majority of achievements are concentrated at Level 4, representing the relational level. Level 3, the multistructural level, follows closely, while Level 2, corresponding to the unistructural level, is the least represented. This distribution aligns with findings by Doğan (2020) in the 2018 primary school mathematics curriculum in Türkiye, where Level 4 achievements were most frequent, followed by Level 3, with the fewest at Level 2. However, Acar and Peker (2023) reported a different pattern in the 2018 middle school mathematics curriculum, where Level 2 achievements predominated, followed by Level 3, with Level 4 being the least common. The current findings suggest that the 2024 middle school mathematics curriculum of the Maarif Model of Century of Türkiye aligns more closely with the 2018 primary school curriculum than with the middle school curriculum from the same period.

The frequency and percentage distribution of achievements across all grade levels resemble a normal distribution curve, indicating a homogeneous structure within the curriculum. This

observation is consistent with Aktan's (2019) findings, who identified a similar pattern in the 2018 primary school mathematics curriculum when analyzed according to the revised Bloom's Taxonomy. Studies using the SOLO taxonomy, such as Acar and Peker's (2023), support this pattern, though Doğan's (2020) study did not align with it.

The SOLO taxonomy, being cognitive in nature, mirrors Piaget's stages of cognitive development. As students advance in age and grade level, one would expect the curriculum to increasingly target higher cognitive levels (Anderson & Krathwohl, 2001; Biggs & Collis, 1982; Göçer & Kurt, 2016). However, this progression was not observed in the study. Instead, the taxonomic levels appear to be structured homogeneously across grade levels. To enhance the curriculum's effectiveness, increasing the proportion of achievements at higher taxonomic levels in upper grades while reducing those at lower levels could be beneficial. This adjustment may lead to a more effective mathematics curriculum (Acar & Peker, 2023).

Research on curricula using the SOLO taxonomy across various subjects has revealed diverse patterns: Öner (2022) found that most achievements in the 11th and 12th-grade geography curriculum were at the relational level, with none at the unistructural level. Yurtcu and Aktan (2023) discovered that primary and middle school achievements in the religion and ethics curriculum were predominantly at the unistructural level, while high school achievements were primarily at the abstract level. Dönmez and Zorluoğlu (2020) observed that the science curriculum was well represented at the unistructural and relational levels, but less so at the multistructural and abstract levels. Arı (2023) noted that the life sciences curriculum focused mainly on the relational level, with the abstract level being the least represented. Bursa (2022) reported that most achievements in the social studies curriculum were at the relational level. Aktı Aslan (2022) highlighted that in the Turkish language curriculum, achievements were predominantly at the relational level and least at the unistructural level.

These findings underscore the variability in how SOLO levels are represented across different subjects and educational stages. In contrast, the middle school mathematics curriculum under the Maarif Model of Century of Türkiye exhibits a homogeneous distribution, with a significant concentration at the higher SOLO levels (4 and 3) and minimal representation at the lower levels (2). This pattern differs from those observed in other subjects.

Recommendations

Based on these findings, it is recommended that the analysis of the Maarif Model of Century of Türkiye be extended beyond the middle school mathematics curriculum to include the primary school mathematics curriculum and other subject areas using the SOLO taxonomy. A broader analysis would provide a more comprehensive understanding of how SOLO levels are represented across various educational stages and subjects. Furthermore, while this study focused on the achievements outlined in the mathematics curriculum, future research should also examine textbooks and assessment questions to gain a fuller picture of the curriculum's alignment with the SOLO taxonomy. This approach would offer deeper insights into how educational materials and evaluations contribute to the development of cognitive skills as defined by the SOLO taxonomy.

Author Contributions

The first author contributed to the research in the introduction and findings sections, and the second author contributed to the method and results sections. All authors contributed equally to the entire study.

Declarations

Ethical Approval and Informed Consent

There are no human subjects in this article and informed consent is not applicable. Ethical approval is not applicable to this study.

Supplemental Material

There are no supplemental materials for this paper.

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TÜRKÇE GENİŞ ÖZET

Türkiye Yüzyılı Maarif Modeli Ortaokul Matematik Dersi Öğretim Programının SOLO Taksonomisine Göre Analizi

Eğitim programları yaşanan toplumsal gelişmeler ve bilimsel ilerlemelere uyum sağlamak amacıyla belirli aralıklarla güncellenmektedir. Bu kapsamda 2024 yılı itibarıyla Türkiye Yüzyılı Maarif Modeli ismiyle Türk eğitim sisteminde de yeni bir eğitim programı uygulamaya alınmıştır. Eğitim programı geliştirme sürecinde taksonomik yaklaşımlardan sıklıkla faydalanılmaktadır. Ancak açıklanan bu eğitim programında hangi taksonomik yaklaşımdan yararlanıldığı belirtilmemiştir. Bu çalışmanın amacı, Türkiye Yüzyılı Maarif Modeli Eğitim Programı'nın ortaokul matematik dersi kazanımlarının SOLO taksonomisine göre analiz edilmesidir. Çalışmada nitel araştırma yöntemlerinden doküman analizi tekniği kullanılmıştır. Araştırmacılar tarafından geliştirilen yazılım ile kazanımlar SOLO taksonomisine göre analiz edilmiştir. Analiz sonuçları raporlaştırılarak tartışılmıştır.

Giriş

Günümüz dünyasında, teknolojide yaşanan hızlı dönüşümler, pek çok alanda toplumları olumlu ya da olumsuz biçimde etkilemektedir. Bu dönüşümler, toplumsal yaşamdan bireysel yaşama kadar her düzeyde bireyler üzerinde etkili olmaktadır. Devletler, bu hızlı dönüşüme ayak uydurabilmek adına birçok alanda düzenlemeler yapmakta ve bunların başında da eğitim sistemleri gelmektedir. Bireyleri toplumsal yaşama hazırlayan eğitim programları, bu dönüşüme uyum sağlamak ve teknolojik ilerlemeden ekonomik katma değer yaratmak amacıyla en önemli araç olarak karşımıza çıkmaktadır. Eğitim programlarının, bireylerin değişen dünyaya ayak uydurabilmelerini sağlamak için yenilikçi ve dinamik bir yapıda olması gerekmektedir. Bu bağlamda, eğitim politikalarının ve öğretim programlarının, teknolojik dönüşüm ve toplumsal ihtiyaçlarla uyumlu bir şekilde güncellenmesi, ülkenin gelecekteki rekabet gücünü artırmak adına kritik bir öneme sahiptir.

Bu bağlamda, Türkiye'de 2024 yılı itibarıyla "Türkiye Yüzyılı Maarif Modeli" eğitim programı hayata geçirilmiştir (MEB, 2024). Bu programın temel yaklaşımı, ideolojiler üstü millî bir şahsiyet inşa ederek bu şahsiyete sahip bir toplum oluşturmak olarak tanımlanmıştır. Türkiye'de daha önce hazırlanan öğretim programlarında, Bloom'un bilişsel alan taksonomisinin kullanıldığı bilinmektedir (Demirel, 2015). Ancak, Türkiye Yüzyılı Maarif Modeli'nin hangi taksonomik yaklaşımı referans aldığı belirtilmemiştir. Bu durum, programın pedagojik temellerinin ve öğrenme çıktılarının değerlendirilmesi açısından önemli bir belirsizlik yaratmaktadır.

Bir eğitim programında hedef, içerik, öğrenme-öğretme süreçleri ile ölçme-değerlendirme faaliyetleri programın ögelerini oluşturur. Hedefler, eğitim faaliyetlerinin bir plan dâhilinde yürütülmesinde ve belirlenen çıktılara ulaşılmasında yol göstericilerdir (Filiz ve Yıldırım, 2019). Bu nedenle eğitim programlarının en önemli bileşenlerinden birisidir ve taksonomik yaklaşımlarda doğrudan hedeflerle ilgilidir. Taksonomiler, hedeflerin belirlenmesinde yol gösterici ve kolaylaştırıcı olması bakımından kullanılmaktadır (Bümen, 2006). Bu yaklaşımlar aynı zamanda hedeflerin hangi bilişsel öğrenme performansları gerektirdiğinin belirlemesi ve ölçme değerlendirme faaliyetlerinde beklenen performans hakkında da referans oluşturmaktadır.

Türk eğitim sisteminde uzun yıllar Bloom taksonomisi kullanılmıştır (Bümen, 2006; Demirel, 2019). Ancak alan yazında Bloom taksonomisine yönelik pek çok eleştiri bulunmaktadır (Ay, 2005; Furst, 1994; Krietzer ve Madaus, 1994; Tutkun, 2012; Yüksel, 2007). Bu eleştiriler nedeniyle alternatif yaklaşımlar incelenmeye başlanmıştır. Bunlar arasında uluslararası alanda en çok bilinen ve kabul gören taksonomilerden birisi SOLO taksonomidir (Arı, 2013). SOLO taksonomisi, Bloom taksonomisinin bilişsel düzeyleri belirleme noktasındaki potansiyel belirsizliklerini ortadan kaldırmaktadır (Hattie ve Purdie, 1998). Bloom taksonomisi bir sınav için temsili görevleri seçebilmek amacıyla yapılmışken (Biggs ve Collis 1982), SOLO taksonomisi hedeflenen öğrenme çıktılarını, bu çıktılara ne ölçüde ulaşıldığını ve bu hedefleri destekleyen öğretim biçimlerini değerlendirmek amacıyla kullanılmaktadır (Brabrand ve Dahl, 2009).

SOLO taksonomisi Biggs ve Collis (1982, 1991) tarafından geliştirilmiştir. Taksonomi, öğrencilerin öğrenme süreçlerini değerlendirmek için hiyerarşik bir yapıya sahip niteliksel bir değerlendirme sistemi kurmuştur (Minogue ve Jones, 2009). Hiyararşik bir bütünlüğe sahip olduğundan her düzey, önceki düzeylerde kazanılan becerileri içermektedir (Tomperi, 2016). Model öğrencilerin bilişsel bilgilerini değerlendirmek için kullanılmaktadır (Lian ve Idris, 2006). Modele göre öğrenmenin derinliği arttıkça, öğrencilerin öğrendiklerinin kanıtı olarak ürettikleri çalışmaların yapısal karmaşıklığı da artmaktadır (Biggs ve Collis, 1982).

SOLO taksonomisi modelinin hiyerarşik yapısı incelendiğinde soyut – niteliksel aşamanın erken yetişkinlik dönemine karşılık geldiği görülmektedir (Biggs ve Collis, 2014). SOLO taksonomisinin daha yüksek düzeyli düşünmeyi sağladığı, akademik performansın gelişmesine katkıda bulunduğu, karmaşık öğrenme içeriklerini düzenlediği ve öğrenme görevlerinin yerine getirilmesini desteklediği savunulmaktadır (Aronshtam vd., 2021; Kaharuddin ve Hajeniati, 2020). Daha çok matematik, biyoloji ve dil öğretimi alanlarında SOLO taksonomisini diğer taksonomilerle karşılaştıran çalışmalar dikkat çekmektedir (Chan vd., 2002). Özellikle matematik alanında her düzeyden öğrencilerin matematiksel düşünme becerilerini yorumlamak ve değerlendirmek için kullanıldığı görülmektedir (Vallecillos ve Mareno, 2002).

Bu çalışmada Türkiye Yüzyılı Maarif Modeli Ortaokul Matematik Dersi Öğretim Programı'nın SOLO taksonomisi ile analiz edilmesi amaçlanmıştır. SOLO taksonomisinin üst bilişsel ve uygulama içerikli derslerde yaygın kullanılması nedeniyle matematik dersi özellikle seçilmiştir. Türkiye'nin eğitim politikaları ve öğretim programları, düzenli olarak gelişim gösteren ve değişen bir yapıya sahiptir. Bu bağlamda, "Türkiye Yüzyılı Maarif Modeli" olarak adlandırılan yeni eğitim yaklaşımı, ortaokul matematik dersinin öğretim programına önemli yenilikler ve değişiklikler getirmiştir. Bu değişikliklerin, öğrencilerin öğrenme düzeylerini ve bilişsel gelişimlerini nasıl etkilediğinin anlaşılması büyük önem taşımaktadır. SOLO taksonomisi, öğrencilerin öğrenme çıktılarının yapısını ve karmaşıklığını analiz etmek için kullanılan bir

modeldir. Bu taksonomi, öğretim programlarının değerlendirilmesinde etkili bir araç olarak kabul edilir. Bu çalışma, Türkiye Yüzyılı Maarif Modeli'nin ortaokul matematik dersine ilişkin öğretim programını SOLO taksonomisine göre analiz ederek, programın öğrencilerin öğrenme süreçlerine ve çıktılarının niteliğine olan etkisini ortaya koyması açısından önemlidir. Bu analiz, eğitim politikaları geliştiren kurumlara, öğretmenlere ve eğitimcilere, programın güçlü ve zayıf yönlerini belirleme konusunda değerli bilgiler sunacaktır. Ayrıca, matematik öğretiminde etkinlik ve verimliliğin artırılması için gerekli olan pedagojik stratejilerin geliştirilmesine de fayda sağlayacaktır. Bu nedenle, çalışma hem teorik hem de pratik açıdan önemli bir boşluğu doldurmayı hedeflemektedir.

Yöntem

Bu araştırmada nitel araştırma yöntemleri içerisinde yer alan doküman incelenmesi tekniği kullanılmıştır. Doküman incelemesi basılı ve elektronik materyallerin incelenmesi veya değerlendirilmesi amacıyla kullanılan sistematik bir analiz yöntemdir (Bowen, 2009). Diğer çözümleyici nitel araştırma yöntemlerinde olduğu gibi, doküman analizi de anlamı ortaya çıkarmak, bir konuda fikir yürütmek ve bir çıkarım elde etmek amacıyla verilerin incelenmesi ve yorumlanması süreçlerini içerir (Corbin ve Strauss, 2008). Bu çalışmada, Türkiye'de programların hazırlanması ve yayınlanmasından sorumlu kurum Millî Eğitim Bakanlığı (MEB) birimlerinden Talim Terbiye Kurulu (TTK) tarafından internet üzerinden yayınlanan Türkiye Yüzyılı Maarif Modeli Ortaokul Matematik Dersi Öğretim Programı (5, 6, 7 ve 8. Sınıflar) incelenmiştir.

Öğrenme çıktılarının SOLO taksonomisine olan ilişkisinin analiz edilebilmesi amacıyla SOLO Taksonomik Analiz Algoritması araştırmacılar tarafından geliştirilmiş, öğrenme çıktıları bu yazılım ile analiz edilerek SOLO ile olan ilişkisi belirlenmiştir. Geliştirilen algoritmaya SOLO taksonomisinin yüklem yapısı ile MEB tarafından yayınlanan ve taksonomide yer almayan yüklem yapıları incelenip kategorize edilerek işlenmiştir. Yazılımın birden fazla kategori ile ilişki kurduğu kazanımlar araştırmacılar tarafından incelenerek kategorisi belirlenmiştir.

Bulgular

Beşinci sınıf programı incelendiğinde en çok 4. düzey (n=42) en az ise 2. düzey (n=10) kazanım ifadesinin yer aldığı görülmektedir. 23 öğrenme çıktısının 14'ünde 2. düzey kazanımın ifadelerinin yer almaması dikkat çekmektedir. 4 çıktıda ise doğrudan 4. düzey kazanımdan başlandığı görülmektedir.

Altıncı sınıf programı incelendiğinde en çok 4. düzey (n=49) en az ise 2. düzey (n=10) kazanım ifadesinin yer aldığı görülmektedir. 24 öğrenme çıktısının sadece 6'sında 2. düzey kazanımın ifadelerinin yer alması dikkat çekmektedir. 6 çıktıda ise doğrudan 4. düzey kazanımdan başlandığı görülmektedir.

Yedinci sınıf programı incelendiğinde en çok 4. düzey (n=57) en az ise 2. düzey (n=13) kazanım ifadesinin yer aldığı görülmektedir. 30 öğrenme çıktısının sadece 10'unda 2. düzey kazanım ifadelerinin yer alması dikkat çekmektedir. 6 çıktıda ise doğrudan 4. düzey kazanımdan başlandığı görülmektedir.

Sekizinci sınıf programı incelendiğinde en çok 4. düzey (n=40) en az ise 2. düzey (n=8) kazanım ifadesinin yer aldığı görülmektedir. 23 öğrenme çıktısının sadece 7'sinde 2. düzey kazanım ifadelerinin yer alması dikkat çekmektedir.

Tüm sınıf düzeyleri karşılaştırmalı olarak incelendiğinde SOLO düzeylerine göre kazanımların farklı sınıf düzeylerinde benzer şekilde dağılım gösterdikleri görülmektedir. Tüm sınıf düzeylerinde en çok kazanım ifadesinin yer aldığı düzey sırasıyla 4. düzey (n=188), 3. düzey (n=179), 5. düzey (n=80) ve 2. düzey (n=41) şeklinde tespit edilmiştir. Kazanım düzeylerinin sıralaması tüm sınıf düzeylerinde toplam ile aynı sıralamada gerçekleşmiştir. Bu noktada kazanımların düzeylere dağılımlarında tutarlılık olduğu görülmektedir.

Tartışma, Sonuç ve Öneriler

Türkiye Yüzyılı Maarif Modeli Ortaokul Matematik Dersi Öğretim Programı'nın tüm sınıf düzeylerindeki kazanımları incelendiğinde en fazla 4. düzey olan ilişkisel düzeye ilişkin kazanımların yer aldığı görülmektedir. Bu durumu 3. düzey olan çok yönlü yapı takip etmektedir. En az 2. düzey tek yönlü yapı düzeyine ilişkin kazanımlar bulunmaktadır. Benzer durumu Doğan (2020) Türkiye'de uygulanan ilkokul matematik programında (2018) olduğu sonucunu belirtmiştir. Acar ve Peker (2023) Türkiye'de uygulanan ortaokul matematik programında (2018) yer alan kazanımlarının solo taksonomisine göre sınıflandırılmasında en fazla 2. düzey olan tek yönlü yapı düzeyinde olduğunu daha sonra 3. düzey olan çok yönlü yapıda olduğunu en az ise 4. düzey olan ilişkisel yapıda yer aldığını belirtmektedir. Bu durum araştırmada incelenen 2024 yılında uygulanmaya başlanan Türkiye Yüzyılı Maarif Modeli Ortaokul Matematik Dersi Öğretim Programı'nın 2018 yılında Türkiye'de uygulanmaya başlanan matematik programlarından ilkokul kısmının (1-4. sınıf) ile örtüştüğü, (5-8. sınıf) ile örtüşmediği sonucuna ulaşılmaktadır.

Tüm sınıf düzeyindeki kazanımların frekans ve yüzde oranları dikkate alındığında oranların şekilsel olarak normal dağılım eğrisine benzediği görülmektedir. Bu durum ortaokul matematik programının homojen bir yapıya göre hazırlandığını göstermektedir. Aktan (2019) ilköğretim matematik öğretim programına (2018) ilişkin kazanımlarının yenilenen Bloom taksonomisine göre incelediği çalışmada da bu durum benzerlik göstermektedir. Benzer şekilde SOLO taksonomisine göre yapılan çalışmada (Acar ve Peker, 2023) bu durum desteklenmektedir. Doğan'ın (2020) yapmış olduğu araştırmada ise bu durum ile örtüşme olmadığı görülmektedir.

SOLO sınıflandırması, bilişsel seviyede olduğu için bu alanda çalışan Piaget'nin bilişsel gelişim evrelerine benzemektedir. Öğrencilerin yaş ve sınıf düzeyleri artıkça bilişsel düzeylerine hitap eden kazanımların artması beklenmektedir (Anderson ve Krathwol, 2001; Biggs ve Collis, 1982; Göçer ve Kurt, 2016). Araştırmada bu durum gözlemlenmemiştir. Taksonomik düzeylerin dağılımlarının homojen bir yapı ile oluşturulduğu görülmektedir. Programın daha işlevsel olması açısından üst sınıflara geçildikçe taksonominin üst seviyelerine karşılık gelen kazanımların artırılması, alt düzeylere denk gelen kazanımların azaltılması matematik öğretim programını daha verimli hale getirebilir (Acar ve Peker, 2023).

Alan yazında diğer derslere ilişkin SOLO taksonomisine göre öğretim programlarına yönelik araştırmalarda, Öner (2022) Coğrafya dersi öğretim programında yer alan 11 ve 12. Sınıf kazanımlarının SOLO taksonomisine göre incelemesinde, en fazla ilişkisel düzeyde kazanım olduğu, tek yönlü düzeye ilişkin kazanımın olmadığı ifade etmiştir. Yurtcu ve Aktan (2023) Din Kültürü ve Ahlak Bilgisi Dersi Öğretim Programı'nda (İlkokul 4. sınıf, ortaokul 5, 6, 7 ve 8. sınıf,

ortaöğretim 9, 10, 11 ve 12. sınıflar) yer alan kazanımların ilkokul ve ortaokul kazanımlarının en çok tek yönlü yapıya uygun kazanımlara yer verildiği, lise düzeyinde ise en çok soyutlanmış yapıya uygun kazanımların yer aldığını belirlemiştir. Dönmez ve Zorluoğlu (2020) Fen Bilimleri Dersi Öğretim Programı'nda yer alan kazanımların SOLO taksonomisine göre analizinde, tek yönlü yapı ve ilişkisel yapı basamaklarının temsil güçlerinin yüksek; çok yönlü ve soyutlanmış yapı basamaklarının ise az olduğu sonucuna ulaşmışlardır. Arı (2023) Hayat Bilgisi Dersi Öğretim Programı'nda yer alan kazanımların SOLO taksonomisine göre incelenmesinde, en çok ilişkisel yapı düzeyinde en az ise soyut yapı evresinde olduğunu belirtmişlerdir. Bursa (2022) Sosyal Bilgiler Öğretim Programı'nın SOLO taksonomisine göre incelenmesinde, kazanımların çoğunluğunun ilişkisel yapı evresinde olduğu görülmüştür. Aktı Aslan (2022) Türkçe Dersi Öğretim Programı kazanımlarının SOLO taksonomisine göre incelenmesinde, kazanımların en çok ilişkisel yapı basamağını, en az ise tek yönlü yapı basamağı temsil ettiği görülmüştür. Tüm bu sonuçlar dikkate alındığında, araştırmada elde edilen sonuçlar ile farklılık gösterdiği görülmektedir.

Alan yazın ve araştırma sonuçları dikkate alındığında, Türkiye Yüzyılı Maarif Modeli başta İlkokul Matematik Dersi Öğretim Programı'nın ve diğer derslere ilişkin programlara yönelik SOLO taksonomisi açısından incelenmesi önerilmektedir. Ayrıca, bu araştırma sadece matematik dersi öğretim programına ilişkin kazanımlar incelenerek yapılmıştır. Bu derslere ve diğer derslere ilişkin ders kitapları ve değerlendirme sorularını dikkate alarak araştırmalar yapılması önerilmektedir.

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School Engagement and Learning Responsibility in Middle School Students[1]

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Abstract

This study aims to examine the relationship between middle school students' levels of school engagement and their learning responsibilities. The correlational study was conducted, which is one of the quantitative research models. The study sample consisted of 353 middle school students in İstanbul, Üsküdar selected through simple random sampling, one of the probability sampling methods. The data collection tools used in the study were a personal information form, School Engagement Scale, and Learning Responsibility Scale. Independent samples t-test, ANOVA, correlation, and multiple linear regression techniques were used in the analysis of the collected data. In the study, it was found that both school engagement and learning responsibility levels of female students were significantly higher. When examining students' learning responsibility, it was found that seventhgrade students and students attending public schools had significantly higher levels of learning responsibility than other students. When examining the predictive power of school engagement on learning responsibility, it was found that school engagement predicted learning responsibility by 62%. Based on these results, it is thought that providing an educational environment in which children feel engaged will also increase their learning responsibilities.

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Introduction

Education is a process that plays a significant role in an individual's life. This process extends from childhood to adulthood, encompassing a major part of one's life. In this context, schools are particularly important institutions where individuals develop social skills, interact with society, and have learning experiences (Boud, 1988; Lee & Smith, 2001; Lodge, 2007; Shavelson & Huang, 2003). These experiences significantly affect an individual's level of school engagement. However, an individual's level of school engagement is shaped not only by acquiring knowledge and skills but also by emotional, cognitive, and behavioral factors. Students' level of school engagement is closely related to active participation in the learning process, a sense of belonging, and positive social relationships (Finn & Voelkl, 1993). Schlecty (2001) underscores the critical importance of the extent to which students internalize their duties and responsibilities in his examination of the concept of school engagement. Similarly, Fredricks et al. (2004), in their models for determining school engagement, highlight the awareness of responsibility and explain the student's fulfillment of duties and responsibilities and participation in class under the heading of behavioral engagement.

Engagement is described as a deep interest in, active participation in, and dedication to the learning process (Cook-Sather & Luz, 2015). Engagement is often conceptualized as a multidimensional construct comprising behavioral, emotional, and cognitive dimensions (Fredricks et al., 2004), and these dimensions are crucial in developing students' learning responsibilities in the classroom (Hospel & Galand, 2016; Pöysä et al., 2018; Steenberghs et al., 2021). Behavioral engagement is the students' engagement in classroom activities; emotional engagement, on the other hand, reflects students' affect, that is, their feelings of inclusion and their emotional associations in the classroom. Cognitive engagement is the students' willingness and effort that they put in the learning process. (DeMonbrun et al., 2017; Rimm-Kaufman et al., 2015). Behavioral engagement reflects active participation in school activities, such as class discussions, debates, attendance, and attentiveness in class (Ackert, 2018). Emotional engagement encompasses students' feelings toward school, including their sense of belonging and positive attitudes toward learning (Luo et al., 2019). Cognitive engagement involves deeper intellectual involvement, such as critical thinking and problem-solving (Upadyaya & Salmela-Aro, 2013). Studies have shown that well-organized classrooms with clear expectations, teachers' use of effective time management strategies, and routines in the classroom can foster behavioral, cognitive, and emotional engagement (Hospel & Galand, 2016). Furthermore, teachers' reinforcement of desirable behaviors is positively related to students' situation-specific behavioral and cognitive engagement during lessons (Pöysä et al., 2018). When a student develops thoughts about going to school merely out of obligation, they tend to disengage from school cognitively, emotionally, and behaviorally. However, for a student who feels that their presence at school is essential and that they themselves are valuable, willingness and engagement come to the forefront in this process. Such students not only fulfill their duties and responsibilities to avoid punishment but also recognize that the educational process serves their individual goals. Consequently, they internalize their aims and objectives and do not neglect their duties and responsibilities (Er, 2021; Jimerson et al., 2003; Finn & Voelkl, 1993; Karababa, et al., 2018).

Similarly, learning responsibility refers to students' ability to take ownership of their learning processes, including setting personal goals, monitoring their progress, and independently

managing tasks (Gökdağ-Baltaoğlu & Güven, 2022). Learning responsibility is a concept that involves both the student's competence and capability. The student performs the necessary actions, manages the learning process, and improves in areas where they recognize deficiencies, thereby increases their academic success (Erişti, 2017; Hill, 2002; Kolan, 2020; Roper, 2007). For a student who feels a sense of responsibility, school engagement can be seen as a phenomenon that develops in tandem. With a sense of responsibility, the student's relationship with the school is not limited to the time spent there, but the learning process is also reinforced at home. Additionally, these students, who not only prepare for learning but also actively participate in extracurricular activities, underscore the importance of fulfilling responsibilities, indicating a relationship between responsibility and engagement (Brooks & Brooks, 2006; Özen, 2013).

As mentioned, learning responsibility is students' taking on their responsibilities, managing their learning processes, evaluating the effects of their learning, and taking steps to address any deficiencies (Hill, 2002; McCombs, 2001; Roper, 2007). This concept involves students being aware of their expectations, setting goals and objectives (Sierra, 2009), showing willingness in the learning process (Clayton, 2003), collaborating effectively (Felder & Brent, 2009), and having positive attitudes and thoughts towards learning, which motivate them to put in effort (Savin-Baden & Major, 2004). Students who possess learning responsibility are inclined to complete their tasks on time (Discenza et al., 2002), care about the tasks or assignments given to them (Warren, 1996), and strive to achieve the best possible outcomes (Kitsantas & Zimmerman, 2009; Zimmerman & Kitsantas, 2005). By acquiring learning responsibility, students can transform it into a skill, enhancing their academic and daily success. Considering learning responsibility as a tool serving a purpose and acknowledging that education is not confined to a school or a physical building, it can be said that students establishing their own learning systems is a key to lifelong success. Indeed, the literature contains various studies demonstrating that learning responsibility is a significant predictor of academic success (Allan, 2006; Bacon, 1993; Başbay, 2008; Carpenter & Pease, 2013; Cook & Luz, 2015; Çam & Ünal-Oruç, 2014; Devlin, 2002; Kaya & Doğan, 2014; Özen, 2013; Yakar, 2017; Yeşil, 2013).

School engagement and learning responsibility are clearly affected by a range of developmental, social, and motivating factors, among which gender, grade level, and school type are particularly significant (Boubih et al., 2023). As children move through the grades, shifts in their cognitive ability, social maturity and academic expectations affect the extent to which they are engaged in and take responsibility for their learning (Amerstorfer & Münster-Kistner, 2021). In Turkey, eighth-grade students face high-stakes testing through the 'Transition to High School Exam (LGS)', which is used to determine their eligibility for entry into high schools, particularly those with competitive academic programs. The exam evaluates students' performance in subjects like Turkish, mathematics, science, and social studies, and it plays a significant role in shaping their future educational path. The desire to perform well on this exam often leads to intense study habits and a strong sense of responsibility for academic success (Güngör, 2021). Gender differences are also noticeable, with girls demonstrating stronger behavioral and emotional engagement, whilst boys frequently respond better to competitive or hands-on activities (Kivikangas et al., 2014). In developing countries, public school students, often from lower socioeconomic backgrounds, are motivated by the goal of securing a profession through education (Çevik, 2005). In contrast, private school students, with

more financial resources, benefit from additional opportunities both inside and outside of school. As a result, school holds more significance for public school students (Kandemir, 2015).

Recognizing these characteristics enables educators to create solutions that address the varying needs of children across grades, genders, and school types. There are numerous studies on the factors affecting students' levels of school engagement and the impacts of these factors on overall quality of life, achievement, and social adaptation. In terms of gender, it is generally noted that female students have higher levels of school engagement, although the relationship between learning responsibility and gender has not been explicitly addressed. Similarly, changes in students' levels of school engagement and learning responsibility across different grade levels have not been sufficiently explored. Therefore, further research is needed to comprehensively examine these factors and their effects on students' school engagement and learning responsibility (Arastaman, 2009; Aydın, 2018; Jenkins, 1997; Kahraman, 2014; Kalaycı & Özdemir, 2013; Lau et al., 2018; Savi, 2011). Existing research on school engagement often addresses general factors, but more specific studies examining the relationships between students and their families, teachers, peers, and the overall school environment are needed. Thus, an in-depth analysis of student-school interaction and understanding how this interaction affects students' levels of engagement is crucial (Kolan, 2020). Enhancing school engagement will positively influence students' overall quality of life, academic achievement, and social adaptation (Dönmez, 2016).

Although the concepts of school engagement and learning responsibility are widely discussed and examined in various contexts, such as classroom setting and school environment, there is no study exploring the relationship between these two constructs. Investigating this interaction is particularly significant in middle school students due to their critical developmental stage, where they experience significant cognitive, emotional, and social changes. This period is crucial for establishing educational attitudes and behaviors that can impact future academic success. By focusing on middle school students, this study aims to fill a research gap and offer valuable insights that could inform strategies to boost both engagement and responsibility, ultimately enhancing academic performance. This study is expected to make a notable contribution to the existing literature and provide actionable recommendations for educators and policymakers to foster student success.

In this vein, the purpose of this study is to examine the relationship between middle school students' levels of school engagement and their learning responsibilities. The research questions have been formulated as follows.

1. What is the level of school engagement among middle school students? Does students' school engagement vary according to:
   - Gender,
   - Grade level,
   - School type?

2. What is the level of learning responsibility among middle school students? Does students' learning responsibility vary according to:
   - Gender,
   - Grade level,
   - School type?
3. Does the school engagement of middle school students predict their learning responsibility?

Method

Research Design

In this correlational study, a quantitative research method, was employed to examine the relationship between middle school students' school engagement and learning responsibilities. Correlational studies aim to describe occurrences or ongoing phenomena (Büyüköztürk et al., 2010). In this model, the simultaneous consideration of two or more variables allows for the observation of whether any change occurs and, if so, the direction and extent of this change (Karasar, 2012).

Sample

The sample of this study consisted of 353 middle school students enrolled in private and public schools in the Üsküdar district of Istanbul during the 2022-2023 academic year. Üsküdar was chosen as the study site because of its diverse demographic structure, which comprises pupils from various socioeconomic and cultural backgrounds, allowing for a more representative analysis of middle school populations. To ensure a balanced representation, students were selected from both public and private schools, which were chosen based on their accessibility and willingness to participate in the study. The schools included were determined to capture sufficient variability within the district. The simple random selection approach, a probability sampling methodology, was used to ensure that every student in the chosen schools had an equal chance of admission. The inclusion procedure began with the collection of lists of all enrolled pupils from participating institutions, which were then utilized to generate a randomized selection. Detailed information about the study sample is presented in Table 1.

Table 1

Demographic Information Regarding the Sample of the Study

Variables		*N*	*%*
Gender	Female	186	52.7
	Male	167	47.3
Grade Level	Fifth Grade	118	33.4
	Sixth Grade	85	24.1
	Seventh Grade	62	17.6
	Eighth Grade	88	24.9
School Type	Private	212	60.1
	Public	141	39.9

The study included a total of 353 students, with 186 females (52.7%) and 167 males (47.3%). The study sample consisted of 353 participants, with slightly more females (52.7%) than males (47.3%). The students were distributed across grade levels, with the highest representation in fifth grade (33.4%) and the lowest in seventh grade (17.6%). A majority of the students attended private schools (60.1%), while 39.9% were from public schools.

Ethical committee approvals, ministry permissions, and parental consents were obtained for the students' participation in the study, and the principle of voluntariness was adhered to.

Data Collection Tools

The data for the study were collected using a Personal Information Form, School Engagement Scale, and Learning Responsibility Scale.

Personal Information Form

Through the Personal Information Form prepared by the researchers, the aim was to gather demographic information about the students. The form included questions regarding demographic characteristics such as gender, grade level, and school type.

School Engagement Scale

The School Engagement Scale utilized in this study to determine the level of school engagement among middle school students was developed by Fredricks et al. (2005). The adaptation into Turkish, as well as the validity and reliability study of the scale, were conducted by Çengel et al. (2017). The School Engagement Scale is a five-point Likert scale consisting of 19 items and three dimensions: behavioral engagement, emotional engagement, and cognitive engagement. Behavioral engagement was measured with five items, with scores ranging from 5 to 25 (low: 5–11, moderate: 12–18, high: 19–25). Emotional engagement was assessed through six items, with possible scores between 6 and 36 (low: 6–15, moderate: 16–25, high: 26–36). Cognitive engagement was evaluated with eight items, resulting in scores ranging from 8 to 40 (low: 8–18, moderate: 19–29, high: 30–40). As scores obtained from the scale increased, students' level of school engagement also increased. The lowest score that could be obtained from the overall scale was 19, while the highest score was 101. The results of the confirmatory factor analysis aimed at supporting the theoretical background of the scale endorsed the three-factor structure. The explained total variance of the scale was 49.39%. When examining the reliability coefficients of the scale, the total Cronbach's Alpha value of the scale was .89, .68 for the behavioral engagement sub-dimension, .80 for the emotional engagement sub-dimension, and .80 for the cognitive engagement sub-dimension. As a result of reliability calculations conducted within the scope of the current study, Cronbach's Alpha coefficients were calculated as .87 for the total scale, .62 for the behavioural engagement dimension, .79 for the emotional engagement dimension, and .82 for the cognitive engagement dimension. All this information indicated that the scale was valid and reliable.

Learning Responsibility Scale

The Learning Responsibility Scale used in this study to determine the level of learning responsibility among middle school students was a scale developed by Yeşil (2013). The scale

consisted of 22 items and two dimensions: learning responsibilities during the course and learning responsibilities outside the course, rated on a five-point Likert scale. Learning responsibilities during the course were assessed through 13 items, with possible scores between 5 and 65 (low: 5–24, moderate: 25–44, high: 45–65). Learning responsibilities outside the course were assessed through 11 items, with possible scores between 5 and 55 (low: 5–21, moderate: 22–38, high: 39–55). As scores obtained from the scale increase, students' level of learning responsibility also increased. The lowest score that could be obtained from the scale was 22, while the highest score was 110. The factor loadings of the items in the scale ranged from .55 to .72. The explained total variance of the scale was 41.36%. When examining the reliability coefficients of the scale, the total Cronbach's Alpha value of the scale was calculated as .89, with Cronbach's Alpha values for the learning responsibilities during class processes and learning responsibilities outside of class calculated as .55 and .72, respectively. As a result of reliability calculations conducted within the scope of the current study, Cronbach's Alpha coefficients were found to be .93 for the total scale, .89 for learning responsibilities during class processes, and .90 for learning responsibilities outside of class. All this data suggested that the scale was both valid and reliable.

Data Analysis

The data collected in the study were analyzed using SPSS 25.00 software. Inclusion criteria for the dataset involved excluding incomplete or unanswered questionnaires. Descriptive statistics were used for analyzing demographic variables, independent samples *t*-tests for comparing two groups, ANOVA for comparing more than two groups, correlation analysis to examine the relationship between school engagement and learning responsibility, and multiple linear regression analysis to determine the predictive power of school engagement on learning responsibility. Before conducting the analyses with the first research question, a normality analysis was performed to determine whether the data exhibited a normal distribution. The criterion of minimal difference between mean and median values was examined during the analysis. Additionally, skewness and kurtosis values were expected to fall within the range of ±2.00 times the standard error (George & Mallery, 2010). After the examinations, it was seen that the scale satisfied both relevant criteria and the assumption of normal distribution was met. With this result, parametric tests were decided to be used. A margin of error of 5% was set for all analyses. Within the scope of the second research question, the learning responsibilities of middle school students were examined concerning the variables of gender, grade level, and school type. Before starting with the analyses, a normality analysis was conducted to ascertain whether the data exhibited a normal distribution. During the analyses, the criterion of minimal difference between mean and median values was considered. Additionally, it was expected that the skewness and kurtosis values would fall within the range of ±2.00 times the standard error value (George and Mallery, 2010). As a result of the analysis, it was observed that the scale met the relevant criteria, and it was concluded that the assumption of normal distribution was met. With this result, the decision was made to employ parametric tests. A significance level of 5% was set for all analyses.

The study received approval from the Institutional Review Board (IRB) at Bahçeşehir University (Approval Date:14.12.2022, Approval Number: E-20221704-604.02.02-48408) prior to its initiation.

Results

Findings Regarding the Level of School Engagement Among Middle School Students

The level of school engagement among middle school students was examined in terms of variables such as gender, grade level, and school type within the scope of the first research question. The analyses began with the examination of descriptive statistics. Table 2 presents descriptive statistics regarding the scores obtained from the School Engagement Scale.

Table 2

Descriptive Statistics Regarding Students' Levels of School Engagement

Scale	*Variables*	*Min. Value*	*Max. Value*	$\bar{x}$	*sd*
School Engagement	Behavioral Engagement	5	18	14.65	2.79
	Emotional Engagement	6	23	15.79	4.49
	Cognitive Engagement	8	32	20.80	5.83
	Total	19	72	51.24	10.84

The table presents descriptive statistics on students' levels of school engagement across three dimensions: behavioral, emotional, and cognitive engagement. The mean score for behavioral engagement is 14.65, suggesting that students generally displayed a moderate level of participation in school activities. For emotional engagement, the mean score is 15.79, indicating that students felt a moderate emotional connection to their school environment. Cognitive engagement shows a higher mean score of 20.80, reflecting a strong intellectual investment in their learning processes. The overall total engagement mean score is 51.24, suggesting that students were moderately engaged in school across all dimensions. These scores show that students were engaged at a moderate level, with cognitive engagement being the strongest.

Results Regarding the Level of School Engagement among Middle School Students Based on Gender

The collected data were analyzed using independent samples *t*-test to determine whether there were differences in students' levels of school engagement based on gender. The data related to the analysis are presented in Table 3.

Table 3

Independent Samples t-Test Results on School Engagement of Middle School Students by Gender

Scale/Subscale	*Gender*	*N*	$\bar{x}$	*sd*	*t*	*df*	*p*
Behavioral Engagement	Female	186	15.25	2.61	4.31	351	0.00*
	Male	167	13.99	2.84			
Emotional Engagement	Female	186	16.57	4.44	3.50	351	0.00*
	Male	167	14.92	4.41			
Cognitive Engagement	Female	186	21.71	5.70	3.13	351	0.00*
	Male	167	19.78	5.82			
School Engagement Total	Female	186	53.53	10.54	4.28	351	0.00*
	Male	*167*	*48.69*	*10.62*			

*$p<0.05$

The analysis revealed that the mean scores of female students in behavioral engagement were higher than the scores of male students. This difference was statistically significant [$t(351)=4.31$; $p<0.05$]. When the emotional engagement dimension was examined, it was found that the mean scores of female students in emotional engagement were higher than the scores of male students. This difference was statistically significant, as well [$t(351)=3.50$; $p<0.05$]. Likewise, in the cognitive engagement dimension, the analysis demonstrated that the mean scores of female students in cognitive engagement were higher than the mean scores of male students. This difference proved to be statistically significant [$t(351)=3.13$; $p<0.05$]. Lastly, the analysis showed that the school engagement total mean scores of female students were higher than the mean scores of male students. This difference in mean scores was statistically significant [$t(351)=4.28$; $p<0.05$].

Results Regarding the Level of School Engagement among Middle School Students Based on Grade Level

The obtained data were analyzed using ANOVA to determine whether there were differences in students' levels of school engagement based on grade level. The results of the analysis are presented in Table 4.

Table 4

ANOVA Results on School Engagement of Middle School Students by Grade Level

Scale/Subscale	*Grade Level*	*N*	$\bar{x}$	*sd*	*F*	*df*	*p*	*Significant Difference*
Behavioral Engagement	5th Grade	118	15.14	2.73	2.427	3-349	0.06	-
	6th Grade	85	14.64	3.20				
	7th Grade	62	14.53	2.57				
	8th Grade	88	14.10	2.49				
Emotional Engagement	5th Grade	118	15.75	4.49	2.488	3-349	0.06	-
	6th Grade	85	14.79	4.82				
	7th Grade	62	16.71	4.26				
	8th Grade	88	16.15	4.21				
Cognitive Engagement	5th Grade	118	20.24	5.39	5.845	3-349	0.00*	8th Grade>5th Grade
	6th Grade	85	19.12	5.49				8th Grade>6th Grade
	7th Grade	62	22.00	6.28				
	8th Grade	88	22.33	5.93				
School Engagement Total	5th Grade	118	51.14	10.46	2.960	3-349	0.03*	
	6th Grade	85	48.54	11.36				
	7th Grade	62	53.24	11.36				
	8th Grade	88	52.58	10.07				

*$p<0.05$

As demonstrated in Table 4, there was no statistically significant difference in behavioral engagement scores across grade-level categories [$F(3.349)= 2.42$; $p>0.05$]. Similarly, there was no statistically significant difference found among the scores of emotional engagement [$F(3.349)= 2.48$; $p>0.05$]. However, a statistically significant difference was found among the

scores of cognitive engagement [$F(3.349)= 5.84$; $p<0.05$]. Lastly, there was a statistically significant difference found among the of school engagement total scores across grade level categories [$F(3.349)= 2.96$; $p<0.05$]. Tukey-B post-hoc tests were conducted to determine from which categories the differences in cognitive engagement and total school engagement scores originated. According to the analysis results, the scores of cognitive engagement for eighth-grade students was higher than the scores of fifth and sixth-grade students. Therefore, the cognitive engagement of eighth-grade students significantly differed from that of other grade-level students. In addition, the total school engagement scores of seventh-grade students were higher than the score of sixth-grade students. Therefore, the level of school engagement of seventh-grade students significantly differed from that of other grade-level students.

Results Regarding the Level of School Engagement among Middle School Students Based on School Type

The data obtained to investigate whether there were differences in students' level of school engagement based on school type were analyzed using independent samples *t*-test. The data related to the analysis are presented in Table 5.

Table 5

Independent Samples t-Test Results on School Engagement of Middle School Students by School Type

Scale/Subscale	*School Type*	*N*	$\bar{x}$	*sd*	*t*	*df*	*P*
Behavioral Engagement	Private	212	14.76	2.95	0.90	351	0.36
	Public	141	14.49	2.53			
Emotional Engagement	Private	212	15.35	4.59	-2.25	351	0.02*
	Public	141	16.45	4.27			
Cognitive Engagement	Private	212	19.91	5.69	-3.58	351	0.00*
	Public	141	22.14	5.79			
School Engagement Total	Private	212	50.02	10.95	-2.61	351	0.00*
	Public	141	53.08	10.44			

*$p<0.05$

As seen in Table 5, there was no statistically significant difference in the scores of behavioral engagement between private and public school students [$t(351)= 0.90$; $p>0.05$]. The mean scores of affective engagements of public school students were higher than those of private school students. This difference was statistically significant [$t(351)= -2.25$; $p<0.05$]. The mean scores of cognitive engagement of public school students were higher than those of private school students. This observed difference in the scores was statistically significant [$t(351)= -3.586$; $p<0.05$]. When compared the school engagement total scores between private and public school students, it was observed that the scores of public school students were higher. This difference was statistically significant, as well [$t(351)= -2.61$; $p<0.05$].

Results Regarding Middle School Students' Level of Learning Responsibility

The analyses started with the examination of descriptive statistics. Table 6 presents descriptive statistics regarding the scores obtained from the Learning Responsibility Scale.

Table 6

Descriptive Statistics on Learning Responsibility

Scale	*Variables*	*Min. Value*	*Max. Value*	$\bar{x}$	*sd*
Learning Responsibility	Learning Responsibilities During the Course	13	52	43.29	7.26
	Learning Responsibilities Outside the Course	11	44	30.40	8.44
	Total	25	96	73.69	14.44

As can be seen in Table 6, the lowest score obtained was 25 and the highest score was 96. For the learning responsibilities during the course subscale, the lowest score obtained was 13 and the highest score was 52. The mean score for learning responsibilities during the course is 43.29, indicating that students take on a moderately high amount of responsibility within the course. For the learning responsibilities outside the course subscale, the lowest score obtained was 11 and the highest score was 44. For learning responsibilities outside the course, the mean score is 30.40, indicating that students also demonstrated a moderately high amount of responsibility outside of course activities. The total mean score for learning responsibility is 73.69, with a standard deviation of 14.44, showing a relatively high level of overall responsibility, combining both in-class and out-of-class responsibilities.

Results on the Level of Learning Responsibility by Gender in Middle School Students

The data collected to determine whether students' levels of school engagement differed by gender were analyzed using an independent samples *t*-test. The results of the analysis are presented in Table 7.

Table 7

Independent Samples t-Test Results on Learning Responsibility of Middle School Students by Gender

Scale/Subscale	*Gender*	*N*	$\bar{x}$	*sd*	*t*	*df*	*p*
Learning Responsibilities During the Course	Female	186	44.62	6.98	3.71	351	0.00*
	Male	167	41.80	7.29			
Learning Responsibilities Outside the Course	Female	186	31.71	7.96	3.11	351	0.00*
	Male	167	28.94	8.73			
Learning Responsibility Total	Female	186	76.33	13.57	3.69	351	0.00*
	Male	167	70.74	14.85			

*$p<0.05$

The analysis results indicated that the learning responsibilities during the course mean scores of female students were higher than those of male students. This difference between female and male students was statistically significant [$t(351)=3.71$; $p<0.05$]. Secondly, the results demonstrated that the mean scores of learning responsibilities outside of the course of female students were higher than those of male students. This difference in the scores between female and male students was also statistically significant [$t(351)=3.11$; $p<0.05$]. Lastly, the analysis revealed that the learning responsibility total scores of female students were higher

than those of male students. This difference in the total scores between female and male students was also statistically significant [$t(351)=3.69$; $p<0.05$].

Results on the Level of Learning Responsibility by Grade Level in Middle School Students

The data collected to determine whether students' learning responsibility differed by grade level were analyzed using ANOVA. The results of the analysis are presented in Table 8.

Table 8

ANOVA Results on Learning Responsibility of Middle School Students by Grade Level

Scale/Subscale	*Grade Level*	*N*	$\bar{x}$	*sd*	*F*	*df*	*p*	*Significant Difference*
Learning Responsibilities During the Course	5th Grade	118	42.58	6.99				
	6th Grade	85	42.28	8.42	2.14	3	0.09	-
	7th Grade	62	44.61	7.38		349		
	Table 8 Cont.							
	8th Grade	88	44.26	6.09				
Learning Responsibilities Outside the Course	5th Grade	118	29.41	8.12				7th Grade>5th Grade
	6th Grade	85	28.46	8.08	4.68	3	0.00*	7th Grade>6th Grade
	7th Grade	62	32.50	8.81		349		
	8th Grade	88	32.13	8.41				
Learning Responsibility Total	5th Grade	118	71.99	13.54				7th Grade>5th Grade
	6th Grade	85	70.74	15.03	4.00	3	0.00*	7th Grade>6th Grade
	7th Grade	62	77.11	15.37		349		
	8th Grade	88	76.39	13.61				

*$p<0.05$

As seen in Table 8, there was no statistically significant difference in the mean scores of learning responsibility during the course among the grade level categories [$F(3,349)= 2.14$; $p>0.05$]. However, there was a statistically significant difference in the mean scores of learning responsibility outside of the course among the grade level categories [$F(3,349)= 4.68$; $p<0.05$]. Lastly, there was a statistically significant difference in the total scores of learning responsibility among the grade level categories [$F(3,349)= 4.00$; $p<0.05$]. Tukey-B test was conducted to determine the specific categories contributing to these differences. According to the analysis results, the learning responsibilities outside the course of seventh-grade students were higher than the scores of fifth and sixth-grade students. Therefore, the learning responsibilities outside the course of seventh-grade students significantly differed from those of fifth and sixth-grade students. In addition, the learning responsibility total scores of seventh-grade students were higher than those of fifth and sixth-grade students. Therefore, the learning responsibilities of seventh-grade students significantly differed from those of fifth and sixth-grade students.

Results Regarding the Level of Learning Responsibility of Middle School Students Based on School Type

The data collected to determine whether students' learning responsibilities differed according to school type were analyzed using the independent samples *t*-test. The results of the analysis are presented in Table 9.

Table 9

Independent Samples t-Test Results on Learning Responsibility of Middle School Students by School Type

Scale/Subscale	*School Type*	*N*	$\bar{x}$	*sd*	*t*	*df*	*p*
Learning Responsibilities During the Course	Private	212	42.37	7.75	-2.92	351	0.00*
	Public	141	44.66	6.23			
Learning Responsibilities Outside the Course	Private	212	29.27	8.17	-3.11	351	0.00*
	Public	141	32.09	8.58			
Learning Responsibility Total	Private	212	71.65	14.49	-3.29	351	0.00*
	Public	141	76.75	13.86			

*$p<0.05$

As seen in Table 9, the mean scores of public school students for learning responsibility during the course were higher than those for private school students. This difference was also statistically significant [$t(351)= -2.25$; $p<0.05$]. Similarly, the mean scores of public school students for learning responsibility outside of the course were higher than those for private school students. This observed difference was statistically significant, as well [$t(351)=-3.11$; $p<0.05$]. Lastly, the learning responsibility total scores of public school students were higher than those of private school students. This difference was also statistically significant [$t(351)= 3.69$; $p<0.05$].

Results on the Prediction of Learning Responsibility by School Engagement in Middle School Students

Within the scope of the third research question, the predictive power of school engagement on learning responsibility in middle school students was examined. Firstly, whether there was a relationship between school engagement and learning responsibility was investigated using Pearson correlation analysis. The data related to the analysis are presented in Table 10.

Table 10

Results of the Correlation Analysis Between School Engagement and Learning Responsibility

Scale/Subscale	*Behavioral Engagement*	*Emotional Engagement*	*Cognitive Engagement*	*School Engagement*
Learning Responsibilities During the Course	0.63***	0.60***	0.70***	0.78***
Learning Responsibilities Outside the Course	0.31***	0.47***	0.72***	0.66***
Learning Responsibility	0.50***	0.57***	0.77***	0.78***

***$p<0.001$

As seen in Table 10, there is a statistically significant strong positive relationship between behavioral engagement and learning responsibilities during the course ($r=0.63$; $p<0.001$). There was a statistically significant weak positive relationship between behavioral engagement and learning responsibilities outside the course ($r=0.31$; $p<0.001$). There was a statistically significant strong positive relationship between emotional engagement and learning responsibilities during the course process ($r=0.60$; $p<0.001$). There was a statistically significant moderate positive relationship between emotional engagement and learning responsibilities outside of the course ($r=0.47$; $p<0.001$). There was a statistically significant strong positive

relationship between cognitive engagement and learning responsibilities during the course (r=0.70; p<0.001). There was a statistically significant strong positive relationship between cognitive engagement and learning responsibilities outside the course (r=0.72; p<0.001). There was a statistically significant strong positive relationship between cognitive engagement and learning responsibility (r=0.77; p<0.001). Finally, there was a statistically significant strong positive relationship between school engagement and learning responsibility (r=0.78; p<0.001). Following this relationship, three multiple linear regression analyses were conducted. The results of the analyses are presented in Table 11, 12 and 13.

Table 11

Results on the Predictive Power of Behavioral Engagement, Emotional Engagement and Cognitive Engagement on Learning Responsibilities During the Course in Middle School Students

Variables	*B*	*SE*	*β*	*t*	*F*	*R2*
Constant (a)	13.19	1.29		10.22		
Behavioral Engagement	0.97	0.09	0.37	10.31***	215.24***	0.65
Cognitive Engagement	0.54	0.05	0.43	10.60***		
Emotional Engagement	0.30	0.07	0.19	4.70***		

Table 11 illustrates the multiple linear regression analysis of the sub-dimensions of school engagement (Behavioral Engagement, Emotional Engagement and Cognitive Engagement) and learning responsibilities during the course. The findings demonstrated that all the dimensions significantly predicted learning responsibility during the course in a positive way and school engagement explained 65% of the variance in learning responsibilities during the course. [F=215.24; p<0.001; $R2$=65%]. Considering Cohen's measures, the effect size was calculated as 1.857, which meant very large, (1.45 ≤ Cohen's d) (Dinçer, 2014).

Table 12

Results on the Predictive Power of Behavioral Engagement, Emotional Engagement and Cognitive Engagement on Learning Responsibilities Outside the Course in Middle School Students

Variables	*B*	*SE*	*β*	*t*	*F*	*R2*
Constant (a)	8.02	1.75		4.60		
Behavioral Engagement	-0.02	0.13	-0.01	-0.13	127.92***	0.52
Cognitive Engagement	0.99	0.07	0.68	14.41***		
Emotional Engagement	0.13	0.09	0.71	1.51		

Table 12 presents the multiple linear regression analysis of the sub-dimensions of school engagement (Behavioral Engagement, Emotional Engagement and Cognitive Engagement) and learning responsibilities outside the course. The findings revealed that among the sub-dimensions, only cognitive engagement significantly predicted learning responsibility outside the course in a positive way [F=127.92; p<0.001; $R2$=52%]. As for the effect size, Cohen's effect value was calculated as 1.083, referring to a very large effect (Dinçer, 2014).

Table 13

Results on the Predictive Power of School Engagement on Learning Responsibilities in Middle School Students

Variables	*B*	*SE*	*β*	*t*	*F*	*R2*
Constant (a)	20.08	2.31		8.71	564.47***	0.62
School Engagement	1.05	0.04	0.79	23.76		

Table 13 presents the multiple linear regression analysis of overall school engagement and learning responsibilities. The findings revealed that school engagement predicted learning responsibilities significantly in a positive way [F=564.47; p<0.001; $R2$=62%]. Based on Cohen's measures, the effect size was calculated to be 1.632, indicating a very large effect (1.45 ≤ Cohen's d) (Dinçer, 2014).

Discussion

The findings of the study indicated that variables such as gender, grade level, and school type had an influence on students' level of school engagement. School engagement is considered a psychological construct encompassing behavioural, emotional and cognitive factors (Jimerson et al., 2003). In the current study, students' levels of school engagement showed significant differences based on gender. In other words, female students exhibited significantly higher levels of school engagement across the behavioural, emotional, and cognitive dimensions of school engagement. This could be attributed to the higher trust of female students in their schools and teachers, and their greater value placed on friendships at school, and their lower rates of absenteeism. This assertion finds support in various studies. For example, Wang and Eccles (2012) found consistent gender differences in the three types of school engagement, indicating that female students tend to have higher levels of engagement. This is further corroborated by Musso et al. (2022), who reported that females are more engaged with school than boys. Additionally, Pyne (2020) highlighted that educators and parents typically perceive behaviourally engaged students as eager to learn, follow school rules, and get along with others, traits that are often more pronounced in female students. However, school engagement cannot be solely attributed to gender; it is a complex phenomenon influenced by regional and cultural factors, student age, social relationships within the school, as well as family and peer environments (Simons-Morton & Crump, 2003). Understanding school engagement requires a comprehensive analysis that considers the intricate interplay of various factors beyond gender alone.

When the effect of grade level on the level of school engagement was evaluated, it was found that eighth-grade students had significantly higher levels of cognitive engagement compared to fifth and sixth-grade students. Additionally, the results revealed that seventh-grade students had higher school engagement scores than sixth-grade students. This indicates that students' level of school engagement may vary depending on their grade level. Differences between grade level and school engagement may be influenced by students' different characteristics, needs, and expectations. During adolescence, students show different patterns of school engagement, indicating that while many might experience a decrease in their involvement, others remain consistent or even become more engaged in school activities (Li &

Lerner, 2011). This variation can be linked to the stress related to high school placement exams, which is especially intense in eighth grade. Given that eighth-grade students might face academic pressures related to high school placement exams during their academic year, the rationale behind the lower levels of school engagement can be understood. The transition process for fifth-grade students to middle school and the different academic loads also influence levels of school engagement. Upon reaching seventh grade, it is believed that students develop a stronger sense of belonging to the school, their teachers, classes, and friends. Some students may temporarily distance themselves from school but later show renewed school engagement. Additionally, some students may display indifferent or negative attitudes towards school despite being successful academically. Therefore, to understand the differences between grade level and school engagement, factors such as students' personality traits, individual differences, family relationships, friendships, and social lives need to be considered (Lombardi et al., 2019; Vidić, 2021). The results of the study also indicated that only the cognitive engagement of eighth-grade students significantly differed from that of other grade-level students, not emotional or behavioural engagement. Eight graders are typically at a more advanced stage of cognitive development, which allows them to handle more complex tasks, engage in abstract thinking, and participate in more sophisticated learning activities (Wang & Peck, 2013). This could lead to higher levels of cognitive engagement, as they are better able to process, analyze, and integrate the information being presented in class. However, their behavioural and emotional engagement might be influenced by external factors such as friendship, classroom environment, and sense of belonging (Ackert, 2018; Luo et al., 2019).

Considering the level of school engagement based on school type, the results indicated statistically significant differences between students attending private and public schools. Students attending public schools had significantly higher levels of school engagement. This difference was also observed in the emotional and cognitive engagement dimensions. In developing countries, students attending public schools, often from lower socioeconomic backgrounds, may be motivated by the desire to obtain a profession through education (Çevik, 2005). Additionally, various projects aimed at enhancing students' school engagement and positive encouragement of students may have contributed to the high levels of school engagement, particularly in public schools. However, students attending private schools have access to various opportunities inside and outside of school due to their financial means. Therefore, they can socialize, develop themselves, and shape their lives not only within school but also through extracurricular activities. Hence, it can be considered natural for schools become more meaningful domains for students attending public schools (Kandemir, 2015). The findings also revealed that there were substantial differences in cognitive and emotional engagement among school types, but not in behavioural engagement. The lack of a significant difference in behavioural involvement between public and private school children shows that school type may not have a significant impact on students' outward participation, effort, or classroom behaviour. Several factors influence behavioural engagement, including classroom management techniques, instructor expectations, and individual student motivation (Larson et al., 2020; Mikami et al., 2017). These elements may be very similar in both public and private school settings, especially if both cultures emphasize similar behavioural standards and expectations.

Several studies provide relevant evidence that school engagement can be associated with the aforementioned factors. For example, Weiss and Baker-Smith (2010) found that the school type attended during the middle grades is significantly related to academic outcomes in the 9th-grade year, indicating a link between school type and student engagement. In another study, Malone et al. (2019) demonstrated that eighth-grade pass rates were significantly higher in middle schools compared to high schools, suggesting a potential impact of grade configuration on student engagement and academic performance. Alp's (2017) research with middle school students revealed that students in public schools experienced a greater sense of belonging compared to students in private schools. While gender, grade, and school type differences in school engagement exist, they are part of a broader landscape that includes regional, cultural, social, and familial influences. Understanding school engagement requires a comprehensive analysis that considers the intricate interplay of various factors beyond gender alone.

When examining students' levels of learning responsibility, results favoring female students were found to be similar to school engagement based on gender, and it was observed that female students scored significantly higher in both the dimensions of learning responsibility during the course and outside the course. These findings indicate that gender is also influential on learning responsibility. Research suggests that female students typically participate more actively in the classroom and often develop stronger connections with their teachers. Wicaksono et al. (2022) found that female students are more likely to communicate with teachers, which points to a more engaged and responsive learning style compared to male students. Although the differences in learning styles between male and female students are thought to have an impact on the results, it is predicted that this situation will explain the different approaches of students with different learning styles regarding learning responsibility. While female students generally engage in a learning process in the classroom by establishing relationships with their teachers thanks to their abilities to connect more socially and emotionally, male students may be less focused on their surroundings and more reluctant to communicate directly with teachers. Therefore, the tendency of female students to strengthen their communication with teachers compared to male students can also come into play as a factor affecting learning responsibility (Markus et al., 2022; Rudasill et al., 2010).

The results revealed no statistically significant difference in the mean scores of learning responsibility during the course among the grade level categories. However, there was a statistically significant difference in the mean scores of learning responsibility outside of the course among the grade level categories and seventh-grade students had higher levels of learning responsibility outside the course compared to students in fifth and sixth-grades. The capacity and willingness of students to take responsibility for their own learning can be determined by their behaviours in understanding a subject, preparing for class, reviewing and revising, and completing assignments. While some students may exhibit a sense of learning responsibility, others may struggle or be reluctant to take on responsibility, which can be explained by various factors (Ayish & Deveci, 2019). The increased awareness of seventh-grade students regarding entrance exams to high school and taking school more seriously than fifth and sixth-grade students may have contributed to their higher levels of responsibility. However, the lack of significant differentiation among eighth-grade students may be attributed to increased anxiety about exams as the exams approach and an increase in avoidance behaviours. Research suggests that eighth grade is a critical time when students face important

decisions about course selection and academic challenges, which can influence their performance and future educational pathways (Reilly et al., 2017). In addition, given the organized context of a classroom, students acquire responsibility in similar ways throughout grades. The classroom setting provides help in the form of a guiding teacher, a timetable, and peer interaction. These might have created a similar atmosphere in which learning responsibility is largely consistent across grade levels. These factors can help students remain responsible for their learning since they can better manage their coursework (Sartika, 2024; Yekta & Alighadr, 2016). Outside of the classroom, however, students have less structure and must rely on their own motives and self-control. This may be more difficult for young children, who rely on their parents or teachers to complete learning activities. Compared to them, a seventh-grade student who is developmentally more mature might be better equipped to handle these responsibilities independently. As students continue their educational journey, their ability to self-manage and accept responsibility for their learning improves and this allows them to adapt more successfully to situations that require intrinsic motivation (Istiqomah et al., 2021; Macintyre et al., 2020).

While students attending public schools demonstrated significantly higher levels of learning responsibility, this notable difference was observed both in academic processes and extracurricular learning responsibilities. Private schools generally have greater financial resources, providing their students with a broader learning environment and more opportunities. These opportunities may enhance students' levels of learning responsibility. However, having a more rigorous educational system than public schools may also be a contributing factor to private school students neglecting their learning responsibilities (Dang & Rogers, 2008). When students feel pressure, they may exhibit behaviors of avoidance and neglect (Jiang et al., 2022). In this regard, both the larger class sizes and the lower educational intensity in public schools compared to private schools may have been effective in enabling students to manage the process and take responsibility through their own efforts.

Several studies have reported similar findings regarding learning responsibility. For example, Golzar (2006) investigated the impact of gender on learning responsibility and found that female students exhibited a notably greater sense of responsibility than their male counterparts. Additionally, the study revealed a significant and positive correlation between academic achievement and the perception of responsibility. Yeşil (2015) conducted a study with high school students to examine the effect of school type on learning responsibility and found that school type caused a significant difference in the level of learning responsibility and all its sub-dimensions. While seventh-grade students may exhibit increased responsibility and awareness due to factors like high school entrance exams, eighth-grade students may face heightened anxiety and avoidance behaviors as they approach crucial exams and decisions about their academic paths. Teachers' influence on student motivation and achievement, as well as the impact of anxiety and motivation on performance, are essential considerations in understanding the dynamics of student behavior and academic outcomes during critical middle school years.

A positive and significant relationship was identified between students' school engagement and learning responsibilities in the study. This relationship was consistent with both the dimensions of learning responsibility during the course and outside the course. When considering the predictive power of school engagement on learning responsibility, it was

concluded that all the dimensions significantly predicted learning responsibility during the course in a positive way and school engagement explained 65% of the variance in learning responsibilities during the course. These findings highlight the importance of fostering cognitive, behavioural, and emotional engagement during class time, as all three play a critical role in shaping students' learning responsibilities within the classroom context. This can be ensured by adopting a multifaceted approach including maintaining well-organized classrooms (Rim-Kaufman et al., 2015), implementing appropriate instructional strategies that promote these constructs (Barlow et al., 2020), utilizing correct assessment methods (Barlow & Brown, 2020), and providing autonomy support (Lu et al., 2022). However, the findings revealed that among the sub-dimensions, only cognitive engagement significantly predicted learning responsibility outside the course in a positive way with a variance of 52%. These findings emphasize that cognitive engagement plays a central role in motivating and enabling students to take responsibility for learning activities beyond the classroom. Behavioural and emotional engagement, however, may be more relevant to in-class activities rather than independent, outside-the-classroom tasks. Cognitive engagement, which includes psychological interest and drive to learn, was found to be an essential factor in defining students' learning responsibilities both within and outside of the classroom (Kusmaryono, 2023). Behavioural engagement, which includes students' behaviours and participation in classroom activities, and emotional engagement are more directly related to in-class learning experiences (Larasaty & Yulianawati, 2019). Cognitive engagement, however, is critical in inspiring and empowering students to take responsibility for their learning inside and outside the classroom. Despite this distinction, school engagement continues to have a substantial impact on students' overall learning experiences in the classroom. By addressing all three dimensions, effective teaching practices can create a balanced and supportive learning environment that meets the diverse requirements of students (Naibert & Barbera, 2022). The findings also revealed that school engagement predicted learning responsibilities significantly in a positive way with 62% of variance. Overall school engagement—encompassing behavioural, emotional, and cognitive aspects—is a critical determinant of students' learning responsibilities. Promoting engagement in these areas can lead to positive academic outcomes and help students develop a sense of ownership and investment in their own learning process (Estévez et al., 2021; Griffin et al., 2020; Parra-Pérez, 2023).

Conclusion and Implications

In conclusion, the research results indicated that students' levels of school engagement and learning responsibility can vary depending on various factors. These results can be beneficial for educators in developing different strategies to enhance students' level of school engagement and learning responsibility. Based on the results, creating a learning environment where children feel connected can also increase their sense of learning responsibility. When teachers promote both in-class and out-of-class socialization, encourage students to express themselves, and opt for activities that foster student cohesion, students' learning responsibility can increase, which in turn may positively impact their academic achievement. Providing regular and constructive feedback to students and supporting their learning process can contribute positively to the development of school engagement and learning responsibility. Additionally, it is important to remember that societal concepts of school, education, and teaching should be reconsidered to enhance levels of school engagement and learning

responsibility. Based on the results, the following recommendations can be made to support future studies:

• Teachers should create classroom environments that foster a sense of belonging and connection among students, as this can enhance both school engagement and learning responsibility.

• Lesson designs and programs related to school engagement and learning responsibility can be developed, and the impact of these programs on students can be investigated. Thus, roadmaps can be drawn up for the development of these critical concepts.

• This study was conducted using cross-sectional methods by collecting and analyzing data from fifth, sixth, seventh, and eighth-grade students. However, longitudinal studies are believed to yield meaningful results in examining students' levels of school engagement and learning responsibility over time.

• Teachers should develop engagement strategies that cater to the diverse needs and interests of students. This could include integrating student interests into the curriculum and employing a variety of teaching methods to accommodate different learning styles.

Author Contributions

All authors contributed equally to the entire study.

Declarations

Ethical Approval and Informed Consent

This study was approved by Bahçeşehir University Institutional Ethical Review Board. All procedures in this study were conducted in accordance with Bahçeşehir University Institutional Review Board's approved protocols. Written informed consent was obtained from the participants for their anonymized information to be published in this article.

Supplemental Material

There are no supplemental materials for this paper.

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TÜRKÇE GENİŞ ÖZET

Ortaokul Öğrencilerinde Okula Bağlılık ve Öğrenme Sorumluluğu

Giriş

Eğitim ve öğretim, bireyin yaşamında önemli bir rol oynayan süreçlerdir. Bu süreç, çocukluktan yetişkinliğe kadar uzanarak bireyin yaşamının önemli bir kısmını kapsar. Bu bağlamda, özellikle okullar; bireyin sosyal becerilerini geliştirdiği, toplumla etkileşimde bulunduğu, öğrenme deneyimlerini yaşadığı önemli kurumlardır (Boud, 1988; Lee & Smith 2001; Lodge, 2007; Shavelson & Huang, 2003). Ancak birçok öğrencinin okula bağlılık düzeyi, sadece bilgi ve beceri kazanma süreciyle değil, aynı zamanda duygusal, bilişsel ve davranışsal faktörlerle de şekillenmektedir. Literatürde cinsiyet açısından öğrencilerin okula bağlılık düzeylerinin genellikle kız öğrencilerde daha yüksek olduğu belirtilmiş, ancak öğrenme sorumluluğu ile cinsiyet arasındaki ilişki belirgin bir şekilde ele alınmamıştır. Benzer şekilde, sınıf seviyeleri açısından da öğrencilerin okula bağlılık ve öğrenme sorumluluğu düzeyleri arasındaki değişimler yeterince ele alınmamıştır. Bu nedenle, daha fazla araştırma yapılması ve bu faktörlerin öğrencilerin okula bağlılık ve öğrenme sorumluluğu üzerindeki etkilerinin daha kapsamlı bir şekilde incelenmesi gerekmektedir (Arastaman, 2009; Aydın, 2018; Jenkins, 1997; Kahraman, 2014; Kalaycı & Özdemir, 2013; Lau vd., 2018; Savi, 2011). Okul bağlılığıyla ilgili mevcut araştırmalar genellikle genel faktörleri ele almakla birlikte, öğrencilerin okula bağlılık düzeyini anlamak ve geliştirmek için yapılan araştırmaların, eğitim sistemine ve paydaşlarına önemli katkılar sağlaması gerekmektedir. Okula bağlılığın artırılması; öğrencilerin genel yaşam kalitesini, akademik başarılarını ve toplumsal uyumlarını olumlu yönde etkileyecektir (Dönmez, 2016). Bu araştırmanın amacı, öğrencilerin okula bağlılık düzeyini etkileyen faktörleri derinlemesine incelemek ve bu faktörlerin öğrenci başarısı ve yaşam kalitesi üzerindeki etkilerini anlamaktır.

Yöntem

Bu araştırmada nicel araştırma yöntemlerinden ilişkisel tarama modeli kullanılmıştır. Araştırmanın örneklemini 2022-2023 eğitim-öğretim yılında İstanbul ili Üsküdar ilçesinde özel ve devlet okullarında öğrenim gören 353 ortaokul öğrencisi oluşturmaktadır. Araştırmanın verilerinin toplanması için Kişisel Bilgi Formu, Okula Bağlılık Ölçeği ve Öğrenme Sorumluluğu Ölçeği kullanılmıştır. Araştırmada betimleyici istatistikler, bağımsız örneklem *t*-testi, ANOVA, korelasyon ve çoklu doğrusal regresyon analizi tekniklerinden yararlanılmıştır.

Bulgular

Davranışsal bağlılık boyutu incelendiğinde, kız öğrencilerin davranışsal bağlılık toplam puan ortalamaları, erkek öğrencilerin davranışsal bağlılık toplam puan ortalamalarından daha yüksektir. Görülen bu fark istatistiksel olarak da anlamlıdır [$t(351)=4.31$; $p<0.05$]. Sınıf düzeyi kategorilerine göre okula bağlılık düzeyi davranışsal bağlılık alt boyut toplam puan ortalamaları arasında istatistiki olarak anlamlı bir farklılık yoktur [$F(3.349)= 2.42$; $p>0.05$]. Benzer bir şekilde, duyuşsal bağlılık alt boyut toplam puan ortalamaları arasında istatistiki olarak anlamlı bir farklılık bulunmamaktadır [$F(3.349)= 2.48$; $p>0.05$]. Fakat bilişsel bağlılık alt boyut toplam puan ortalamaları arasında istatistiki olarak anlamlı bir farklılık vardır [$F(3.349)= 5.84$; $p<0.05$]. Özel ve devlet okulu öğrencilerinin genel toplam puan ortalamaları karşılaştırıldığında devlet okulu öğrencilerinin okula bağlılık toplam puan ortalamalarının daha yüksek olduğu görülmektedir. Görülen bu fark, istatistiksel olarak da anlamlıdır [$t(351)= -2.61$; $p<0.05$].

Kız öğrencilerin ders süreci öğrenme sorumlulukları alt boyut toplam puan ortalamalarının, erkek öğrencilerin ortalamalarından daha yüksek olduğu görülmektedir. Kız ve erkek öğrencilerin ders süreci öğrenme sorumlulukları alt boyutu toplam puan ortalamalar arası bu fark istatistiksel olarak anlamlıdır [$t(351)= 3.71$; $p<0.05$]. Sınıf düzeyi kategorilerine göre öğrenme sorumluluğu genel toplam puan ortalamaları arasında istatistiki olarak anlamlı bir farklılık vardır [$F(3,349)= 4.00$; $p<0.05$]. Devlet okulu öğrencilerinin ders süreci öğrenme sorumlulukları alt boyut toplam puan ortalamaları incelendiğinde, devlet okulu öğrencilerinin ortalamalarının, özel okul öğrencilerinin ortalamalarından daha yüksek olduğu görülmektedir. Görülen bu fark istatistiksel olarak da anlamlıdır [$t(351)= 3.69$; $p<0.05$].

Okula bağlılık ile öğrenme sorumluluğu arasında istatistiksel olarak anlamlı pozitif yönde güçlü bir ilişki vardır ($r=0.78$; $p<0.001$). Ayrıca, okula bağlılığın ders süreci öğrenme sorumluluğunu ve ders dışı öğrenme sorumluluğunu istatistiksel olarak anlamlı bir şekilde yordadığı görülmüştür [$F(2.35)=324.13$; $p<0.001$].

Tartışma

Araştırmadan elde edilen bulgular, cinsiyet, sınıf düzeyi ve okul türü gibi değişkenlerin öğrencilerin okula bağlılık düzeyi üzerinde etkili olduğunu ortaya koymaktadır. Okula bağlılık çok boyutlu yapısı ile içeriğinde bilişsel, duyuşsal ve davranışsal faktörleri de barındıran psikolojik bir bütün olarak değerlendirilir (Jimerson vd., 2003). Mevcut araştırmada öğrencilerin okula bağlılık düzeyleri, cinsiyet değişkenine bağlı olarak anlamlı farklılıklar göstermektedir. Ayrıca yedinci sınıftaki öğrencilerin okula bağlılık puanlarının, altıncı sınıftakilerden daha yüksek olduğu görülmüştür. Bu durum, öğrencilerin okula bağlılık düzeyinin sınıf düzeyine bağlı olarak değişebileceğine işaret etmektedir. Okul türü değişkeninin okula bağlılık düzeyine etkisi değerlendirildiğinde, özel ve devlet okullarında okuyan öğrenciler arasında istatistiksel olarak anlamlı farklılıklar olduğu görülmüştür. Devlet okullarında okuyan öğrencilerde, özellikle gelişmekte olan ülkelerde, maddi durumu daha düşük kesimde yer almaları, okuyarak bir meslek sahibi olma isteklerini pekiştiren bir unsur olarak devreye girebilir (Çevik, 2005).

Öğrencilerin öğrenme sorumluluğu düzeyleri incelendiğinde, cinsiyet değişkenine bağlı olarak kız öğrencilerin lehine bir sonuçla karşılaşılmış ve hem ders süreci hem de ders dışı öğrenme sorumluluğu boyutunda kız öğrencilerin anlamlı derecede yüksek puanlar aldıkları görülmüştür. Bu sonuç kız öğrencilerin, erkek öğrencilere göre öğretmenleriyle iletişimlerini sağlamlaştırma eğilimleri de öğrenme sorumluluklarına etki eden bir faktör olarak kaynaklanmasından dolayı devreye girmiş olabilir (Markus vd., 2022; Rudasill vd., 2010). Sınıf düzeyi değişkenine göre yedinci sınıftaki öğrencilerin öğrenme sorumluluğu ve ders süreci öğrenme sorumluluklarının da beşinci ve altıncı sınıfta olan öğrencilerinden daha yüksek olduğu görülmüştür. Yedinci sınıf öğrencilerinin sorumluluk düzeylerinin yüksek olmasında liseye giriş sınavları konusunda daha küçük sınıflara göre farkındalıklarının artmış olması ve okulu beşinci ve altıncı sınıf öğrencilerine oranla daha fazla ciddiye almaları etkili olmuş olabilir. Ancak sekizinci sınıf öğrencilerinin bu anlamlı farklılaşmaya dâhil olmamasının altında yatan neden olarak sınav yaklaştıkça sınava ilişkin kaygıların artması ve kaçınma davranışlarının çoğalması düşünülmektedir (Reilly vd., 2017).

Öğrencilerin okula bağlılıkları ile öğrenme sorumlulukları arasındaki ilişki incelendiğinde okula bağlılık ve öğrenme sorumluluğu arasında pozitif yönde ve anlamlı bir ilişki olduğu görülmüştür. Bu ilişki, ders süreci ve ders dışı öğrenme sorumlulukları alt boyutlarıyla da uyumludur. Okula bağlılığın öğrenme sorumluluğunu yordama gücü ele alındığında, okula bağlılığın ders süreci ve ders dışı öğrenme sorumluluklarını %62 oranında pozitif yönde açıklayıcı etkisi olduğu sonucuna varılmıştır.

Sonuç ve Öneriler

Sonuç olarak, araştırma bulguları, öğrencilerin okula bağlılık ve öğrenme sorumluluğu düzeyinin çeşitli faktörlere bağlı olarak değişebileceğini göstermektedir.

- Öğretmenler, öğrenciler arasında aidiyet duygusunu destekleyici sınıf ortamları yaratmalıdır. Bu durum hem okul bağlılığını hem de öğrenme sorumluluğunu artırabilir.
- Okula bağlılık ve öğrenme sorumluluğuyla ilgili ders tasarımları, programlar geliştirilmelidir ve geliştirilen bu programların öğrenci üzerindeki etkisi araştırılmalıdır.
- Bu çalışma kesitsel yöntemlerle yürütülmüştür. Gelecekte yapılacak olan boylamsal çalışmalarla öğrencinin süreç içerisinde okula bağlılık ve öğrenme sorumluluğu düzeyleri incelenmelidir.
- Öğretmenler, öğrencilerin çeşitli ihtiyaç ve ilgi alanlarına hitap eden bağlılık stratejileri geliştirmelidir. Bu, öğrenci ilgi alanlarını öğretim programlarına entegre etmeyi ve farklı öğrenme tercihlerine hitap etmek için çeşitli öğretim yöntemleri kullanmayı içerebilir.