

Beyond teaching: Lifelong learning competencies of vocational teachers

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Abstract

The aim of this research is to determine the perception levels of vocational teachers regarding their lifelong learning competencies and to examine whether these perceptions differ according to various demographic variables. The study group consisted of 107 vocational teachers working in vocational and technical secondary schools during the 2023-2024 academic year. The Lifelong Learning (Updated) Key Competencies Scale was used as a data collection tool. The findings show that vocational teachers generally have a high level of lifelong learning competencies. Teachers received the highest scores in the personal, social, and learning-to-learn competency dimensions, and the lowest scores in the multilingualism competency dimension. A significant difference was found in favor of male teachers according to the gender variable, and a significant difference was found in the digital competency scores of teachers working in the fields of information technology and justice according to the branch variable. In contrast, no significant differences were found based on age, educational status, higher education institution graduated from, and professional seniority. The research reveals the lifelong learning competencies of vocational teachers based on different branches, providing up-to-date data for planning professional development policies, improving in-service training practices, and research in the field of vocational and technical education.

Keywords: Continuous professional development, Digital competence, Lifelong learning competencies, Lifelong learning, Professional development, Teacher education, Vocational education, Vocational teachers.

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Contribution of this paper to the literature

This research fills a significant gap in the literature by examining the lifelong learning competencies of vocational teachers based on an updated key competencies framework. The study allows for the evaluation of competencies across different disciplines and demographic characteristics, and contributes to the planning of continuous professional development processes for vocational teachers and the development of vocational technical education policies.

1. Introduction

Recent and rapid changes in today's world have transformed learning from an activity limited to a specific educational period into a sustainable development process that extends throughout all stages of life. Therefore, lifelong learning stands out as a strategic approach that enables individuals to adapt to changing social, economic, and technological conditions, develop new competencies, and strengthen their employability (Molnár et al., 2024). Teachers' roles have changed due to the rapid developments in worldwide educational approaches, the widespread adoption of digital technologies and artificial intelligence applications, transformation in labor market. Teachers are expected not only to impart their subject knowledge but also to adapt to changing technologies, continuously improve their professional competencies, and instill a culture of lifelong learning in their students. This requirement is particularly pronounced for teachers working in vocational and technical education. Because vocational teachers need to constantly update their professional knowledge and skills in line with rapidly changing sector needs, digital technologies, and new production processes. Indeed, Njenga (2023) states that the professional development of vocational teachers is not limited to formal education; it should be supported by on-the-job learning, peer collaboration, and practice-based learning processes. Similarly, Ye, He, Bai, and Wu (2024) emphasize that the sustainability of technical and vocational education depends on teachers continuously improving their digital literacy, 21st-century skills, and lifelong learning competencies. Therefore, determining the lifelong learning competencies of vocational teachers is important both for supporting the continuous professional development of teachers and for improving the quality of vocational education.

Teachers' lifelong learning competencies play a crucial role in their ability to adapt to the changing expectations of education systems. The teaching profession has evolved from a static profession sustained with initially acquired knowledge and skills to a dynamic professional development process requiring continuous learning, self-assessment, professional collaboration, and adaptation to innovation. Therefore, teachers are expected not only to update their subject knowledge but also to continuously improve their pedagogical, digital, and social competencies. Teachers' professional development processes are supported by structured activities such as formal education, in-service training programs, and postgraduate studies, as well as informal learning processes such as peer collaboration, self-reflection, on-the-job learning, and experience sharing. This necessitates that teachers make lifelong learning an integral part of their profession (Njenga, 2023; Polz, 2020).

For teachers working in vocational and technical education institutions, lifelong learning competencies are of even greater critical importance. Vocational teachers must closely follow not only the changes occurring in educational programs but also the transformations in industry, production technologies, and the labor market. In particular, Industry 4.0, artificial intelligence, automation, and digital production processes necessitate the continuous updating of vocational teachers' technical knowledge and skills. Today, technical and vocational education aims not only to provide skills for a specific profession but also to develop 21st-century competencies such as problem-solving, critical thinking, digital literacy, interdisciplinary knowledge use, and lifelong learning. Therefore, the participation of vocational teachers in continuous professional development is considered one of the fundamental conditions for the sustainability of quality vocational education (Ye et al., 2024).

Indeed, recent research shows that traditional in-service training alone is insufficient for the professional development of vocational teachers. In addition to formal learning activities such as workshops, short-term training programs, and academic courses, vocational teachers also make use of informal learning methods such as collaboration with colleagues, practice-based learning, workplace experiences, self-assessment, and following professional literature. However, the frequency and quality of these learning activities are influenced by individual and contextual factors such as teachers' career stage, institutional support, professional development opportunities, and educational policies (Njenga, 2023). Therefore, determining the lifelong learning competencies of vocational teachers is considered important not only in terms of supporting their individual professional development but also in terms of improving the quality of vocational education, adapting to changing sector expectations, and developing sustainable education policies.

In recent decades, there has been an important increase in studies on the lifelong learning competencies and continuous professional development of vocational teachers in the international literature. Particularly with the impact of digital transformation, artificial intelligence applications, and Industry 4.0, vocational teachers are expected not only to update their subject knowledge but also to improve themselves continuously in terms of digital pedagogy, flexible teaching approaches, and learning-to-learn skills. The Organisation for Economic Co-operation and Development (OECD) (2021) emphasizes that regular participation of vocational education teachers in professional development activities improves teaching quality, facilitates the integration of new technologies into teaching processes, and supports the development of students' higher-level skills. Similarly, UNESCO-UNEVOC (2022) states that digitalization is reshaping the competency areas of vocational teachers; teachers should be supported in terms of digital skills, collaboration with the industry, and a culture of continuous learning. Zhou, Tigelaar, and Admiraal (2022) systematic review of the continuous professional development of vocational teachers revealed that effective professional development programs not only update subject knowledge but also improve pedagogical knowledge, technological competence, industry experience, and reflective thinking skills. Njenga (2023) in her research on technical and vocational education teachers, determined that teachers who participated in continuous professional development activities diversified their teaching methods, improved their classroom practices, and adapted more easily to changing sector expectations. All these findings show that the lifelong learning competencies of vocational teachers are critically important not only in terms of individual

professional development but also in terms of the quality of vocational education and adaptation to the expectations of the labor market.

Although numerous studies have been conducted in Türkiye on teachers' tendencies, attitudes, and perceptions towards lifelong learning, studies directly addressing the lifelong learning experiences of vocational teachers have not been sufficient. The increasing importance of vocational education in terms of global economic development and employment policies makes the examination of vocational teachers' lifelong learning competencies a significant research area. Accordingly, this research aims to examine vocational teachers' perceptions of their lifelong learning competencies and to determine whether these perceptions differ by various variables such as age, gender, educational status, teaching field, and seniority.

The following research questions guided this study.

RQ1: What are the perceptions of vocational teachers regarding their lifelong learning competencies?

RQ2: Do vocational teachers' perceptions of lifelong learning competencies differ significantly according to age?

RQ3: Do vocational teachers' perceptions of lifelong learning competencies differ significantly according to gender?

RQ4: Do vocational teachers' perceptions of lifelong learning competencies differ significantly according to educational status?

RQ5: Do vocational teachers' perceptions of lifelong learning competencies differ significantly according to the higher education institution from which they graduated?

RQ6: Do vocational teachers' perceptions of lifelong learning competencies differ significantly according to teaching field?

RQ7: Do vocational teachers' perceptions of lifelong learning competencies differ significantly according to professional seniority?

2. Theoretical Framework

2.1. Lifelong Learning in the Teaching Profession

The transition to an information society, advancements in digital technologies, and transformations in education systems have made teaching a dynamic profession requiring continuous learning. Today, teachers are not only expected to implement curricula or impart subject knowledge to students; they are also expected to be individuals who can adapt to changing information, technology, and societal needs, manage their own learning processes, and pursue lifelong professional development. The Learning Compass 2030, developed by the OECD, emphasizes that in future education systems, it is not enough for individuals to simply acquire knowledge; they must develop competencies such as learning how to learn, self-regulation, taking responsibility, and adapting to changing circumstances (Organisation for Economic Co-operation and Development (OECD), 2019). This approach necessitates that teachers also adopt a lifelong learning model that continuously supports their professional development.

Lifelong learning is considered a continuous development process that enables teachers to update their professional competencies. Molnár et al. (2024) state that digital transformation and the rapidly changing labor market necessitate the continuous renewal of individuals' knowledge and skills, and therefore lifelong learning is of strategic importance not only for individual development but also for economic and social sustainability. Similarly, Polz (2020) states that the knowledge and skills acquired during the pre-service training process in the teaching profession will not be sufficient on their own throughout their professional lives; teachers need to participate in continuous professional learning activities to adapt to changing educational environments.

2.2. Conceptual Model Regarding Lifelong Learning Competencies of Teachers

In recent years, the acceleration of digital transformation, the widespread adoption of artificial intelligence technologies, and changes in the labor market have made it imperative for individuals to continuously update their knowledge and skills. Therefore, lifelong learning is considered a fundamental element not only of education policies but also of economic and social development. The European Commission (2018) prioritizes the development of core competencies such as learning to learn, digital literacy, personal and social competencies, and citizenship competencies to enable individuals to adapt to changing living and working conditions. Similarly, the OECD's Learning Compass 2030 framework (Organisation for Economic Co-operation and Development (OECD), 2019) emphasizes that the primary aim of education is not merely to produce individuals who transmit knowledge, but to cultivate individuals who can manage their own learning, think critically, and adapt to change. This approach demonstrates that lifelong learning has become a central and fundamental approach in today's education systems. Teachers play a particularly important role in this transformation process. They are not only transmitters of knowledge but also professionals who cultivate a learning culture among students, model continuous learning, and guide change. OECD reports on teachers' professional learning indicate that teachers being individuals who continuously develop their skills and engage in lifelong learning is critical for the quality of education systems. (Organisation for Economic Co-operation and Development (OECD), 2019). For teachers to adapt to changing knowledge and skill requirements, it is essential that they remain open to continuous learning.

Teachers' lifelong learning competencies are associated with dimensions such as learning to learn, self-regulation, digital literacy, critical thinking, problem-solving, and continuous professional development. These competencies support teachers in continuing to learn not only during their university education but also throughout their professional lives. The increasing prevalence of information and communication technologies in educational settings has made the ability of teachers to access new information sources, evaluate information, and independently manage learning processes even more important. Among the key competencies identified by the European Commission, digital competence and learning-to-learn competence are considered fundamental components for teachers' professional sustainability (European Commission, 2018).

In this context, teachers' lifelong learning competencies are located at the intersection of individual development, professional competence, and adaptation to societal transformation. Conceptually, changing global conditions and the requirements of the information society highlight the need for continuous learning among teachers; this need, in

turn, necessitates the development of lifelong learning competencies. Developed lifelong learning competencies support the professional development of teachers and ultimately contribute to the development of skills in learning how to learn, innovation, and adaptability to change in students. Thus, lifelong learning competencies are considered one of the fundamental components of training qualified teachers (Organisation for Economic Co-operation and Development (OECD), 2019).

Based on the Key Competencies Framework for Lifelong Learning put forth by the European Commission (2018) a conceptual model was developed by the researcher to explain the role of lifelong learning competencies of teachers in the educational process. This model aims to reveal, from a holistic perspective, how lifelong learning competencies are reflected in the professional development processes and future teaching practices of teachers.

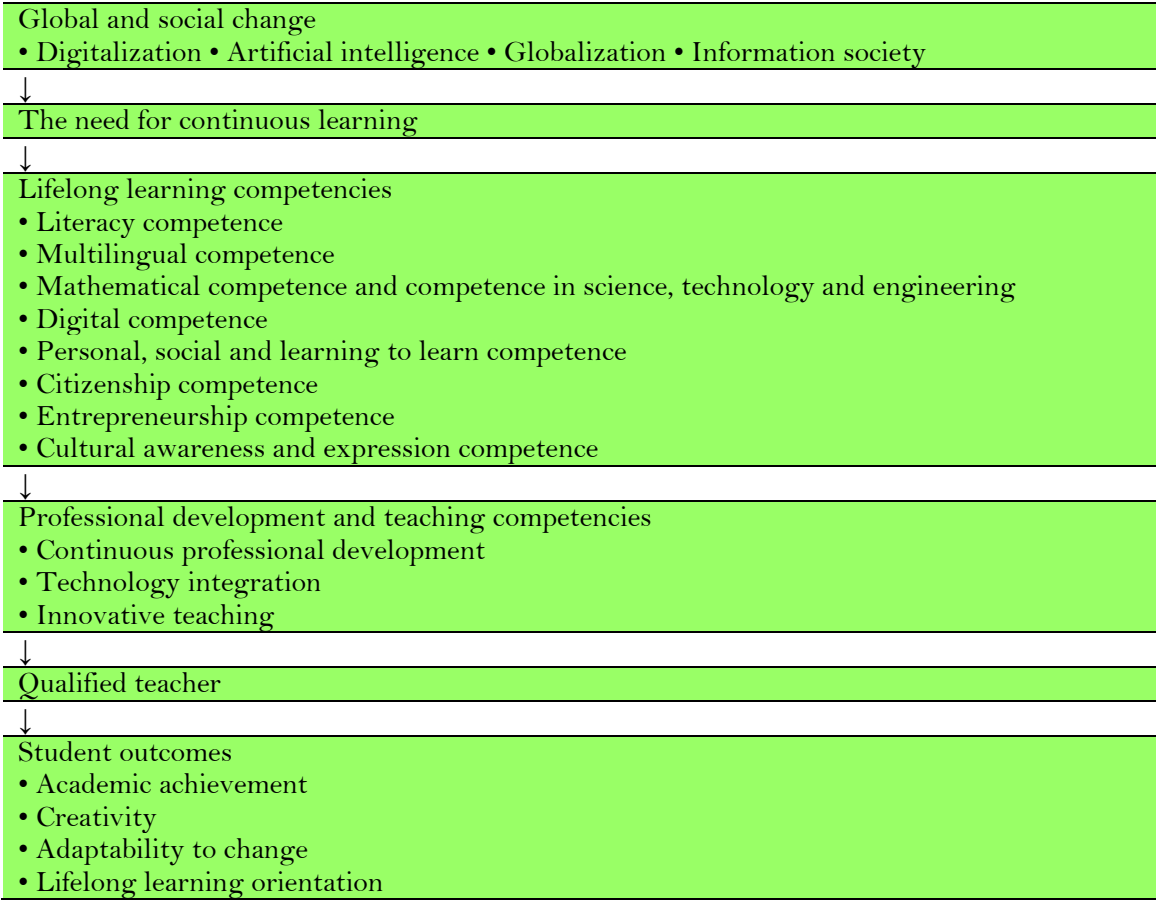


Figure 1. Conceptual model regarding lifelong learning competencies of teachers.

Note: The model was developed by the researcher based on the OECD Learning Compass 2030 (Organisation for Economic Co-operation and Development (OECD), 2019) and the European Commission (2018).

The conceptual model presented in Figure 1 explains the formation of lifelong learning competencies in teachers and their reflection in educational processes. The model primarily assumes that global and societal change factors such as digitalization, advancements in artificial intelligence technologies, globalization, and the requirements of the information society have created a need for continuous learning in individuals. Today, the ease of access to information and the rapid obsolescence of information make it difficult for individuals to sustain their lives solely with the knowledge and skills acquired during a specific educational period. Therefore, it is considered important for teachers to adopt a lifelong learning approach in order to adapt to change and maintain their professional competence.

The lifelong learning competencies at the center of the model consist of literacy, multilingualism, mathematics, science, technology and engineering competencies, digital competence, personal and social competencies, learning to learn, citizenship, entrepreneurship, and cultural awareness and expression competencies. These competencies encompass not only the ability of teachers to access and use information, but also their capacity to manage learning processes, interact with different cultures, develop social responsibility, and produce innovative solutions. Therefore, lifelong learning competencies are among the fundamental determinants of both the individual and professional development of teachers.

In the model, it is accepted that lifelong learning competencies are one of the basic elements that support teachers' professional development and teaching competencies. Teachers who are open to continuous learning are expected to update their field knowledge, use educational technologies effectively, reflect innovative teaching approaches to the classroom environment, and adapt more easily to changing educational needs. This process contributes to increasing the quality of teaching while making the professional development of teachers sustainable. Therefore, lifelong learning competencies have a decisive role in the development of qualified teacher characteristics.

The final stage of the model focuses on the impact of teachers' qualifications on student development. It is envisioned that teachers who embrace continuous learning, keep up with innovations in their field, and pursue professional development will not only improve their students' academic achievements but also support the development of important skills such as creativity, adaptability, and lifelong learning tendencies. Accordingly, the model considers teachers' lifelong learning competencies as a fundamental element strengthening the relationship between individual development, professional competence, and student outcomes; it emphasizes that these competencies play a decisive role in training qualified teachers.

2.3. Lifelong Learning Competencies of Vocational Teachers

Lifelong learning competencies are important for all teachers, but they are even more critical for teachers working in vocational and technical education. This is primarily because vocational and technical education is directly

linked to the labor market and is one of the fields most rapidly affected by technological advancements. The OECD defines vocational education teachers as a "dual specialization" group, emphasizing the need for them to continuously update both their pedagogical competencies and their professional knowledge and skills in their field. Furthermore, the effective integration of digital technologies into teaching processes and the maintenance of strong collaborations with the industry are considered essential components of the continuous professional development of vocational education teachers.

Similarly, Ye et al. (2024) state that Industry 4.0, artificial intelligence, and digital transformation processes are reshaping the aims of technical and vocational education; vocational teachers need to develop not only technical knowledge but also digital literacy, interdisciplinary thinking, problem-solving, and lifelong learning competencies. Njenga (2023) argues that the continuous professional development of vocational teachers is not limited to formal education but should be supported by on-the-job learning, peer collaboration, and practice-based learning processes. These studies show that lifelong learning competencies of vocational teachers are one of the key determinants of the sustainability of quality vocational education.

Although there has been a significant increase in national and international literature on teachers' lifelong learning competencies and continuous professional development in recent years, research largely focuses on teachers' tendencies, attitudes, or general competencies towards lifelong learning. In contrast, studies directly addressing the lifelong learning competencies of teachers working in vocational and technical education institutions are limited. Yet, technological advancements, digital transformation, and changes in the labor market most significantly impact the continuous professional development and competencies of vocational teachers. Therefore, evaluating the lifelong learning competencies of vocational teachers within the context of current conditions is important both for filling this gap in the literature and for improving professional development policies and in-service training practices. Accordingly, this research aims to determine the lifelong learning competency levels of vocational teachers and to examine these competencies in terms of various demographic variables.

3. Methodology

This section includes information on the research design, research group, data collection tool and data analysis.

3.1. Research Design

This research is a descriptive study conducted within the scope of a survey model to examine the lifelong learning competency levels of vocational teachers. The aim of the research is to examine the lifelong learning competencies of vocational teachers in terms of various demographic variables such as age, gender, educational status, faculty graduated from, teaching field, and professional seniority. Accordingly, a descriptive survey model, one of the quantitative research methods, was used. Within the scope of the research, the current situation regarding the lifelong learning competency levels of teachers was attempted to be described in line with the data obtained from vocational teachers working in state vocational high schools affiliated with the Ministry of National Education in the 2023-2024 academic year.

3.2. Research Group

The study group consists of 107 vocational teachers working in various Vocational and Technical Anatolian High Schools affiliated with the Ministry of National Education in Kayseri city center during the 2023–2024 academic year. The teachers participating in the study work in different vocational fields such as information technology, electrical-electronic technology, mechanical technology, accounting and finance, child development, food and beverage services, health services, justice, and similar areas. This allows for a comparison of the lifelong learning competencies of vocational teachers across different branches.

When the demographic characteristics of the participants are examined, it is seen that 63.55% of the teachers are male ($n = 68$) and 36.45% are female ($n = 39$). According to the age distribution, the majority of the participants are teachers aged 46 and over (58.88%). 83.18% of the teachers have a bachelor's degree, 14.95% have a master's degree, and 1.87% have a doctorate. 72.90% of the participants were graduates of faculties of education, while 27.10% graduated from other faculties. In terms of professional seniority, it was determined that 60.75% of the teachers had 21 years or more of experience. Furthermore, teachers from 19 different professional fields participated in the study, including information technology, electrical-electronic technology, mechanical technology, accounting and finance, child development, justice, office management, food and beverage services, health services, and transportation services. The diverse age, seniority, and subject area characteristics of the participants contributed to the evaluation of vocational teachers' lifelong learning competencies from different demographic perspectives. Although the research included teachers from 19 different professional fields, the limited number of participants in some branches is a factor that should be considered when interpreting comparisons made between branches.

3.3. Data Collection Tools

The Lifelong Learning (Updated) Key Competencies Scale (LLKCS) was used as a data collection tool in the research. A review of the literature reveals that lifelong learning competency scales developed in Turkey are largely based on the key competencies framework published by the European Commission in 2018. The sub-dimensions of this scale are literacy competence, multilingual competence, mathematical competence and competence in science, technology and engineering (MC&CSTE), digital competence, personal, social and learning to learn competence, citizenship competence, entrepreneurship competence, and cultural awareness and expression competence. According to the European Commission, these competencies form a complementary whole and encompass the knowledge, skills, and attitudes necessary for individuals to adapt to changing social, economic, and technological conditions. From this perspective, lifelong learning is considered a continuous learning and development process that continues throughout an individual's life, not limited to a specific educational period. In the assessment tool developed accordingly, a six-point Likert scale was used to allow participants to evaluate their competency levels for each statement. Scoring on the scale was arranged as follows: 0 "None", 1 "Lowest", 2 "Low", 3 "Medium", 4 "Good", and 5 "Best" (Akkaya-Tatlıdil, 2023). The scale consists of a total of 38 items.

3.4. Data Analysis

The data collection tool was administered to 107 teachers, and the data obtained were transferred to a computer environment. In the data analysis of the research, statistical techniques were used to determine the mean scores of the scales, their standard deviations, and the differences in scores between groups. The obtained data were analyzed using the IBM SPSS 29.0 program. In the research, Kolmogorov-Smirnov analysis was applied primarily to determine whether the data showed a normal distribution. The obtained data are shown in Table 1.

Table 1. Results of the Kolmogorov-Smirnov analysis.

Variables	Statistics	df	p
Age	0.351	107	0.001
Gender	0.410	107	0.001
Educational status	0.482	107	0.001
Faculty of graduation	0.457	107	0.001
Teaching field	0.185	107	0.001
Seniority	0.362	107	0.001
LLKCS	0.103	107	0.001

Table 1 shows that the data set related to the scale and variables does not exhibit a normal distribution ($p<0.050$). Therefore, non-parametric tests were used in the analyses related to the sub-problems. The Kruskal-Wallis Test and the Mann-Whitney U Test were applied to examine the effects of participants' demographic characteristics (age, gender, educational status, graduated faculty, teaching field, and seniority) on the dependent variables.

4. Findings

This section presents the findings obtained as a result of statistical analyses of the data collected to answer the sub-problems of the research.

4.1. Findings on the Vocational Teachers' Lifelong Learning Competencies

The first research question of the study aims to obtain findings to determine whether vocational teachers' perceptions of lifelong learning competencies are at a high level. For this purpose, descriptive findings regarding teachers' lifelong learning competencies are first presented. Table 2 below shows the minimum scores, maximum scores, standard deviations, and means obtained from LLKCS for vocational teachers.

Table 2. Descriptive statistics of vocational teachers' lifelong learning competencies.

Variables	N	Min.	Max.	$\bar{X}$	Ss
LLKCS	107	59	190	143.84	26.064
Literacy competence	107	6	15	13.43	1.986
Multilingual competence	107	0	20	7.68	5.124
MC&CSTE	107	6	30	23.48	5.446
Digital competence	107	5	25	20.17	4.255
Personal, social and learning to learn competence	107	12	35	29.71	5.222
Citizenship competence	107	7	20	16.49	3.121
Entrepreneurship competence	107	5	25	18.85	3.967
Cultural awareness and expression competence	107	4	20	13.98	3.652

When the total scores obtained from LLKCS in Table 2 are examined, it is seen that the lowest score obtained in terms of the scale as a whole is (59) and the highest score is (190).

4.2. Findings on the Lifelong Learning Competencies by Age

The second research question of the study aims to obtain findings to determine whether vocational teachers' perceptions of lifelong learning competencies differ significantly by age. The Kruskal-Wallis test was applied to examine whether there is a statistically significant difference in the perception levels of vocational teachers regarding lifelong learning competencies by age. The findings of this analysis are given in Table 3.

Table 3. Kruskal-Wallis Test results for vocational teachers' perceptions of lifelong learning competencies by age group.

Age Group	N	Mean Rank	df	X ²	p
≤30 years	2	39	4	8.861	0.065
31-35	10	61.50			
36-40	15	63.67			
41-45	17	67.82			
≥46 years	63	47.25			

Table 3 shows the results of the Kruskal-Wallis test, conducted to examine whether there is a statistically significant difference in the perception levels of vocational teachers regarding lifelong learning competencies based on their ages. According to these results, when comparing the scores obtained by participants on the relevant scale regarding lifelong learning competencies by age, no significant difference was observed between the scores ($p: 0.065$; $p > 0.05$).

4.3. Findings on the Lifelong Learning Competencies by Gender

The third research question of the study aims to obtain findings to determine whether vocational teachers' perceptions of lifelong learning competencies differ significantly by gender. The Mann Whitney U test was applied to examine whether there is a statistically significant difference in the perception levels of vocational teachers regarding lifelong learning competencies by gender. The findings of this analysis are given in Table 4.

Table 4. Mann Whitney U test results for vocational teachers' perceptions of lifelong learning competencies by gender.

Gender	N	Mean Rank	Sum of Ranks	U	p
Female	39	45.46	1773	993	0.031
Male	68	58.90	4005		

Looking at these results in Table 4, a significant difference is observed between the scores obtained by the participants on the scale regarding lifelong learning competencies when compared by gender variable (p: 0.031; p<0.05). When comparing the rank averages of the scores obtained by the participants on the scale, it is seen that male vocational teachers (58.90) have a higher rank average than female participants (45.46).

4.4. Findings on the Lifelong Learning Competencies by Educational Status

The fourth research question of the study aims to obtain findings to determine whether vocational teachers' perceptions of lifelong learning competencies differ significantly by their educational status. The Kruskal-Wallis test was applied to examine whether there is a statistically significant difference in vocational teachers' perceptions of lifelong learning competencies based on their educational status. The findings of this analysis are presented in Table 5.

Table 5. Kruskal-Wallis test results for vocational teachers' perceptions of lifelong learning competencies by educational status.

Variable	Educational Status	N	Mean Rank	df	X²	p
LLKCS	Associate Degree	2	55.25	2	0.151	0.927
	BA	89	53.48			
	MA	16	56.72			

Table 5 shows the results of the Kruskal-Wallis test, conducted to examine whether there is a statistically significant difference in the perception levels of vocational teachers regarding lifelong learning competencies based on their educational status. According to these results, when comparing the scores obtained by participants on the relevant scale regarding lifelong learning competencies based on their educational status, no significant difference was observed between the scores (p: 0.927; p > 0.05).

4.5. Findings on the Lifelong Learning Competencies by Faculty of Graduation

The fifth research question of the study aims to determine whether vocational teachers' perceptions of lifelong learning competencies differ significantly based on the variable of the higher education institution from which they graduated. A Mann Whitney U test was applied to examine whether there is a statistically significant difference in the perception levels of vocational teachers regarding lifelong learning competencies based on the faculty from which they graduated. The findings of this analysis are presented in Table 6.

Table 6. Mann Whitney U test results for vocational teachers' perceptions of lifelong learning competencies by graduated faculty.

Graduated Faculty	N	Mean Rank	Sum of Ranks	U	p
Faculty of Education	78	56.92	4440	903	0.110
Other	29	46.14	1338		

Table 6 shows the results of the Mann Whitney U test, conducted to examine whether there is a statistically significant difference in the perception levels of vocational teachers regarding lifelong learning competencies based on the faculty they graduated from. According to these results, when comparing the scores obtained by participants on the relevant scale regarding lifelong learning competencies based on the faculty they graduated from, no significant difference was observed between the scores (p: 0.110; p > 0.05).

4.6. Findings on the Lifelong Learning Competencies by Teaching Field

The sixth research question of the study aims to obtain findings to determine whether vocational teachers' perceptions of lifelong learning competencies differ significantly according to teaching fields. The Kruskal-Wallis test was applied to examine whether there is a statistically significant difference in vocational teachers' perceptions of lifelong learning competencies according to their teaching fields. The findings of this analysis are presented in Table 7.

Table 7. Kruskal-Wallis test results for vocational teachers' perceptions of lifelong learning competencies by teaching field.

Variable	Teaching field	N	Mean Rank	df	X²	p
LLKCS	Accounting and Finance	24	48.98	18	30.53	0.033
	Information Technologies	15	83.57			
	Justice	4	23.75			
	Office Management	5	61.40			
	Child Development and Education	6	51.33			
	Electrical and Electronics Technology	14	62.14			
	Handicrafts Technology	1	36.50			
	Food Technology	1	13			
	Clothing Production Technology	5	35.20			
	Mapping and Cadastre	1	5			
	Food and Beverage Services	2	46			
	Health Services	7	39			
	Metal Technology	2	44			
	Furniture and Interior Design	2	30.50			
	Motor Vehicle Technology	1	76			
	Graphics and Photography	2	70.50			

Variable	Teaching field	N	Mean Rank	df	X²	p
	Machinery Technology	13	54.42			
	Renewable Energy Technology	1	33.50			
	Transportation Services	1	66.50			

Table 7 shows the results of the Kruskal-Wallis test conducted to examine whether there is a statistically significant difference in the perception levels of vocational teachers regarding lifelong learning competencies according to their teaching fields. Looking at these results, a significant difference is observed between the scores obtained by the participants on the scale regarding lifelong learning competencies when compared by teaching field ($p: 0.033$; $p<0.05$). In order to determine which sub-dimension of the scale this difference is related to, a Kruskal-Wallis analysis was conducted, and significant differences were observed between the groups in the "Digital Competence" and "Citizenship Competence" sub-dimensions of the scale. The results regarding these dimensions are shown in Tables 8 and 9.

Table 8. Kruskal-Wallis test results for vocational teachers' perceptions of the "digital competence" by teaching field.

Variable	Teaching field	N	Mean Rank	df	X²	p
Digital Competence	Accounting and Finance	24	46.85	18	40.276	0.002
	Information Technologies	15	82.50			
	Justice	4	18			
	Office Management	5	74.20			
	Child Development and Education	6	43.08			
	Electrical and Electronics Technology	14	68.89			
	Handicrafts Technology	1	27.50			
	Food Technology	1	7			
	Clothing Production Technology	5	51.30			
	Mapping and Cadastre	1	9.50			
	Food and Beverage Services	2	73			
	Health Services	7	32.50			
	Metal Technology	2	39.75			
	Furniture and Interior Design	2	19.75			
	Motor Vehicle Technology	1	72.50			
	Graphics and Photography	2	55			
	Machinery Technology	13	55.35			
	Renewable Energy Technology	1	27.50			
	Transportation Services	1	27.50			

Table 8 shows the results of the Kruskal-Wallis test conducted to examine whether there is a statistically significant difference in the perception levels of vocational teachers regarding the digital competence sub-dimension according to their teaching field. Looking at these results, when comparing the scores obtained by the participants in the relevant sub-dimension regarding lifelong learning competencies according to the teaching field, a significant difference is observed between the scores of the groups ($p: 0.002$; $p< 0.05$).

Table 9. Kruskal-Wallis test results for vocational teachers' perceptions of the " citizenship competence " by teaching field.

Variable	Teaching field	N	Mean Rank	df	X²	p
Citizenship Competence	Accounting and Finance	24	42.44	18	30.585	0.032
	Information Technologies	15	79.10			
	Justice	4	35.63			
	Office Management	5	49			
	Child Development and Education	6	56.25			
	Electrical and Electronics Technology	14	61.11			
	Handicrafts Technology	1	44.50			
	Food Technology	1	10.50			
	Clothing Production Technology	5	31.70			
	Mapping and Cadastre	1	5			
	Food and Beverage Services	2	36.25			
	Health Services	7	57			
	Metal Technology	2	36.25			
	Furniture and Interior Design	2	31			
	Motor Vehicle Technology	1	95.50			
	Graphics and Photography	2	86.50			
	Machinery Technology	13	61.23			
	Renewable Energy Technology	1	44.50			
	Transportation Services	1	59			

Table 9 shows the results of the Kruskal-Wallis test conducted to examine whether there is a statistically significant difference in the perception levels of vocational teachers regarding the citizenship competency sub-dimension according to the teaching field. Looking at these results, a significant difference is observed between the scores of the groups when comparing the scores obtained by the participants in the relevant sub-dimension regarding lifelong learning competencies according to the teaching field ($p: .032$; $p<.05$). A "Dunn-Bonferroni test" was conducted to reveal the pairwise comparisons of the scores obtained by the participants in the two sub-dimensions of the scale according to the teaching field.

As a result of this analysis, a difference was observed only in the pairwise comparison of the scores obtained in the "Digital Competency" sub-dimension between the participants in the "Information Technology" and "Justice"

teaching fields in the corrected significance values. The results regarding the groups with significant differences are shown in Table 10.

Table 10. Pairwise comparison results for teaching fields with significant differences.

Groups with Significant Difference	Z	Se	p	Adj. p
Information Technologies-Justice	64.500	17.254	0.001	0.032

Table 10 shows that the results of the "Dunn-Bonferroni test" comparing the pairwise scores of participants on the "Digital Competence" sub-dimension of the scale reveal a significant difference in the adjusted scores of participants in the "Information Technology" and "Justice" teaching fields. The rank mean of the scores obtained by "Information Technology" teaching field teachers on this sub-dimension is 82.50, while the rank mean of the scores obtained by "Justice" teaching field teachers on this sub-dimension is 18.

4.7. Findings on the Lifelong Learning Competencies by Seniority

The seventh research question of the study aims to determine whether vocational teachers' perceptions of lifelong learning competencies differ significantly by seniority. A Kruskal-Wallis test was applied to examine whether there is a statistically significant difference in vocational teachers' perceptions of lifelong learning competencies based on the seniority. The findings of this analysis are presented in Table 11.

Table 11. Kruskal-Wallis test results for vocational teachers' perceptions of lifelong learning competencies by seniority.

Years	N	Mean Rank	df	X ²	p
0-5	6	46.33	4	7.980	0.092
6-10	6	64.50			
11-15	18	54.06			
16-20	12	75.42			
≥21 years	65	49.77			

Table 11 shows the results of the Kruskal-Wallis test, conducted to examine whether there is a statistically significant difference in the perception levels of vocational teachers regarding lifelong learning competencies by seniority. According to these results, when comparing the scores obtained by participants on the relevant scale regarding lifelong learning competencies based on their seniority, no significant difference was observed between the scores (p: 0.092; p > 0.05).

5. Results, Discussion and Recommendations

The study determined that vocational teachers generally possess a high level of lifelong learning competency. This finding indicates that vocational teachers have the competencies to adapt to changing information, technology, and professional needs. Today, teachers, especially those working in vocational and technical education, are expected to develop not only their subject knowledge but also their digital skills, problem-solving capacity, and continuous learning habits. Therefore, this finding is important because it shows that vocational teachers have a perception of competency that allows them to sustain their professional development. This result parallels many studies conducted on teachers. For example, Akçay (2021) determined that teachers working in lifelong learning centers have above-average lifelong learning tendencies and competencies. Similarly, Özsoy and Akfırat (2024) revealed that teachers have a high level of lifelong learning competency and that these competencies are an important element supporting psychological resilience. Furthermore, Yıldız-Durak and Tekin (2020) also reported that teachers in different branches have a high level of lifelong learning competency. However, one of the most important contributions of the current research is that it directly examines vocational teachers, in contrast to previous studies that have mostly focused on teachers in different school types. Nevertheless, because some vocational fields were represented by relatively small numbers of participants, the findings related to field comparisons should be interpreted as preliminary. Given the continuous interaction of the vocational education field with technology, this finding is significant because it demonstrates that vocational teachers possess the learning competencies to adapt to changing industry expectations.

The study revealed that vocational teachers received the highest scores in the personal, social, and learning-to-learn competency dimensions, while the lowest scores were obtained in the multilingualism competency dimension. The European Commission (2018) considers learning-to-learn competency as a fundamental area of competency that supports the development of all other competencies. According to Jarvis (2004) individuals can continue the lifelong learning process by taking responsibility for their learning and making learning a natural part of their lives. From this perspective, the high scores of teachers in the learning-to-learn dimension can be considered a positive result. However, the low level of multilingualism competency suggests that teachers in Türkiye need to be supported in terms of their foreign language proficiency and participation in internationalization processes. Studies conducted by Özsoy (2021) and Akkaya-Tatlıdil (2023) also indicate that foreign language and international communication dimensions remain at lower levels compared to other competency areas.

Furthermore, the study determined that the lifelong learning competencies of vocational teachers did not differ significantly according to age. This finding indicates that teachers in different age groups have similar levels of lifelong learning competencies. The widespread use of digital learning environments, increased in-service training opportunities, and the encouragement of continuous professional development for teachers may have reduced the impact of age differences. This finding is consistent with the results of Akçay (2021) research conducted with teachers working in lifelong learning centers. In that study, it was also determined that teachers' competencies did not significantly change according to age. Similarly, Özsoy and Akfırat (2024) did not find a significant age-related difference in teachers' lifelong learning competencies. In contrast, Yıldız-Durak and Tekin (2020) reported that teachers' lifelong learning competencies differed significantly according to age. This difference is thought to stem from the sample characteristics in the studies, the measurement tools used, or the fact that different teacher groups were examined.

The study also found that male teachers had significantly higher lifelong learning competencies than female teachers. This finding suggests that gender may influence vocational teachers' perceptions of lifelong learning competencies. The fact that male teachers are more numerous in vocational and technical education institutions, working in technology-based fields and participating more in digital learning and professional development activities, could be one of the factors explaining this result. This finding is similar to the one obtained in Akçay (2021) study, which showed that the gender variable created a significant difference in lifelong learning tendencies. In contrast, Yıldız-Durak and Tekin (2020) stated that teachers' lifelong learning competencies did not significantly change according to gender.

Moreover, the study determined that teachers' lifelong learning competencies did not differ significantly according to their educational level. This finding indicates that postgraduate education alone does not increase teachers' perceptions of lifelong learning competencies. The fact that teachers' continuous professional development is now supported not only by academic degrees but also by in-service training, individual learning efforts, and professional experience may explain this result. This finding is consistent with Akçay (2021). However, Yıldız-Durak and Tekin (2020) reported a significant difference according to educational level. This difference may stem from differences in the sample structure and the measurement tools used.

The research findings indicate that the higher education institution from which teachers graduated does not have a significant impact on their lifelong learning competencies. This result suggests that teachers' lifelong learning competencies cannot be explained solely by the quality of their graduating institution. It can be argued that experiences gained throughout their professional lives, in-service training, and individual learning efforts play a more decisive role in the development of these competencies. The study also determined that lifelong learning competencies differed significantly depending on the teachers' field of work. This difference was particularly evident in the dimensions of digital competence and citizenship competence. In pairwise comparisons, a significant difference was only observed in the digital competence dimension between teachers in the Information Technology and Justice fields. This suggests that the expectations and needs of different professional fields regarding technology use may also be reflected in teachers' lifelong learning competencies.

However, since the significant difference was observed only between specific fields, it is important to carefully evaluate these findings and support them with new research using samples that more balancedly represent different professional fields. It is expected that teachers working in the field of information technology, in particular, will have a greater need for continuous learning due to their work with constantly updated software, hardware, and digital applications. In contrast, teachers working in fields where technological transformation is less limited may perceive this need at a lower level. The study also determined that teachers' lifelong learning competencies did not show a significant difference based on their professional seniority. This finding indicates that teachers perceive their lifelong learning competencies at a similar level regardless of their length of service. The increased accessibility of professional development opportunities for teachers at all stages of their careers may have contributed to the absence of seniority-based differences.

This result is similar to Akçay (2021) research findings. In the same way, Yıldız-Durak and Tekin (2020) also stated that professional seniority did not create a significant difference in lifelong learning competencies. Overall, the findings suggest that teachers' lifelong learning competencies are more closely related to their individual desire to learn, their efforts to improve themselves, and their level of utilization of professional development opportunities, rather than their length of service. The absence of significant differences in the study based on age, educational status, higher education institution graduated from, and professional seniority indicates that lifelong learning competencies have become a common requirement of the teaching profession rather than a specific demographic characteristic. This finding from the research is similar to the research results of Akkaya-Tatlıdil (2023), Ertaş (2022), Torun (2020) and Özsoy (2021) which revealed that teachers have a high level of lifelong learning competencies. This situation shows that the need for teachers to continuously maintain their professional development in order to adapt to the changing understanding of education is increasing. Indeed, Field (2006) emphasizes that learning is not limited to a certain age period, but is a dynamic process that continues throughout an individual's life.

Consequently, the research findings indicate that vocational teachers possess a high level of lifelong learning competency; however, some competency areas require improvement. These findings offer various implications for policymakers, education administrators, and practitioners. Especially considering the impact of digital transformation on educational processes, prioritizing practices that will improve teachers' digital competencies is crucial. In addition, providing development opportunities that will enhance their foreign language skills, entrepreneurial spirit, and knowledge and experience in international educational practices can contribute to teachers' more effective adaptation to changing professional needs. In this regard, it is recommended that the Ministry of National Education create application-based and continuous professional development programs that consider the needs of different branches; and that these programs include more content on artificial intelligence applications, digital instructional design, international collaborations, and global educational approaches. It is assessed that such practices will strengthen the lifelong learning culture of vocational teachers and positively contribute to the quality of educational processes. Furthermore, encouraging teachers' participation in international projects and mobility programs such as Erasmus+, eTwinning, and similar initiatives will contribute to the development of both their multilingualism competencies and intercultural interaction skills. Strengthening the learning organization culture in educational institutions, expanding professional learning communities that support teachers' continuous learning through collaboration with colleagues, and developing technology-supported learning environments are also important.

However, future research that comparatively examines the lifelong learning competencies of teachers working in different regions and school types, conducts in-depth analyses of teachers' learning experiences through qualitative and mixed methods research, and addresses lifelong learning competencies in conjunction with current variables such as digital transformation, AI literacy, teacher well-being, professional burnout, and sustainable education will make significant contributions to the literature.

5.1. Evaluation of the Findings from an EU Competencies Perspective

In order to interpret the research findings more comprehensively, the results obtained were evaluated in line with the Key Competencies Framework for Lifelong Learning developed by the European Commission (2018). In this context, Table 12 presents the theoretical relationship between the lifelong learning competencies examined in the research and the key competency areas defined by the European Commission.

Table 12. Alignment of Lifelong Learning Competencies with the European Commission (2018) Key Competences Framework.

European Commission (2018) Key Competences	Interpretation for Vocational Teachers	Contribution to Professional Development
Literacy Competence	Ability to access, understand, evaluate and communicate information effectively	Professional communication and information literacy
Multilingual Competence	Ability to communicate in different languages and interact across cultures	Internationalization and intercultural competence
Mathematical Competence and Competence in Science, Technology and Engineering	Analytical thinking and application of scientific knowledge	Technological adaptation and evidence-based practice
Digital Competence	Effective, critical and responsible use of digital technologies	Technology integration and digital pedagogy
Personal, Social and Learning to Learn Competence	Self-regulation, continuous learning and personal development	Lifelong professional learning and adaptability
Citizenship Competence	Active participation in society and understanding democratic values	Social responsibility and civic engagement
Entrepreneurship Competence	Creativity, initiative-taking and innovation	Innovation and problem-solving skills
Cultural Awareness and Expression Competence	Understanding and appreciating cultural diversity	Inclusive teaching and cultural sensitivity

When the research findings are evaluated from the perspective of the European Commission (2018) Key Competencies Framework for Lifelong Learning, it is seen that vocational teachers have strong perceptions, especially in the dimensions of personal, social and learning-to-learn competencies; however, they need to improve in the area of multilingualism competencies. This situation, when evaluated together with the theoretical mapping presented in Table 12, reveals the strong and areas for improvement in the lifelong learning profile of vocational teachers.

5.2. Limitations

This research is limited to data obtained from vocational teachers working in vocational and technical secondary schools affiliated with the Ministry of National Education in Kayseri city centre during the 2023–2024 academic year. Since the data used in the research are based on the self-assessments of the participants, the findings reflect the teachers' perceptions of lifelong learning competencies.

Furthermore, the fact that the research, within the scope of a descriptive survey model, only considered the specified demographic variables resulted in the exclusion of different individual and institutional variables that could affect lifelong learning competencies. In addition, although an attempt was made to ensure sample diversity by including teachers from different professional fields, the limited number of participants in some branches is a factor that should be considered when interpreting comparisons made between branches.

Therefore, caution should be exercised when generalizing the research findings to different samples and study groups; it is recommended that future studies with larger and more balanced samples support these findings. Future studies should aim to include more balanced samples across vocational teaching fields to enable more robust comparisons between disciplines.

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