Sakarya University Journal of Education

e-ISSN : 2146-7455
Publisher : Sakarya University

Vol. 15, No. 3, 357-384, 2025
DOI: https://doi.org/10.19126/suje.1690701

Research Article

Informal Learning Opportunities of Middle and High School Students: A Comparative Analysis Based on Selected Variables

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Received: 03.05.2025
Accepted: 22.11.2025
Available Online: 09.12.2025

Abstract: This study aims to identify the informal learning resources of middle and high school students and to examine the effects of certain individual, familial, and environmental socio-demographic variables on their informal learning opportunities (ILOs). The sample of the study consisted of 1,310 students from grades 5 to 10 in a province located in eastern Türkiye. This survey-based study collected data through the Informal Learning Opportunities Test (ILOT), and the data were analyzed using descriptive statistics, chi-square, independent samples t-test, and ANOVA. In addition to the statistical analyses, effect size values were also calculated to assess the practical significance of the results. The results of this study revealed that middle and high school students predominantly engaged in informal learning through easily accessible sources within their immediate environments. While the results showed no significant differences in students' ILOs based on gender, notable variations were observed according to grade level, place of residence, living arrangements during the school term, family's economic status, and parents' education levels and occupations. Nevertheless, the effect size values calculated based on the statistical results showed that the differences associated with living with family, family's economic status, father's education level, and mother's occupation were not practically significant. In contrast, the results of the study revealed that among the variables examined, grade level, place of residence, mother's education level, and father's occupation had a practically significant moderate effect on students' ILOs. Based on these results, it is recommended that educational policies and school practices take into account students' grade levels, places of residence, mothers' educational levels, and fathers' occupations in order to enhance their access to ILOs.

Keywords: Informal Learning Opportunities, Middle and High School Students, Socio-Demographic Variables

1. Introduction

Students acquire knowledge in various environments, not only within classrooms where structured pedagogical strategies aim at specific learning objectives, but also in informal and spontaneous settings (Kim & Dopico, 2016). Research across various countries indicates that students develop their understanding of scientific concepts through diverse experiences both inside and outside the classroom, accumulating knowledge through sustained engagement with various learning resources (Bathgate et al., 2014; Falk & Needham, 2013; Tal & Dierking, 2014). The inevitable paradigm shift regarding learning recognizes students' self-directed learning as a process that initiates, facilitates, and sustains self-discovery and self-actualization (Mogas et al., 2022). Throughout their lives, most individuals acquire knowledge informally; this learning occurs within family, community, and workplace environments (Jeffs & Smith, 2011), and a significant portion of their learning is based on informal learning. Informal learning can include studies initiated by an incident with a bug on the sidewalk, an interaction with a parent, or a playmate's comment. In other words, almost all experiences in which a child interacts with the natural world lead in some sense to science learning. Research in the US points out that much of the learning that takes place throughout people's lives can be informal in nature (Latchem, 2014). Opportunities and constraints related to learning environments, materials, and socio-interactional characteristics lead to a great diversity of student learning (Stewart & Jordan, 2017). Informal opportunities are crucial to support and deepen student knowledge learned in the classroom (Shaby et al., 2019). Informal learning provides opportunities for acquiring knowledge and skills beyond traditional classrooms, promoting self-directed learning. It encompasses both physical environments

Cite as(APA 7): İnaltekin, T., & Karaçöp, A. (2025). Informal learning opportunities of middle and high school students: A comparative analysis based on selected variables. *Sakarya University Journal of Education*, 15(3), 357-384. https://doi.org/10.19126/suje.1690701

and digital spaces (Nguyen & Diederich, 2023). In these setting, learning interactions are guided by individuals' interests or choices and situated within purposeful settings (Nguyen & Diederich, 2023; Rogoff et al., 2016). These opportunities can enhance students' enthusiasm for and comprehension of science (Bell et al., 2009). Informal learning has an interdisciplinary nature, integrating knowledge, skills, and methods from basic sciences, physical education, history, and various well-established disciplines (Asfeldt et al., 2022). In addition, various factors such as gender, family, cultural background, age, and socio-economic status provide important clues in understanding the impact of informal learning on students (Yun et al., 2023). In addition, technology, social media, and mobilization play an important role in these learnings (Lundgren et al., 2022). Thanks to emerging and increasingly available mobile technologies, learning can literally take place anywhere, anytime, and go beyond traditional educational settings (Koper, 2004).

Communication and interactions beyond the physical or geographical boundaries of traditional learning environments encourage and intensify students to learn much more (Warren et al., 2012). Furthermore, this form of informal learning is deeply rooted in real-life situations and closely aligned with daily experiences (Zhang & Gao, 2014). Thus, ubiquitous technologies possess significant potential to facilitate pervasive learning experiences (Bonanati & Buhl, 2022; Hung & Zhang, 2012) and consequently, this fosters more interactive and impactful learning experiences (Zhang & Gao, 2014). Informal learning can lead to the exchange of knowledge, the generation of innovative ideas, and the development of effective learning methodologies (Daume & Galaz, 2016). “The emotional”, “physical,” and “social” interactions that occur during these experiences can stimulate memories and the attainment of new learning directly linked to previous experiences (Idema & Patrick, 2016; Jose et al., 2017). Much knowledge is acquired informally in the learner's life, but studies on the factors that influence the acquisition of this knowledge are almost non-existent and insignificant compared to the volume of other studies in this field. Despite the emphasized importance of informal learning, the published studies in this field have largely focused on student learning psychology (Cayubit, 2022; Todd & Zvoch, 2019; Walan & Gericke, 2021; Xie et al., 2023; Zimmerman et al., 2022) and academic performance (Chen et al., 2023; Littrell et al., 2022; Lundgren et al., 2022; Maiorca et al., 2021; Nguyen & Diederich, 2023; Ocular et al., 2022; Tang & Zhang, 2020). Informal learning environments significantly influence students' overall well-being, their attitudes towards scientific activities, and their ability to manage the stresses associated with educational programs (Quiroga-Marabol et al., 2019; Singh et al., 2023). This makes the study of informal learning conditions an important initiative in education because an individual's informal learning outcomes are influenced by many factors. In addition, it is difficult to find studies in the literature that examine the effect of different variables (gender, grade level, residential area, family, economic level, parental education, and parental occupation) on students' informal learning. There is a great need for insight into the factors affecting informal learning in education. This is because understanding how students' informal learning experiences are influenced by which variables is a key element to accurately describe students' academic motivation and performance (Jose et al., 2017). The study of these factors is new to the study of informal learning, and they can be generally recognized as key determinants of student success in informal learning. Therefore, there is a need for detailed systematic studies that closely examine the factors that influence students' informal learning opportunities (ILOs). Therefore, this article aims to contribute to the conceptual framework in this field. This study aims to identify the informal learning resources of middle and high school students and to examine the effects of certain individual, familial, and environmental socio-demographic variables on their ILOs. The results obtained from this research may provide evidence for potential improvements in the education of these students. Based on this purpose, the main research question of the study is as follows:

RQ. What are the informal learning resources of middle and high school students, and do their ILOs differ according to certain individual, familial, and environmental socio-demographic variables?

In line with this overarching question, the study also seeks to address the following sub-questions:

SQ1. From which sources do middle and high school students most frequently obtain informal learning?

SQ2. Do the categories of sources through which middle and high school students acquire informal learning differ from one another?

SQ3. Do the ILOs of middle and high school students differ according to gender?

SQ4. Do the ILOs of middle and high school students differ according to their grade level?

SQ5. Do the ILOs of middle and high school students differ according to their place of residence?

SQ6. Do the ILOs of middle and high school students differ according to whether they live with their families during the school term?

SQ7. Do the ILOs of middle and high school students differ according to their families' economic status?

SQ8. Do the ILOs of middle and high school students differ according to their parents' level of education?

SQ9. Do the ILOs of middle and high school students differ according to their parents' occupations?

1.1. Related research on ILOs

A significant body of previous literature has largely focused on the impact of informal learning environments on students' academic achievement. Among these studies, Chen et al. (2023) conducted an experimental study on the impact of informal learning experiences in a science museum on sixth-grade students' scientific content knowledge. The results of the study revealed that the science content knowledge scores of the treatment group showed a significant improvement. Similarly, Littrell et al. (2022) examined the impact of informal learning experiences on the scientific understanding of a group of middle and high school students about global climate change. The results showed that students who participated in the study had a transformative experience in terms of their learning about climate change compared to those who did not. In another study, Ocular et al. (2022) examined the natural talk of parent-child dyads during informal learning in an aquarium and a home. The results highlight that these informal learning experiences trigger processes that provide meaningful ways for families to engage with science and can lead to positive learning outcomes for children. The majority of the remaining studies were interested in the impact of informal learning on the psychology of learning. Among these, Maiorca et al. (2021) examined the impact of informal STEM learning on middle school students' career aspirations. In the study, it was concluded that student self-efficacy scores after the informal learning experience were significantly higher than their initial self-efficacy scores. In their study, Walan and Gericke (2021) examined which factors in out-of-school activities are identified as interesting by children aged 8-12. The researchers identified two new factors that influence students' interest in STEM: appreciating and learning about what is amazing in out-of-school activities. Zimmerman et al. (2022) investigated how students' socioemotional attitudes toward science learning and science were affected by a summer camp. The results indicated a significant increase in students' socio-emotional attitudes and demonstrated that socio-emotional connections to science can be shaped through such experiences. In addition to these studies, a very limited number of studies have focused on the variables affecting ILOs. Among them, Tisza et al. (2019) investigated the role of age and gender in the implementation of informal science learning activities for children. The results showed that the gender and age of the participants were significantly related to the science content addressed and the

purpose of the activity. Dabney et al. (2016) investigated the connections between family involvement in informal science activities and the development of early interest in science. Their results revealed that families with higher parental education levels were more inclined to engage in informal science experiences, thereby fostering a supportive environment that encouraged their children's initial interest in science. The results also showed that parental (mother and father) occupation, occupation and hobbies were associated with students' early interest in science in primary school.

2. Method

2.1. Research design

This research employed a survey-based quantitative approach to assess the ILOs available to middle and high school students (McMillan & Schumacher, 2010). This model is quite suitable for examining the extent to which students have access to ILOs and how these opportunities differ according to factors such as gender and who they live with during school time, grade level, place of residence, achievement level, family economic level, parental education level and parental occupation.

2.2. Participants

While determining the sample of this study, the age groups to which the scales used in the studies on informal learning were applied were taken into consideration. In Türkiye, the results of the Higher Education Institutions Examination are used to place students in higher education institutions. Centralized exams put intense pressure on students. Students who attend out-of-school courses to prepare for the exam are unable to spend enough time with their families and friends and cannot allocate enough time and resources to social and cultural activities. In addition, the thought of being successful in exams causes students' communication with their families and friends to deteriorate or decrease (Kumandaş & Kutlu, 2014). Secondary school 11th and 12th grade students were not included in the sample, considering their current situation and the fact that it would not be possible for them to allocate time for informal learning activities due to their age groups and the fact that they were in the stage of intensive exam preparation. The selection of 5th-10th grade students to whom Gerber et al. (2001) Informal Learning Opportunities Assay (ILOA), which is the basis for the development of the measurement tool used in this research, was also deemed appropriate in terms of making a comparison with the literature. The participants in this study were middle and high school students attending public schools. The research sample was selected using the stratified cluster sampling method, a type of random sampling. In the first step of sample selection, strata were formed by considering the provincial center, central villages, and 7 districts. At least one middle school and one high school were randomly chosen from each stratum, ensuring their selection was proportional to the total number of schools in each category. The middle schools selected as the sample were divided into four strata (5th, 6th, 7th and 8th grades) and high schools into two strata (9th and 10th grades) according to grade level, and the Informal Learning Opportunities Test (ILOT) was administered to students in at least one grade level in each selected school, taking into account the number of branches and students in each grade level. In this context, data were obtained from 1310 students studying in grades 5-8 and 9-10. Table 1 presents the socio-demographic details of the students involved in the study.

Table 1

Socio-Demographic Information of the Students Participating in the Study

Variable	Value	f	%
Gender	Female	731	55.8
	Male	579	44.2
Grade Level	5th	221	16.9
	6th	229	17.5
	7th	217	16.5
	8th	219	16.7
	9th	213	16.3
	10th	211	16.1
Place of Life	Metropolitan City	32	2.4
	City	308	23.6
	District	460	35.1
	Village	506	38.6
	Other	4	0.3
Place of Residence at School Time	With Family	1064	81.2
	School Dormitory	233	17.8
	At home alone or with friends	2	0.2
	At relatives' house	7	0.5
	Family and Social Policies Institution	3	0.2
	Other	1	0.1
Total		1310	100

As presented in Table 1, over half of the study participants were female. Additionally, the distribution of students across grade levels appears to be nearly equal. Approximately three quarters of the students spent most of their lives in districts and villages. Approximately four-fifths of the students in the sample lived with their families during school hours. In addition to the individual socio-demographic variables of the students, familial socio-demographic variables were also included. Information about the familial variables of the students in the study is given in Table 2.

Table 2

Socio-Demographic Characteristics of the Students' Families

Variable	Value	f	%
Family Income Level	Low	87	6.6
	Middle	873	66.6
	High	337	25.7
	Unspecified	13	1.0
Mother Education Level	Illiterate	131	10.0
	Primary School	418	31.9
	Middle School	376	28.7
	High School	217	16.5
	University	124	9.5
	Unspecified	44	3.4
Father Education Level	Illiterate	27	2.1
	Primary School	262	20.0
	Middle School	379	28.,9
	High School	372	28.4
	University	206	15.7
	Unspecified	64	4.9
Mother Occupation	Not working	1010	77.1
	Retired	9	0.7
	Worker	41	3.1
	Officer	55	4.2
	Farmer	45	3.4
	Self-employment	90	6.9
	Tradesmen/ Artisans	14	1.1
	Unspecified	46	3.5

Table 2 (*Continued*)			
Father Occupation	Not working	59	4.6
	Retired	11	0.8
	Worker	270	20.6
	Officer	215	16.4
	Farmer	367	28.0
	Self-employment	165	12.6
	Tradesmen/ Artisans	149	11.4
	Unspecified	74	5.6
Total		1310	100

The data in Table 2 show that approximately one third of the students participating in the study had families with a medium economic level. Additionally, it was found that 70.6% of the mothers of participating students had attained an education level of secondary school or lower. Half of the students (50%) had fathers with a middle school education level or below. In addition, it was revealed that the mothers of the majority (77%) of the students participating in the study were not employed. On the contrary, it was observed that the majority of the participant students' fathers were employed, mainly farmers, workers, and officers.

2.3. Data collection

The ILOT was delivered to the students face-to-face in the form of printed test forms between March and April 2023, taking into account the Ministry of National Education study calendar. The application was carried out based on students' voluntary submission to the researchers by answering the ILOT outside of school class times.

Informal Learning Opportunities Test (ILOT): For gathering data in this research, the researchers used the informal learning scales obtained from the literature, the theoretical framework of informal learning, and the ILOT, which was drafted by the researchers taking into account today's conditions, Turkish culture, the opportunities offered by the state to children and young people, and the structure of public institutions and non-governmental organizations. The ILOT consisted of multiple-choice (single answer and multiple choice), yes/no answer, fill-in-the-blank, and open-ended items that requested students to detail the frequency of their engagement in various informal learning activities. In addition, there were 9 items in the ILOT to determine the individual and family socio-demographic characteristics of the students. Items in the ILOT were designed to include “social activities with family and/or friends”; “solitary activities”; “school-related activities”; “non-school-related courses”; “group activities”; “work and daily chores”; “traveling”; “some general activities”; and “technology-based social participation activities”. The ILOT was developed to assess the variety and frequency of informal learning that students engage in outside the classroom. It encompasses a broad spectrum of informal experiences that can contribute to students' cognitive development. The ILOT utilized in this research is grounded in the concept that intellectual development is nurtured through “a diverse array of student activities”, extending beyond those conducted within the home environment. The ILOT was developed based on learning theories emphasizing that “experiences”, “cognitive conflict”, and “social interaction” are fundamental elements in fostering intellectual growth. “These experiences”, “cognitive conflicts,” and “social interactions” were not limited to the child's home environment or science-specific activities. The ILOT includes a wide range of activities such as participating in sports organizations or family trips and travels, playing with friends, making decisions on one's own, and being active in after-school clubs or community groups. The ILOT was drafted by the researchers, both of whom are experts in the field of science education, and submitted to two science teachers for content review. The majority of the items in the ILOT included activities that are internationally valid for all humanity, while some items included items that can be adapted locally according to countries and cultures. Through the development and evaluation of the draft version, experts concurred that the ILOT was suitably structured for students in grades 5 through 10 and effectively encompassed their informal learning experiences. To examine the

validity and reliability of the Informal Learning Opportunities Tool (ILOT), data were collected from two separate groups of Turkish students. In this context, both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted to determine the scale's factor structure and valid items. Based on the data from the first student group (N = 1224), the EFA revealed a seven-factor structure comprising 30 items with factor loadings ranging from .45 to .76. In the second student group (N = 1312), five items with negative or very low item-total correlations were removed from the scale (DeVellis, 2017; Field, 2018). As a result, the final form of ILOT consists of 25 items and a seven-factor structure. The factors and factor loadings of the developed ILOT are as follows: (F1) Social Media Use (68–.79); (F2) Time Spent on Shopping and Entertainment Activities (48–.72); F3: Leisure Activities (.59–.76); (F4) Technology Use, Hobbies, Travel, and Participatory Activities (.48–.65); (F5) School-Related and Non-School-Related Education, Culture, and Sports Activities (.44–.77); (F6) Library and Research Activities (.78–.81); and (F7) Activities Requiring Independent Decision Making (.53–.79).

The CFA results revealed that the seven-factor structure of the 25-item ILOT was consistent with the data. When the fit indices were evaluated, three of the six indices obtained showed good fit, while the other three showed acceptable fit. The χ^2/df ratio of 4.76 indicates that the model has a statistically acceptable fit (acceptable; <5). The other fit indices were RMSEA = .05 (good fit; ≤ .06), CFI = .90 (acceptable fit; ≥ .90), IFI = .90 (acceptable fit; ≥ .90), GFI = .92 (good fit; ≥ .90), and AGFI = .90 (good fit; ≥. 85) (Kline, 2016; Tabachnick & Fidell, 2019). The 25-item structure of the ILOT, with item–total correlations ranging from .22 to .50, demonstrated a Cronbach's alpha coefficient of .75. In addition to Cronbach's α, McDonald's ω reliability coefficient was also computed as an alternative measure, yielding a value of .78 for the ILOT. This reliability coefficient value indicates that the 25-item ILOT is a reliable instrument for measuring students' ILOs.

The scoring of the ILOT for children and youth was conducted based on the participants' responses to the items included in the test. In all yes/no items, a response of "yes" was assigned 1 point, while a response of "no" was assigned 0 points. In some items, in addition to the yes/no responses, participants who answered "yes" were asked to specify the activities they participated in within four open-ended spaces. In these items, a "no" response was scored as 0, and a "yes" response accompanied by one valid entry was scored as 1 point; furthermore, each additional valid response written in the open spaces was awarded 1 extra point. Certain items in the ILOT required students to indicate their participation in activities from multiple-response options. In these items, which contained more than five options, a "no" response was scored as 0, while "yes" responses were scored according to the number of options selected, ranging from 1 to 5 points. Participants who marked more than five options received a maximum of 5 points. Additionally, some items measured the amount of time students spent on certain activities or the frequency with which they engaged in them, using three, four, or five-point scales. In this time or frequency-based items, the lowest time/frequency category was assigned 0 points, with increasing options scored from 1 to 4 points. However, for Items 13 and 15, the minimum duration/frequency was evaluated as 1 point. In Item 19, in addition to the base scoring, extra points ranging from 1 to 5 were awarded according to the number of purposes indicated, with a maximum of 5 extra points given to those who selected more than five options. Some items assessed with whom the participants spent their time and contained two response options. In these items, the response "with adults" was scored as 0, while "alone" was scored as 1 point.

Finally, other items in which students could indicate multiple activities from a list of more than five options were scored similarly: no selection received 0 points, 1 to 5 selections received scores ranging from 1 to 5 points, and selecting more than five activities resulted in a maximum of 5 points.In accordance with all the scoring criteria described above, an overall ILOT score was calculated for each participant. The ILOs of children and youth were thus quantified as continuous scores, which were used as the dependent variable in the study. Within this framework, the study examined whether ILOs of middle and high school students differed significantly across various socio-demographic variables.

2.4. Data analysis

A detailed analysis of the participants' responses to the items in the ILOT was conducted to calculate the frequency and percentage values related to the sources from which middle and high school students obtain informal learning. In addition, a chi-square goodness-of-fit test (one-sample chi-square test) was employed to determine whether the categories of sources through which students acquire informal learning differed significantly from one another. For large sample sizes (over 500), normality violations pose less of a problem when using parametric tests. In a large sample, a variable with statistically significant skewness often does not deviate from normality enough to make a significant difference in the analysis. For example, in a one-way analysis of variance (ANOVA), if there are at least 20 degrees of freedom, the F-test is robust to normality violations of the variables (Pallant, 2020; Tabachnick & Fidell, 2019). Given the sample size of this study, normality violations for parametric tests will not be a major issue. Nevertheless, we presented skewness values as evidence of normal distribution. Descriptive statistics (mean and standard deviation), independent samples t-test (gender and who lived with during school time), and ANOVA (grade level, place of residence, family economic level, parents' education level, and parents' occupation) techniques were used to determine whether ILOT scores differed according to the socio-demographic characteristics discussed in the study. To reveal the true effect of the independent variables, gender and whether students live with their families during the school term on ILOs, effect sizes were calculated using eta squared (η^2) based on the obtained *t*-value and sample size (Green & Salkind, 2005; Tabachnick & Fidell, 2019). Additionally, to determine the true effect of the independent variables grade level, place of residence, family's economic status, parents' educational level, and parents' occupation on ILOs, effect sizes were calculated using η^2 based on the *F*-statistic and sample size (Lakens, 2013). Eta square ranges in value from 0 to 1. An η^2 value of 0 indicates that there are no differences in the mean scores among groups. A value of 1 indicates that there are differences between at least two of the means on the dependent variable and that there are no differences on the dependent variable scores within each of the groups (i.e., perfect replication). In general, η^2 is interpreted as the proportion of variance of the dependent variable that is related to the factor. However, η^2 of .01, .06, and .14 are, by convention, interpreted as small, medium, and large effect sizes, respectively (Green & Salkind, 2005; Lakens, 2013; Tabachnick & Fidell, 2019).

3. Results

A detailed analysis was conducted on the participants' responses to the items in the ILOT. For each item, frequency and percentage values were calculated, and the consistency of responses across item categories was evaluated using the chi-square goodness-of-fit test. The analysis results for the responses given to each item included in the ILOT are presented in Table 3.

Table 3

Analysis Results Regarding Participants' Informal Learning Sources

Items	Category	*f*	%	X^2
I1. TV programs	0	11	0.8	301.13*
	1	190	14.5	
	2	267	20.4	
	3	265	20.2	
	4	227	17.3	
	5+	350	26.7	
I2. Collecting things	Yes	260	19.8	476.41*
	No	1050	80.2	
I3. Types of books or magazines	0	74	5.6	260.68*
	1	197	15.0	
	2	310	23.7	
	3	183	14.0	

Table 3 (*Continued*)

	4	173	13.2	
	5+	373	28.5	
I4. Have a library card	Yes	268	20.5	457.31*
	No	1042	79.5	
I5. Frequency of visiting the library	Never	645	49.2	422.59*
	Several times a year	184	14.0	
	Several times a month	271	20.7	
	Once a week or more	210	16.0	
I6. Participating in any school-related activity	0	520	39.7	1227.22*
	1	495	37.8	
	2	181	13.8	
	3	67	5.1	
	4	33	2.5	
	5+	14	1.1	
I7. Participating in any non-school-related class or course	0	770	58.8	2131.87*
	1	384	29.3	
	2	98	7.5	
	3	33	2.5	
	4	20	1.5	
	5+	5	0.4	
I8. Having a personal desktop or laptop computer	Yes	390	29.8	214.43*
	No	920	70.2	
I9. Daily computer usage hours	None	637	48.6	707.50*
	<1	216	16.5	
	1–2	214	16.3	
	2–3	101	7.7	
	>3	142	10.8	
I10. Participating in summer or youth camps	0	1090	83.2	4232.95*
	1	138	10.5	
	2	51	3.9	
	3	19	1.5	
	4	2	0.2	
	5+	10	0.8	
I11. Membership in an amateur or licensed sports team	0	1077	82.2	32.21.34*
	1	156	11.9	
	2	51	3.9	
	3	15	1.1	
	4	11	0.8	
I12. Tasks or duties regularly performed at home	0	239	18.2	288.94*
	1	166	12.7	
	2	193	14.7	
	3	166	12.7	
	4	114	8.7	
	5+	432	33.0	
I13. Frequency of clothing shopping	Several times a year	369	28.2	553.01*
	Several times a month	813	62.1	
	Once a week or more	128	9.8	
I14. Shopping for clothes alone or with an adult	Alone	187	14.3	668.78*
	With an adult	1123	85.7	
I15. Frequency of grocery shopping	Several times a year	81	6.2	465.71*
	Several times a month	532	40.6	
	Once a week or more	697	53.2	
I16. Go grocery shopping alone or with an adult	Alone	323	24.7	336.56*
	With an adult	987	75.3	
I17. Places visited and interesting events attended	0	189	14.4	109.69*
	1	240	18.3	

Table 3 (*Continued*)

	2	215	16.4	
	3	192	14.7	
	4	134	10.2	
	5+	340	26.0	
I18. Having a social media account	0	415	31.7	242.97*
	1	183	14.0	
	2	166	12.7	
	3	172	13.1	
	4	131	10.0	
	5+	243	18.5	
I19. Frequency of social media account usage	>6 hours	112	8.5	554.56*
	4–5 hours	140	10.7	
	1–3 hours	432	33.0	
	<1 hour	626	47.8	
I20. Having a smartphone or tablet	Yes	893	68.2	172.96*
	No	417	31.8	
I21. Frequency of smartphone or tablet usage	>6 hours	131	10.0	361.12*
	4–5 hours	182	13.9	
	1–3 hours	499	38.1	
	<1 hour	498	38.0	
I22. Frequency of going to restaurants	Never	242	18.5	258.53*
	Several times a year	351	26.8	
	Several times a month	552	42.1	
	Once a week or more	165	12.6	
I23. Frequency of going to the movies	Never	813	62.1	1064.61*
	Several times a year	307	23.4	
	Several times a month	142	10.8	
	Once a week or more	48	3.7	
I24. Frequency of going to the park	Never	291	22.2	62.81*
	Several times a year	232	17.7	
	Several times a month	420	32.1	
	Once a week or more	367	28.0	
I25. Traveling outside the province of residence	0	325	24.8	118.86*
	1	205	15.6	
	2	213	16.3	
	3	182	13.9	
	4	385	29.4	

The data presented in Table 3 indicate that the majority of participants (85%) watch more than two television programs, suggesting that such viewing significantly contributes to their informal learning. Additionally, approximately one-fourth of the participants (26.7%) were found to watch more than five different types of television programs. However, the number of television program types watched varies significantly among participants. Moreover, only about one-fifth of the participants (19.8%) reported collecting items as a hobby. This result indicates that students generally have low tendencies toward engaging in collection-making activities. Furthermore, the rates of collection-making were found to differ significantly. Similarly, approximately four-fifths of the students (80%) read more than two types of books and magazines, benefiting from these sources as part of their informal learning processes. The number of types of books and magazines read also varies significantly. However, the majority of students (79.5%) were found not to possess a library card other than the one belonging to their school library. In addition, more than half of the participants (63.3%) stated that they never visit libraries other than their school library or do so only a few times per year. Therefore, both library card ownership and the frequency of library visits differ significantly among students.

Furthermore, about two-fifths of the participants (39.7%) reported that they never participated in extracurricular school-related activities. In contrast, only about one-fifth (22.5%) participated in two or more of such activities, thereby contributing to their informal learning processes. This result shows that students' participation levels in school-related activities differ significantly. On the other hand, the results revealed that the majority of students (88%) never attended or attended only one course or class unrelated to school that could contribute to their informal learning. The rates of participation in such external courses or classes also vary significantly. In addition, it was found that most participants (70%) do not own a personal computer or laptop. Similarly, about two-thirds (65%) either do not use a computer at all or use it for less than one hour per day. This indicates that both computer ownership and daily computer usage levels differ significantly among students. Moreover, only about one-sixth of the students (16.8%) have participated in summer or youth camps that provide ILOs. The levels of participation in such camps were also found to differ significantly.

Other results indicate that approximately four-fifths of the participants (82.2%) are not members of an amateur or licensed sports team. In contrast, a large majority (81.8%) engage in one or more household tasks, benefiting from ILOs at home. Therefore, both participation in sports teams and involvement in household tasks differ significantly among students. Furthermore, about three-fifths of the participants (62.1%) reported going shopping for clothes several times a month, while the vast majority (85.7%) stated that they do so with an adult. The frequency of clothing shopping and whether students shop alone or with an adult were both found to differ significantly. Similarly, most students (93.8%) reported going grocery shopping several times a month or more often, thereby gaining informal learning experiences. However, only about one-fourth (24.7%) go grocery shopping without an adult. Accordingly, both the frequency of grocery shopping and whether students shop alone or with an adult vary significantly. In addition, the majority of the students (85.6%) reported visiting at least one or more places of interest and participating in engaging activities that support their informal learning. The number of places visited and activities attended also differs significantly.

Furthermore, more than two-thirds of the participants (68.3%) reported having at least one social media account, with about one-fifth (18.5%) indicating that they have five or more accounts. Additionally, more than half (52.2%) use social media for one hour or more per day. Both social media ownership and daily usage times were found to differ significantly. Similarly, more than two-thirds of the participants (68.2%) own a personal smartphone or tablet, and about three-fifths (62%) use these devices for more than one hour daily. The ownership and daily usage duration of smartphones and tablets also vary significantly. Finally, approximately half of the students (45.3%) reported that they never go to restaurants or do so only a few times per year. Moreover, about three-fifths (62.1%) never go to the cinema, while a similar proportion (60.1%) visit parks several times a month or more frequently. Thus, the frequency of visiting restaurants, cinemas, and parks differs significantly among students. Overall, it was found that approximately three-fourths of the participants (75.2%) have traveled outside their city of residence, and their frequency of intercity travel also shows significant variation.

In this section, the results regarding whether the ILOT scores of the participating students differ according to the independent variables of gender, educational level, place of residence, living with family during the school term, family's economic status, parents' educational level, and parents' occupation are presented. Descriptive statistics and analysis results for the ILOT scores of the students participating in the study according to gender groups are given in Table 4.

Table 4

Results of ILOT Scores According to Gender

Gender	N	X	Sd	Skewness	t	p	η^2
Female	731	34.69	11.29	0.06	0.225	0.822	.00004
Male	579	34.83	11.18	0.18			

As shown in Table 4, the ILOT scores of students exhibited a normal or near-normal distribution within each gender group. If the skewness is less than plus or minus one (< +/-1.0), the variable is considered to be approximately normally distributed. An independent sample t-test was conducted to test whether the students participating in the study differed in terms of the dependent variable of ILOT score, which was normally distributed according to the independent variable of gender. The results of the analysis showed that the ILOT scores of the participants did not differ according to gender groups, t (1308) = 0.225; p >.05. The independent variable of gender accounts for only a very small proportion of the variance in the dependent variable of ILOs. In other words, the effect of gender on ILOs is small, η^2 = .00004; η^2 < .01.

Table 5 presents the descriptive statistics and analysis results for the ILOT scores of the students participating in the study according to their grade levels.

Table 5

Results of ILOT Scores According to Grade Level

Grade Level	N	$\bar{X}$	Sd	Skewness	F	p	η^2
5th	221	30.41	10.66	.585	21.429	.001	.076
6th	229	30.72	10.25	.455			
7th	217	37.98	11.28	-.035			
8th	219	37.03	10.60	-.145			
9th	213	35.67	11.19	-.084			
10th	211	37.04	10.98	-.111			

An examination of Table 5 reveals that students' ILOT score averages vary according to grade level. The 7th, 8th, and 10th-grade students have higher ILOT score averages compared to other groups. When the skewness coefficient values in Table 4 are examined, it is observed that the ILOT scores are normally or approximately normally distributed across grade levels (Skewness < ±1.0). ANOVA was conducted to determine whether the ILOT scores, which are normally distributed dependent variables, differ significantly based on the independent variable of students' grade levels. The results of the analysis showed a statistically significant difference in ILOT score averages across grade levels, F (5,1304) = 21.429; p < .05. To identify which grade levels differ in terms of ILOT score averages, the "Tukey post-hoc test" was applied. The results of the "Tukey test" indicated that the ILOT score averages of 7th, 8th, 9th, and 10th grades were significantly higher than those of 5th and 6th grades, p < .05. However, no statistically significant differences were found among the other grade levels. The independent variable of grade level explains approximately 7.6% of the variance in the dependent variable of ILOs. Accordingly, the effect of grade level on ILOs can be considered moderate, η^2 = .076; η^2 > .06.

Descriptive statistics and analysis results for students' ILOT scores based on their place of residence are presented in Table 6.

Table 6

Results of ILOT Scores by Residence

Residence	N	$\bar{X}$	Sd	Skewness	F	p	η^2
Metropolitan City	32	41.72	12.892	-.502	35.466	.001	.075
City	308	37.73	11.255	-.085			
District	460	36.37	10.791	.026			
Village	510	31.05	10.439	.290			

According to Table 6, students' ILOT score averages vary based on their residence. Students who have spent the majority of their lives in metropolitan areas have higher average ILOT scores compared to other groups. The skewness coefficients in Table 5 indicate that ILOT scores are normally or approximately normally distributed across different residential categories (Skewness < ±1.0). ANOVA was conducted to determine whether the ILOT scores, which are normally distributed dependent variables, differ significantly based on the independent variable of place of residence, which includes more than two groups. The results of the analysis revealed a statistically significant difference in ILOT score averages among students depending on their residence, F (3, 1306) = 35.466; p < .05. To identify between which groups the differences occurred, the "Tukey post-hoc test" was conducted. The results of the "Tukey test" indicated that students living in metropolitan areas, cities, and districts had significantly higher ILOT scores than those living in villages (p < .05). Furthermore, it was found that students residing in metropolitan areas had significantly higher scores than those living in districts. However, no statistically significant difference was found between students living in metropolitan areas and those in cities. The independent variable of place of residence explains approximately 7.5% of the variance in the dependent variable of ILOs. Accordingly, the effect of place of residence on ILOs is considered moderate, η^2 = .075; η^2 > .06.

Descriptive statistics and analysis results for students' ILOT scores based on who they live with during the school term are presented in Table 7.

Table 7

Results of ILOT Scores by Living Arrangement During the School Term

Place of Residence at School Time	N	X	Sd	Skewness	t	p	η^2
With family	1064	35.23	11.457	.072	3.222	.001	.008
Away from family	246	32.67	10.017	.196			

The descriptive statistics in Table 7 show that students' mean ILOT scores differ based on their living arrangement with family during the school term. Additionally, an examination of the skewness coefficients in Table 6 reveals that the ILOT scores are normally or approximately normally distributed based on students' living arrangements with family during the school term (Skewness < ±1.0). To analyze whether ILOT scores, as a dependent variable with normal distribution, differ based on the independent variable of living with family during the school term, an "independent samples t-test" was conducted. The analysis presented in Table 6 reveals a statistically significant difference in the average ILOT scores based on whether students reside with their families during the school term, t (1308) = 3.222; p <.05. When examining the ILOT score averages, it is observed that this difference favors students who live with their families during the school term. The independent variable of living with the family during the school term accounts for only a small proportion of the variance in the dependent variable of ILOs. In other words, the effect of living with the family during the school term on ILOs is small, η^2 = .0008; η^2 < .01.

Descriptive statistics and analysis results for students' ILOT scores based on their families' economic status are presented in Table 8.

Table 8

Results of Students' ILOT Scores According to the Economic Level of Their Families

Family Economic Level	N	X	Sd	Skewness	F	p	η^2
Low	87	29.67	11.733	.691			
Middle	873	34.25	10.940	.118	20.199	.001	.030
High	337	37.47	11.237	-.052			

According to the statistical values in Table 8, students' mean ILOT scores differ based on their families' economic level. Students with high and medium economic status have higher mean ILOT scores compared to those with low economic status. An examination of the skewness coefficients in Table 7 reveals that the ILOT scores are normally or approximately normally distributed according to the economic status groups (Skewness < ±1.0). ANOVA was conducted to assess whether there were differences in ILOT scores, which are normally distributed dependent variables, based on the independent variable of family economic status, which includes three groups. The results of the analysis showed a statistically significant difference in ILOT score averages according to students' families' economic status, F (2, 1294) = 20.199; p < .05. To identify which economic status groups contributed to the difference in mean ILOT scores, a "Tukey post-hoc test" was conducted. The results of the "Tukey test" revealed that students with high economic status had significantly higher ILOT score averages compared to those with medium and low economic status. Additionally, students with medium economic status had significantly higher ILOT score averages than those with low economic status. The independent variable of the family's economic status explains approximately 3% of the variance in the dependent variable of ILOs. Thus, the effect of the family's economic status on ILOs is considered small, η^2 = .03; .01 < η^2 < .06.

Descriptive statistics and analysis results for students' ILOT scores based on their parents' educational levels are presented in Table 9.

Table 9

Results of Students' ILOT Scores by Parents' Educational Levels

	Mother's educational level							Father's educational level						
Educational levels	N	X	Sd	Skew.	F	p	η^2	N	X	Sd	Skew.	F	p	η^2
1	131	30.75	10.89	.27				27	32.85	11.69	-.17			
2	418	33.03	10.55	.04				262	31.58	10.57	.25			
3	376	30.24	10.82	.19	24.081	.001	.071	379	33.66	11.00	.14	15.254	.001	.047
4	217	38.99	11.15	-.01				372	36.77	10.94	.02			
5	124	40.37	10.83	-.23				206	38.36	11.41	-.01			

The numerical values representing educational level are as follows:
1 = Illiterate, 2 = Primary school, 3 = Middle school, 4 = High school, and 5 = University level.

According to Table 9, students' mean ILOT scores differ based on their parents' educational levels. In general, students whose parents have at least a high school education tend to have higher average ILOT scores. Additionally, an examination of the skewness coefficients in Table 8 reveals that ILOT scores are normally or approximately normally distributed according to the parents' education level groups (Skewness < ±1.0). To assess whether ILOT scores, as a dependent variable with normal distribution, differ based on the independent variable of parents' education level, which includes more than two groups, ANOVA was conducted. The analysis results in Table 8 show that students' ILOT score averages differ significantly based on both the mother's and father's education level, F (4,1261) = 24.081; p < .05, and F (4,1241) = 15.254; p < .05. To determine which specific parent education level groups contributed to the differences in mean ILOT scores, a "Tukey post-hoc test" was applied. The results of the "Tukey

test" indicated that students with both mothers and fathers having at least a high school or university education had significantly higher ILOT score averages than those whose parents were illiterate or had only primary or middle school education. The independent variable of mother's educational level explains approximately 7% of the variance in the dependent variable of ILOs, whereas father's educational level accounts for about 4.7% of the variance. Accordingly, the effect of mother's educational level on ILOs is considered moderate, $\eta^2 = .071$; $\eta^2 > .06$, while the effect of father's educational level is considered small, $\eta^2 = .047$; $.01 < \eta^2 < .06$.

Descriptive statistics and analysis results for students' ILOT scores based on their parents' occupational groups are presented in Table 10.

Table 10

Results of Students' ILOT Scores by Parents' Occupational Groups

	Mother's occupation							Father's occupation						
Parents' Occupations	N	X	Sd	Skew.	F	p	η^2	N	X	Sd	Skew.	F	p	η^2
1	1010	34.52	11.04	.18	12.046	.001	.038	59	32.73	11.40	.77	17.415	.001	.067
2	41	37.85	12.25	-.19				270	33.33	11.00	.31			
3	55	43.29	9.26	-.42				215	38.42	10.85	.09			
4	45	29.49	10.08	.51				367	31.69	11.17	.18			
5	90	33.34	12.04	.02				165	37.90	10.82	-.23			
6	-	-	-	-				149	38.11	10.23	.02			

The numerical values representing parents' occupations are as follows:
1 = Not working, 2 = Worker, 3 = Officer, 4 = Farmer, 5 = Self-employment and 6 = Tradesmen/ Artisans

Upon examining the descriptive statistics in Table 10, it is observed that students' mean ILOT scores differ based on their parents' occupational groups. Students whose mothers are officer or workers have higher mean ILOT scores. Additionally, students whose fathers are officer or tradesmen/artisans, as well as those whose fathers are self-employed, have higher mean ILOT scores. An examination of the skewness coefficients in Table 9 reveals that the ILOT scores are normally or approximately normally distributed according to the parents' occupational groups (Skewness < ±1.0). To assess whether there were differences in ILOT scores, which are normally distributed dependent variables, based on the independent variable of parents' occupations (with more than two groups), ANOVA was conducted. The analysis results in Table 9 showed statistically significant differences in ILOT score averages based on parents' occupational groups, F (4,1236) = 12.046; $p < .05$ and F (5,1224) = 17.415; $p < .05$. To determine which parents' occupational groups contributed to the differences in mean ILOT scores, a "Tukey post-hoc test" was applied. The results of the "Tukey test" indicated that students whose mothers are officer have significantly higher ILOT score averages compared to students whose mothers are not working, farmers, or self-employed. Furthermore, students whose mothers are workers or not working also have significantly higher ILOT score averages than students whose mothers are farmers. The multiple comparison test results also revealed that students whose fathers are officer, tradesmen, or self-employed have significantly higher ILOT score averages compared to students whose fathers are not working, farmers, or workers. The independent variable of mother's occupation explains approximately 4% of the variance in the dependent variable of ILOs, while father's occupation accounts for about 7% of the variance. Accordingly, the effect of mother's occupation on ILOs is considered small, $\eta^2 = .038$; $.01 < \eta^2 < .06$, whereas the effect of father's occupation is considered moderate, $\eta^2 = .067$; $\eta^2 > .06$.

4. Discussion and Conclusion

This study aims to identify the informal learning resources of middle and high school students (grades 5-10) and to examine the effects of certain individual, familial, and environmental socio-demographic variables on their ILOs. The results of this study revealed that middle and high school students primarily obtained informal learning from easily accessible sources within their immediate surroundings. However, the results also indicated that students did not sufficiently benefit from or were unable to benefit from informal learning sources that offer greater cognitive challenges and richer social interactions, such as participation in summer and youth camps, engagement in non-school-related courses or classes, involvement in sports teams, and attendance at cinemas and parks. The limited utilization of these types of sources by many students may be attributed to the restricted opportunities provided by their cities, families, schools, and communities. If some informal learning sources are accessible to children and young people, their insufficient utilization of these sources may stem from their own preferences. The literature indicates that the reasons limiting access to and the choice to benefit from informal learning sources constitute a multi-faceted issue (Akiva et al., 2017). Moreover, socio-demographic variables identified in this study, such as grade level, place of residence, and parents' economic status, educational level, and occupation, which were found to have a small to moderate effect on students' ILOs, may also contribute to children's and adolescents' insufficient engagement with certain informal learning sources. In this regard, the existing literature provides empirical evidence and theoretical insights into how socio-demographic factors influence students' access to and participation in ILOs. Studies emphasize the importance of considering personal or situational factors such as age, educational level, socioeconomic status, geographical conditions, family background, and access to resources when examining participation in formal or informal learning and related learning outcomes (Dunst, 2020; McNamara et al., 2020; Peñaloza et al., 2022; Prior et al., 2025).

In this context, the result that ILOs do not differ by gender for middle and high school students is consistent with contemporary research trends that emphasize the democratizing effect of digital technologies, changing social norms, and evolving educational practices. With both female and male students benefiting from similar access to online resources, social networks, and extracurricular activities, their ILOs are becoming increasingly independent of gender. However, it was found that the effect of gender on ILOs among middle and high school students was quite small. The calculated effect size also supported the result that the mean ILOT scores did not differ significantly between gender groups (Green & Salkind, 2005). This shift toward equal access is supported by research on digital learning environments, family dynamics, and the changing role of gender in education (Greenhow & Lewin, 2016; Ito et al., 2013; Pröbster et al., 2022; Selwyn, 2022). Studies show that both genders now use digital platforms for educational purposes such as watching instructional videos, exploring new topics, or participating in online discussions (Selwyn, 2022). Informal learning, which occurs outside formal educational settings (such as through hobbies, social media, and peer interactions), has become a significant aspect of young people's development. In the digital age, due to the accessibility of technology, gender-based differences in learning opportunities have decreased. Both boys and girls participate in various informal learning platforms, such as social media, YouTube tutorials, and online games, where learning opportunities are generally offered independently of gender (Cherif et al., 2024; Greenhow & Lewin, 2016; Pröbster et al., 2022). Research also emphasizes that the role of the family in shaping students' informal learning experiences may be less gendered than previously assumed. Families are increasingly adopting an equal approach to supporting their children's informal learning, whether through access to technology or encouraging various extracurricular activities, thereby further reducing gender inequalities (Fivush, 2011). Furthermore, the idea that ILOs do not differ by gender aligns with results from various studies suggesting that individual preferences, rather than gender, are the primary factor influencing participation in informal learning (Renninger & Hidi, 2016). Dawson's

(2014) research revealed that access to informal science learning, “equality” and “inclusion/exclusion” should be understood as “complex,” “interconnected” and “multifaceted issues”.

It was found that ILOs differ according to students’ grade levels and are particularly higher among students in grades 7 to 10. Furthermore, the results indicated that the effect of grade level on ILOs among middle and high school students was moderate. The calculated effect size also supported the result that the mean ILOT scores differed across grade level groups. Informal learning, typically defined as learning that occurs outside of school environments and without a structured curriculum, is compatible with students' developmental readiness, social interactions, and access to extracurricular environments (Tisza et al., 2019). In a study conducted by Kerai et al. (2024) with children and adolescents attending grades 6 to 8 from three schools selected from rural and urban areas, the participation of young people in both structured and unstructured out-of-school activities was examined according to gender and age variables. The study concluded that the types of activities and the frequency of participation varied by gender and were influenced by whether the students lived in rural or urban areas. The study found that 7th-grade students participated in more out-of-school activities than 6th-grade students, but contrary to our study, 6th-grade students participated more than 8th-grade students. It was also stated that the time spent on out-of-school activities was greater among older participants compared to younger ones, and greater among males compared to females. Similarly, Sefton-Green (2013) highlights that adolescents are more likely to participate in interest-based learning activities outside of school, such as online communities, hobby projects, and media production. These results show that informal learning is not equally distributed across grade levels (by age), but peaks as students become socially and intellectually more independent. However, some studies have found no significant differences in ILOs based on grade levels. Falk and Dierking (2010) suggest that informal learning is highly contextual and is influenced more by factors such as family support, community resources, and personal motivation than by school grade levels. Previous research emphasizes that although older students may engage in more complex informal learning, younger students still significantly benefit from informal learning experiences, particularly those mediated by parents (Griffin, 2004; Kerai et al., 2024). While the development of memory related to children's personal experiences requires a range of “neurobiological”, “cognitive, linguistic”, and “social mechanisms”, culture is pivotal in the development of this memory. It is emphasized that children develop skills and competence within a cultural context through culturally organized activities, especially informal learning practices. This process continues throughout childhood and adolescence (Rogoff et al., 2018). This shows that while the nature of informal learning may change, opportunities do not show a distinct difference according to grade levels.

It was found that students' ILOs differed depending on their place of residence. The effect size calculated for this variable indicated that the impact of place of residence on ILOs was moderate. Among the variables examined in the study, place of residence, together with grade level, was found to have the highest effect on students’ ILOs. The results that students who spend the majority of their lives in metropolitan cities, cities, and districts have higher levels of ILOs compared to those living in village, and that students in metropolitan cities have more opportunities than those in districts, align with the common belief that urban environments tend to offer richer educational resources and more diverse learning contexts (OECD, 2012). These regions generally provide greater access to museums, libraries, science centers, extracurricular programs, and technologically enriched environments that facilitate informal learning (Eppley, 2017; Harris & Hodges, 2018; Kormos & Wisdom, 2021). Alam and Parvin (2024) demonstrated that secondary school science education has become a favored choice among urban elites, with these students also achieving high performance in public examinations. This research has demonstrated that both formal and informal science education require high budgets. However, this perspective is challenged by various studies that argue ILOs do not significantly differ based on the type of residential area in which students live. Kalonde (2018) has stated that technology is a key tool in the

learning process and plays an important role in acquiring 21st-century literacy skills, irrespective of income level or geographical setting. Emphasis has been placed on how technology in rural schools provides students with options, experiences, and resources that enable them to acquire these skills on par with their urban peers. These results show that while city centers offer more structured, institution-based informal learning options, rural areas can compensate for this with contextually rich, community-based, and experiential learning opportunities that are often overlooked in traditional metrics. Furthermore, advances in technology and internet access have contributed to bridging the gap between urban and rural ILOs (Livingstone & Sefton-Green, 2016; Wang et al., 2019). In this light, it is crucial to acknowledge that when assessing ILOs, not only the quantity but also the diversity and contextual suitability of these experiences must be considered.

The results revealed that whether students lived with their families during the school term had an impact on the ILOs of secondary and high school students. However, the effect size calculated for this variable indicated that its actual impact on ILOs was quite low. At this point, the concept of effect size is particularly important, as it reflects the practical significance of the results. One way to assess the importance of a result is through effect size, which is also known as the strength of association. In large samples, even very small differences between groups can turn out to be statistically significant; however, this does not necessarily imply that these differences are meaningful in practical terms (Pallant, 2020). The research results that students who live with their families during the school period have more ILOs are consistent with the existing literature that emphasizes the role of the family environment in facilitating learning outside of formal education. Families often serve as the first and most consistent source of informal learning by providing emotional support, resources, guidance, and structured or unstructured learning experiences (Hoover-Dempsey & Sandler, 2005). Living with family can increase access to parental involvement, shared activities (e.g., reading, visiting cultural places), and encouragement for self-discovery. All of these contribute to informal learning (Epstein, 2011; Karaçöp, 2020). However, this view is not universally supported. Some studies have shown that living with or away from the family during the school period does not affect the quantity or quality of informal learning students engage in. Students living away from their families often compensate for the lack of opportunities provided by the family through peer networks, digital learning platforms, and community participation, thus continuing informal learning from various sources. The contradictions in the results of the studies can be attributed to differences in socio-cultural contexts, access to resources, and changing definitions of what constitutes "informal learning." Other factors, such as students' intrinsic motivation, the availability of learning environments, and technological accessibility, can mitigate the absence of family during school time (Garbacz et al., 2015; Ito et al., 2013; Pearrow et al., 2019).

The results of the study indicated that the economic status of the family created differences in the ILOs of secondary and high school students. However, the small effect size calculated for this variable suggested that the statistically significant difference observed was not practically meaningful. These results demonstrated that the strength of the relationship between these two variables was weak. The relationship between a family's economic status and students' access to ILOs has been a recurring theme in educational research. Similar to our study, some research indicates that higher family income is associated with greater access to ILOs (e.g., museum visits, extracurricular programs, travel), while other studies argue that economic status is not a definitive determinant of informal learning experiences. Previous research has emphasized the cultural and community-based nature of informal learning, showing that children from different socioeconomic backgrounds gain rich informal learning experiences through participation in community activities, such as observation and listening (Rogoff et al., 2018; Wang, 2021). Similarly, Gutiérrez and Rogoff (2003) argue that focusing on economic inequalities may obscure the complex and valuable ways in which learning occurs in marginalized communities. They caution against deficit perspectives on low-income families and demonstrate that children from these backgrounds often engage in meaningful learning through observation,

collaboration, and contributing to family life. Furthermore, Nasir and Hand (2006) discuss how students from low-income families can access informal learning through community practices such as sports, music, or religious participation. These areas provide cognitive, social, and emotional learning opportunities that rival, and even surpass, those offered by formal programs accessible to wealthier families. Moreover, Sefton-Green (2013) points out that informal learning in low-income environments often takes different forms, and it is frequently underestimated. His research on young people's participation in digital media and other self-directed activities shows that out-of-school learning is highly diverse and not solely dependent on economic resources. Sociocultural perspectives assert that learning is fundamentally shaped by social and cultural processes, highlighting the significance of local activity contexts in children's development. From this viewpoint, comprehending learning entails examining how individuals engage in specific activities and how they utilize 'artifacts,' 'tools,' and 'other social environments' to facilitate their learning. Some studies have highlighted the role of social capital in educational inequality and its impact on educational outcomes. It has been found that types of family social capital vary by social class, which in turn contributes to changes in academic performance based on socioeconomic status. Moreover, household income and family education level are significantly related to the nature of family social capital, such as the level of family interest in children's education and trust between family members (Karaçöp, 2020; Pearrow et al., 2019).

This study revealed that parental education level had an impact on the ILOs of secondary and high school students. When the education levels of mothers and fathers were examined separately, it was found that students whose mothers had a high school or higher level of education had greater access to ILOs. A similar pattern was observed among students whose fathers had a high school or higher education level. However, the effect size values calculated separately for each variable indicated that the impact of mothers' education on ILOs was moderate, while the impact of fathers' education was small. Based on these results, it can be concluded that the strength of the relationship between maternal education level and students' ILOs is greater than that of paternal education. The result that students with parents who have higher educational levels (such as high school or university degrees) tend to have more ILOs is a common assumption in educational research. Thapa-Parajuli et al. (2025) identified that factors such as "academic performance", "school type", "maternal education", and "the educational levels of family members" providing academic support play a significant role in children's educational outcomes. However, some studies challenge this view by arguing that parental education does not necessarily determine the quantity or quality of informal learning experiences available to children. Lareau (2011) criticized the overemphasis on parental education in determining learning support, arguing that social class has a significant influence on parenting culture. Middle-class families (typically with higher educational levels) may use structured activities to support learning, while working-class families often rely more on informal, child-led experiences. Additionally, Pattison et al. (2016) found that children engage in informal learning through daily interactions, independent explorations, and digital technologies, regardless of their parents' educational background. This study highlights that motivation, curiosity, and access to community or peer resources can be stronger determinants of informal learning participation than parental education.

The results of this study revealed that parental occupation had a significant impact on students' ILOs. Comparisons based on maternal occupation showed that students whose mothers were employed in civil service had significantly greater access to ILOs than those whose mothers were unemployed, farmers, or self-employed. However, the small effect size associated with maternal occupation indicated that, despite the statistically significant difference, the practical significance of this variable was limited. On the other hand, comparisons based on paternal occupation revealed that students whose fathers were officers, tradesmen, or self-employed had significantly higher levels of ILOs than those whose fathers were unemployed, farmers, or laborers. The moderate effect size calculated for paternal occupation suggested that this variable had not only a statistically significant but also a practically

meaningful impact on students' ILOs. In conclusion, the results indicated that maternal education level and paternal occupation had a moderate practical influence on the ILOs of secondary and high school students. Furthermore, the results regarding the influence of parents' professional status - particularly government employees, freelancers, and self-employed individuals -on children's ILOs align with traditional socioeconomic perspectives. Children from farming families, for instance, were found to be at a disadvantage in terms of ILOs. However, some studies argue that a family's occupation or work style (formal or freelance) does not directly affect children's education. Thapa-Parajuli et al. (2025) found that the type of parental employment (whether formal or freelance) did not significantly affect children's educational outcomes. Ivaniushina and Aleksandrov (2015) explored the cultural and structural resources behind class differences in youth participation. They found that both working-class and middle-class parents had similar participation in organized activities, and that due to financial constraints, working-class families relied on social institutions for participation opportunities. Schools play a crucial role in equalizing access to extracurricular activities by offering low-cost or free programs, allowing working-class children to participate in school activities similar to middle-class youth. However, working-class children remain disadvantaged in extracurricular activities. The difference in participation between social classes is smaller within schools, but more significant outside of them, demonstrating the critical role that schools play in equalizing access to participation opportunities across social class groups. Despite these results, various studies show that parental occupation alone is not a definitive determinant of informal learning participation. Instead, informal learning is influenced by cultural values, community practices, and the daily experiences created by families, regardless of professional background. González et al. (2005) argue against the idea that certain professions inherently provide more or fewer learning opportunities. Their study on knowledge funding shows that working-class and immigrant families, including those in agricultural or manual labor professions, possess rich experiential knowledge that supports informal learning. These "funds" typically come from household practices, community participation, and work-based experiences that children observe and engage with. Similarly, Rogoff et al. (2018) assert that learning is culturally organized and often embedded in daily family and community life, independent of parents' professional roles. They argue that participation in collective efforts, such as agricultural tasks or freelance work, can offer cooperative and developmentally rich ILOs. Hughes and Pollard (2006) critique the simplistic relationship between parental occupation and educational advantage. They suggest that a farmer's child, by being involved in crop planning, machine usage, and seasonal cycles, can access complex and practical learning experiences that white-collar workers' children might not. While research shows that informal learning participation is often shaped by social inequalities, such as coming from socially privileged, culturally dominant, middle-class, or wealthy backgrounds, it has also been emphasized that the success of informal science learning programs in providing equitable outcomes depends on how much they challenge the dominant power structures that shape, inform, and mediate social life (Archer et al., 2021; Dawson, 2019; Feinstein & Meshoulam, 2014). Thus, while certain professions may offer more access to formal resources (e.g., museums, extracurricular lessons), ILOs are much more culturally and contextually diverse than the professional categories of parents might suggest. This highlights the importance of recognizing the wide range of informal learning experiences that arise from cultural, community, and daily family activities, which go beyond what might be predicted by parents' professional status alone.

5. Recommendations

Based on the results obtained, it is recommended that efforts be made to increase ILOs for younger students. Additionally, studies should be conducted to enhance ILOs for children living in smaller settlements such as villages and towns. Policies can be developed to address the reasons why some children live apart from their families, both during school hours and outside of school time, and to reduce inequalities in ILOs based on these circumstances. Based on the results related to familial factors,

it has become evident that children from “low” and “middle-income” families should be supported in terms of their ILOs. It is particularly important to raise awareness and provide information to parents with educational levels below high school, especially at the middle school level, so that they can support their children's ILOs. Furthermore, policies should be developed to support children of parents who are farmers, not working, or working-class in terms of their ILOs. Based on these results, it is recommended that educational policies and school practices take into account students’ grade levels, places of residence, mothers’ educational levels, and fathers’ occupations in order to enhance their access to ILOs. Moreover, further qualitative research should be conducted to enable a more detailed examination of how children and young people utilize informal learning sources, as well as to explore the ILOs available in both proximal and distal environments and the reasons why some students do not or cannot take advantage of these opportunities.

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Article Information Form

Authors Notes: The data of the study were collected in accordance with ethical standards. Ethical permissions were obtained from the decision of Kafkas University Social and Human Sciences Ethics Committee dated 10/12/2021 and numbered 25 and the decision of Kars Provincial Directorate of

National Education dated 20.09.2022 and numbered E.58291949. Participants were informed about the study, participation was voluntary and their consent was obtained.

Funding: This study was supported by Kafkas University Scientific Research Projects Coordination Office with the code 2022-SB-59

Authors Contributions: The first author was responsible for identifying the research topic, writing the conceptual framework of the introduction, literature review and writing the methodology section. The second author was responsible for preparing the data collection tool and analyzing the data. Both authors contributed equally to the data collection, conclusion and discussion sections of the study.

Conflict of Interest Disclosure: No potential conflict of interest was declared by authors.

Artificial Intelligence Statement: No artificial intelligence tools were used while writing this article.

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