# Determining Elementary Teachers' Competencies Using Practical Content Development Technologies

**Ecem Tunca**
Information Technologies Teacher, Turkiye

**Fazilet Güler Köse**
Primary School Teacher, Turkiye

**Aynur Geçer**
Kocaeli University, Turkiye

## To cite this article:

# Determining Elementary Teachers' Competencies Using Practical Content Development Technologies

**Ecem Tunca, Fazilet Güler Köse, Aynur Geçer**

| Article Info | Abstract |
|---|---|
| | In education, as in all areas of our lives, the rapid development of computers and the Internet has brought about radical changes. The variety and use of technology in the educational environment is becoming increasingly widespread. A qualified teacher should have a personality that is in a state of constant renewal and development, which is directly proportional to the development of science and technology. Therefore, it is valuable for elementary teachers to become digitally literate and to know how to use this technology in teaching. The aim of this study was to investigate the competence of elementary teachers in the use of practical technologies for content development. This study is descriptive in the general survey type. The "Personal Information Form" and the "Competence Scale for Using Practical Content Development Technologies" were used to collect the research data. According to the results of the research, elementary teachers' competence in the use of practical content development technologies was very low. It was found that the competences of the teachers with a good level of Internet use were higher than those of the teachers with a poor level of Internet use. |

## Introduction

The rapid development of computers and the Internet has led to radical changes in the field of education and in every aspect of our lives (Bartsch, & Cobern, 2003). The diversity and use of technology is becoming increasingly widespread in educational environments. Teachers have the biggest role in the use of existing technologies in the formation of effective, efficient, and attractive learning. Teachers' skills in developing digital content and effectively integrating these technologies into their lessons are extremely important in achieving the goals of their lessons (Metin, 2018; Sarımanoğlu, 2019; Öztürk, 2019). The realization of effective learning in primary education environments also depends on student-content interaction. This interaction can be provided with technologies and materials prepared to meet the needs of students with individual learning differences (Kaya, 2006; Balaman, & Tüysüz, 2011; Metin, 2018; Öztürk, 2019).

Nowadays, it is necessary for teachers to receive qualified training before starting their work and to use science and technology for the constant development of their technological, educational, and professional skills. Using new technologies by transferring them to education is extremely important for improving the quality of education (Yılmaz, 2007). 'The use of modern technology in education will not only enable students to learn easier and

faster, but will also provide job satisfaction for teachers (Aslan, & Baysal, 2017; Özişli, & Bağcı, 2022; Aksu, & Ay, 2023 ). Therefore, it is valuable for elementary teachers to be digitally literate and to know how to use this technology effectively in teaching.

In Turkiye, the Ministry of National Education(MoNE) (2017) conducted studies to determine the competencies expected of teachers and established the "General Competences for the Teaching Profession." These competences are categorized into six main competence areas and 31 sub-competences in line with European countries. Among the competencies developed by MoNE, such as student awareness, teacher and learning processes, curriculum, content knowledge, professional development, personal and professional values, links with education, family and society, and monitoring and evaluation of learning and development, etc. should be considered in ensuring the effectiveness of learning and teaching processes.

MoNE emphasized the necessity for teachers to have the necessary skills to produce digital content within their professional development through the competencies it determined (MoNE, 2017). MoNE has carried out various projects to realize these competencies. When the Opportunities Enhancement and Technology Improvement Movement Project (hereinafter referred to as FATİH) implemented by MoNE is evaluated, it is seen that teachers have improved their technological competences and that there is more cooperation between stakeholders in the implementation of technology in schools. However, the existing digital content is incomplete and inadequate, causing students and teachers to require digital content for all courses.

Various studies show that with the development and changes in science and technology in Turkiye, primary school teachers are not trained in accordance with these developments and there are significant deficiencies in the use of educational technologies (Ulaş, & Ozan, 2010; Öztürk et al, 2013; Tekin & Polat, 2016; Kokoç, Erdoğdu, & Çakıroğlu, 2016; Kayabaşı & Özerbaş, 2017; Ayan, 2018; Yüksel, 2019). During the pandemic period, when the studies on the digital competencies of teachers in Turkiye are examined, it is seen that teacher competencies do not fully meet the requirements of the digital age, and in this direction, there are deficiencies in the in-service training activities of teachers (Arslan, 2019; Avcı & Güven, 2021; Kabaran, 2020). These deficiencies have become more evident, especially during and after the COVID-19 pandemic period.

In the study conducted by Başaran et al. (2021) during the pandemic period, the technology competencies of teachers in the distance education process were examined. It was observed that while the teachers participating in the study stated that they were skilled in using Office software and technological tools necessary for distance education, they lacked the ability to use Web 2.0 tools effectively. Oguguo et al. (2023) examined the use of online learning applications for teaching delivery and assessment in higher education institutions in the post-Covid era. Results of the study show a low extent of use of online learning applications in classroom instruction and continuous assessment.

In the current digital age, it has become an important requirement for all individuals to have digital competences (European Commission [EC], 2017). Digital competence includes more than skills related to information and communication technologies and knowledge of how to use complex connected devices and applications (Falloon,

2020). EC has carried out a study to identify and improve the digital competences of teachers and educators. As a result of this study, the Digital Competences for Educators (DigCompEdu) Framework was shared with the public. The competencies that teachers should have are analyzed under six headings; (1) professional engagement, (2) digital resources, (3) learning and teacher, (4) assessment, (5) empowering learners, and (6) facilitating students' digital competence (Redecker, 2017; Almenera et al.2020).Today, individuals who know how to access information, how to produce information, where and how to use it, and who can think critically should be raised (Gültekin, 2016). Realization of this goal is only possible with qualified teachers who renew and develop themselves by following technological developments and enrich the teaching process by using them in educational practices (Yılmaz, 2007).

The ease of students' access to information through technology, economic and technological developments, and new approaches in education lead to the expectation that teachers should constantly renew their knowledge and skills. The process that started with the definition of teaching skills with the behaviorist approach in the 1960s has developed with the emergence of the understanding of "technical pedagogical content knowledge", which combines technology, pedagogy and content knowledge. It is not sufficient to provide adequate technological infrastructure and materials in schools. Support for all areas of student development can only be provided by teachers who have the competence to use the resources available in the school competently (TED, 2009).

Teachers should provide the guidance that students need in the processes of creating creative products and designing digital content. It is extremely important for teachers to support students in the acquisition and development of digital literacy skills in the primary education environment (Taş, 2019; MoNE, 2022). In this age of digital transformation, it has become a necessity for educators to have knowledge, skills, and attitudes toward digital competences and to integrate digital technologies into the learning-teaching process correctly and effectively.Assessing teachers' digital literacy can improve the quality of teaching, improve learning outcomes, encourage teachers to work better, and address concerns about competence (Organization for Economic Co-operation and Development [OECD], 2013).

The use of technology is an important advantage in the process of developing content and materials for primary education courses (Şahin,2015; Hamli, & Hamli, 2021). It has become a necessity today to determine whether teachers, especially those who prepare students for the future, have these competencies and to take measures according to the current situation. The aim of this study was to determine the competency levels of primary school teachers in using technology-supported practical content development tools and to support them according to identified needs.

The purpose of this study was to examine the perceptions of primary school teachers about their competences in using applied content development technologies and to examine their perceptions of these competences in terms of some variables. In this context, the following questions were sought to be answered in this study:
1. Based on the perceptions of primary school teachers, what is their level of competence in using practical content development technologies?
2. Do the perceptions of primary school teachers about their competence in using practical content

development technologies differ significantly according to gender, age, education level, foreign language level, internet usage, and participation in content development courses?

## Method

### The Research Design

This study was designed according to a single survey and causal comparative model among quantitative research models. Single research models are "studies conducted with the aim of determining the occurrence of variables individually, in type or quantity" (Karasar, 2009). In this study, classroom teachers' competencies in using content development technologies were examined. Then, we examined whether various variables caused a difference in teachers' competencies in using content development technologies.

### Participants in the Research

The participants consisted of teachers working in Turkiye. A total of 154 elementary teachers participated in the study. The demographic characteristics of the teachers are shown in Table 1.

Table 1. Demographic Characteristics of Teachers who Participated in the Study

| Variable | Category | n | % |
|---|---|---|---|
| Gender | Woman | 99 | 64.3 |
| | Man | 55 | 35.7 |
| | 21-30 | 58 | 37.7 |
| Age | 31-40 | 59 | 38.3 |
| | 41 and above | 37 | 24.0 |
| | Undergraduate | 144 | 93.5 |
| Educational level | Postgraduate | 10 | 6.5 |
| | Weak | 57 | 37.0 |
| Level of the foreign | Medium | 80 | 51.9 |
| language | Good | 14 | 9.1 |
| | Excellent | 3 | 1.9 |
| Taking a course related to | I did not take a course | 77 | 50.0 |
| content development | I took a course | 77 | 50.0 |
| | Low level | 34 | 22.1 |
| Internet usage competence | Medium level | 74 | 48.1 |
| | High level | 46 | 29.9 |

### Data Collection Tools

The data were collected using the "Personal Information Form" developed by the researchers and the "Scale of Competencies for the Use of Practical Content Development Technologies" developed by Avci et al., (2020).

*Scale of Competencies for the Use of Practical Content Development Technologies*

In this study, "Practical Content Development Technologies Use Competencies Scale" (Avci et al., 2020) was used as a data collection tool. Permission to use the scale was obtained from the researchers who developed the scale via e-mail. The scale consists of 15 items and three sub-factors (Factor 1: Content Preparation, Factor 2: Product Presentation, Factor 3: Communication and Collaboration). The scale is a 5-point Likert scale ('5' means 'very competent' and '1 - not competent'). Because of exploratory factor analysis, the variance explained by the three factors is 60.95%. All factor loadings are between 0.515 and 0.797. Cronbach's alpha reliability coefficient of the developed scale was calculated as .90. The values of the ranges in the competence scale for the use of practical content development technologies are as follows: 1.00-1.80 not competent at all; 1.81-2.60 not competent; 2.61-3.40 partially competent; 3.41-4.20 competent; 4.21-5.00 very competent. This scale was developed by Avci et al. (2020) for pre-service teachers. Confirmatory factor analysis was performed to apply the scale to classroom teachers. The adapted scale was again shared with the classroom teachers online, and the data were collected and associated with demographic variables. For the adaptation of the scale, confirmatory factor analysis was first conducted on the data collected from 120 classroom teachers. The results of the confirmatory factor analysis are as follows: GFI = 0.81, NFI = .87, CFI = 0.91, and RMSEA = .12. These values have been interpreted as acceptable values in the literature (Byrne, 2010; Yaşlıoğlu, 2017). The Cronbach's alpha reliability coefficient of the scale used in this study was calculated as .93. When the sub-dimensions of the scale were examined, Cronbach's alpha was calculated as 0.89 for the content sub-factor, 0.79 for the product sub-factor, and 0.91 for the collaboration sub-factor. This value is set as highly reliable in the literature (Çokluk et al., 2014). Because of confirmatory factor analysis, the significance of the factor structure was examined at the 0.05 level, and the results are shown in Figure 1.
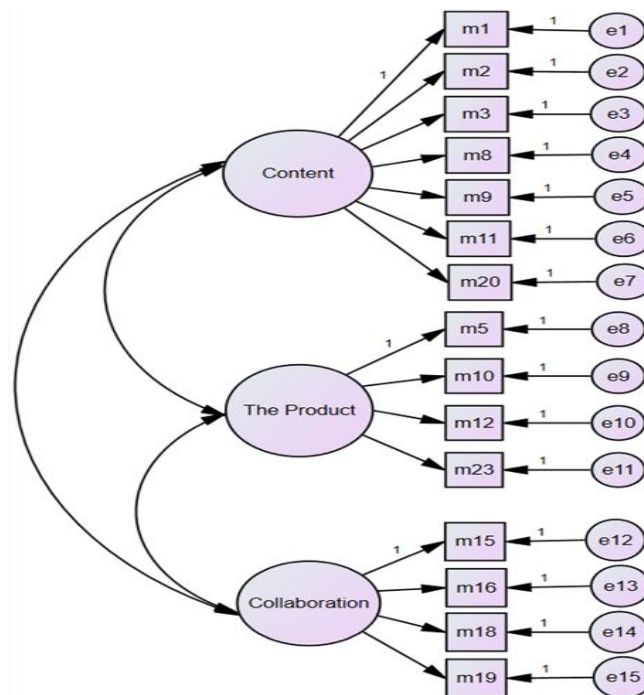


Figure 1. Significance of the Factor Structure of the Scale of Competences for Using Practical Content Development Technologies

No item was eliminated because of the analysis. After adaptation, data were collected from 154 teachers. Demographic variables were analyzed using data collected from classroom teachers.

*Research Ethics*

Participation in the study was entirely voluntary. Participants were informed about the purpose of the study. Each participant was free to stop answering the questionnaire at any time.

*Data Analysis*

SPSS program 23.00 was used to analyze the research data. According to the data obtained from the research, it was checked whether the score distributions were normal, and skewness and kurtosis values were examined. In cases where the independent variables were normally distributed, the t-test for the independent sample was used if the number of categories was two, and ANOVA analysis was used if the number of categories was more than two and the variances were homogeneous.

# Results

In this chapter, the results related to elementary teachers' competences in using practical content development technologies are presented in accordance with the order of the research aims.

**What is the Level of Elementary Teachers' Competence in Using Practical Content Development Technologies?**

The results of the analyses made according to the sub-factors and total scale scores of the scale of elementary teachers' competencies in using practical content development technologies are given in Table 2.

Table 2. Findings related to Sub-Factors and Total Score Regarding Elementary Teachers' Competencies in Using Practical Content Development Technologies

| Scale and subdimensions | n | $\overline{X}$ | s | Level |
|---|---|---|---|---|
| Content dimension | 154 | 1.96 | 0.881 | I am not qualified |
| Product dimension | 154 | 1.63 | 0.772 | I am not enough at all |
| Collaboration dimension | 154 | 2.74 | 1.261 | Partially competent |
| Scale total | 154 | 2.08 | 0.852 | I am not qualified |

In Table 2, it is concluded that elementary teachers' competences in using practical content development technologies are not sufficient according to their total scale scores ($\overline{X}$=2.08). According to the sub-factors of the scale, the teachers who participated in the research answered "I am not sufficient" for the items related to content with the first factor score ($\overline{X}$=1.96); "I am not sufficient at all" for the items related to product with the second factor score ($\overline{X}$=1.63); and "I am partially sufficient" for the items related to collaboration with the third factor

score ($\overline{X}$=2.74).

**Do Elementary Teachers' Competences in Using Practical Content Development Technologies Differ Significantly according to Gender, Age, Education Level, Foreign Language Level, and Internet Usage Level?**

*Results of Analysis of Elementary Teachers' Competencies in Using Practical Content Development Technologies according to Gender*

The results of the analyses of elementary teachers' competencies in using practical content development technologies according to gender are given in Table 3.

Table 3. t-Test Analysis Results of Elementary Teachers' Perceptions of the Sub-Dimensions of Competencies for Using Practical Content Development Technologies according to Gender

| Scale and subdimensions | Gender | n | $\overline{X}$ | s | t | p |
|---|---|---|---|---|---|---|
| Content dimension | Woman | 99 | 1.94 | 0,83 | -.353 | .724 |
| | Male | 55 | 2.00 | 0,96 | | |
| Product dimension | Woman | 99 | 1.64 | 0.73 | .142 | .887 |
| | Male | 55 | 1.62 | 0.83 | | |
| Collaboration dimension | Woman | 99 | 2.71 | 1.25 | -.310 | .757 |
| | Male | 55 | 2.78 | 1.29 | | |
| | Woman | 99 | 2.07 | 0.82 | -.258 | .797 |
| Scale total | Male | 55 | 2.11 | 0.91 | | |

\* p<.05

In Table 3, the competences of elementary teachers in using practical content development technologies did not show a significant difference according to gender in terms of scale sub-dimensions and total (t= -2.58; p<0,05). According to the total scores obtained from the scale, the scores of female teachers ($\overline{X}$=2.07) and male teachers ($\overline{X}$=2.11) were close to each other.

*One-Way Analysis of Variance Results of Elementary Teachers' efficacy of Using Practical Content Development Technologies According to Age*

One-way analysis of variance (ANOVA) results of elementary teachers' competence in using practical content development technologies according to age are presented in Table 4. According to the table, primary school teachers' competencies in using applied content development technologies differed in the total scale (F=1.97; p<0.05). It was determined that the scale also differed in the content dimension (F=3.10; p<0.05), product dimension (F=2.77; p<0.05) and collaboration dimension (F=8.58; p<0.05). It was observed that the competencies of classroom teachers in using applied content development technologies decreased as the age level increased in total scale scores and sub-dimensions. Younger teachers were found to have higher efficacy in using applied content development technologies than older teachers. These findings show that as the age of the teachers

participating in the study increases, their efficacy in using applied content development technologies decreases.

Table 4. One-Way Analysis of variance Results of Elementary Teachers' Efficacy in Using Practical Content Development Technologies according to Age

| Scale and subdimensions | Age | n | X̄ | s | F | p | Difference |
|---|---|---|---|---|---|---|---|
| Content dimension | 21-30 | 58 | 2.37 | 0.90 | | | |
| | 31-40 | 59 | 1.98 | 0.80 | 3.10 | .000 | 1-3; 2-3 |
| | 41 and above | 37 | 1.28 | 0.45 | | | |
| Product dimension | 21-30 | 58 | 1.84 | 0.81 | | | |
| | 31-40 | 59 | 1.74 | 0.81 | 2.77 | .000 | 1-3; 2-3 |
| | 41 and above | 37 | 1.15 | 0.31 | | | |
| Collaboration dimension | 21-30 | 58 | 3.51 | 1.32 | | | |
| | 31-40 | 59 | 2.65 | 1.01 | 8.58 | .000 | 1-2; 1-3; |
| | 41 and above | 37 | 1.68 | 0.48 | | | 2-3 |
| Scale total | 21-30 | 58 | 2.53 | 0.87 | | | |
| | 31-40 | 59 | 2.09 | 0.74 | 1.97 | .000 | 1-2; 1-3; |
| | 41 and above | 37 | 1.35 | 0.33 | | | 2-3 |

*t-Test Analysis Results of Elementary Teachers' Perceptions of the Subdimensions of Competencies when Using Practical Content Development Technologies According to Educational Level*

The results of t-test analyses of elementary teachers' perceptions about the sub-dimensions of their competencies in using practical content development technologies according to their educational level are given in Table 5.

Table 5. t-Test Analysis Results of Elementary Teachers' Perceptions of the Sub-Dimensions of Competencies for Using Practical Content Development Technologies according to Their Educational Level

| Scale and subdimensions | Education Level | n | X̄ | s | t | p |
|---|---|---|---|---|---|---|
| Content dimension | Undergraduate | 144 | 1.89 | 0.85 | -3.608 | .000 |
| | Graduate | 10 | 2.90 | 0.69 | | |
| Product dimension | Undergraduate | 144 | 1.60 | 0.77 | -1.856 | .043 |
| | Graduate | 10 | 2.07 | 0.61 | | |
| Collaboration dimension | Undergraduate | 144 | 2.62 | 1.19 | -4.868 | .000 |
| | Graduate | 10 | 4.50 | 0.98 | | |
| Scale total | Undergraduate | 144 | 2.014 | 12.280 | -4.113 | .000 |
| | Graduate | 10 | 3.10 | 10.362 | | |

Table 5 shows classroom teachers' perceptions of the sub-dimensions of their proficiency in using practical content development technologies in the content dimension (t= -3.60; p<0.05), product dimension (t= -1.85; p<0.05), and collaboration. This reveals that there is a significant difference in the size (t= -4.86; p<0.05) and the total scale (t= -4.11; p<0.05). The averages of teachers with a graduate degree are higher than those of teachers

with a bachelor's degree in the total scale and subscales.

*One-Way Analysis of Variance Results of Elementary Teachers' Perceptions of the Subdimensions of Competencies for Using Practical Content Development Technologies according to the Foreign Language Level*

One-way analysis of variance results of elementary teachers' perceptions about the sub-dimensions of their competence in using practical content development technologies according to their foreign language level are given in Table 6.

Table 6. One-Way Analysis of Variance Results of Elementary Teachers' Efficacy in Using Practical Content Development Technologies according to the Foreign Language Level

| Scale and subdimensions | Level of the foreign language | n | $\bar{X}$ | s | F | p | Difference |
|---|---|---|---|---|---|---|---|
| | Weak | 57 | 1.53 | 0.76 | | | 1-2; 1-3; |
| Content dimension | Medium | 80 | 2.04 | 0.78 | 3.90 | .000 | 2-3 |
| | Good | 17 | 3.05 | 0.55 | | | |
| | Weak | 57 | 1.39 | 0.66 | | | 1-2; 1-3; |
| Product dimension | Medium | 80 | 1.65 | 0.76 | 3.32 | .000 | 2-3 |
| | Good | 17 | 2.41 | 0.67 | | | |
| | Weak | 57 | 1.85 | 0.84 | | | 1-2; 1-3; |
| Collaboration dimension | Medium | 80 | 3.00 | 1.08 | 14.17 | .000 | 2-3 |
| | Good | 17 | 4.52 | 0.61 | | | |
| | Weak | 57 | 1.57 | 0.68 | | | 1-2; 1-3; |
| Scale total | Medium | 80 | 2.19 | 0.73 | 2.79 | .000 | 2-3 |
| | Good | 17 | 3.27 | 0.40 | | | |

As seen in Table 6, classroom teachers' perceptions of the sub-dimensions of the competencies of using practical content development technologies differed in the content dimension (F=3.90; p<0.05), product dimension (F=3.32; p<0.05), collaboration dimension (F=14.17; p<0.05) and total dimension (F=2.79; p<0.05) of the scale according to their foreign language level. In summary, it was observed that as the foreign language level of classroom teachers improved, their competencies in using practical content development technologies increased in all sub-dimensions of the scale and in the total scores of the scale. It was determined that the digital competencies of teachers with good foreign language levels were higher than those of teachers with poor foreign language levels. From this point of view, it can be stated that as the foreign language level of classroom teachers improves, their competence in using practical content development technologies also increases.

*ANOVA Test Analysis Results of Elementary Teachers' Perceptions of the Subdimensions of Competencies in Using Practical Content Development Technologies according to Internet Usage Levels*

The results of the analyses of elementary teachers' perceptions about the sub-dimensions of their competencies in

using practical content development technologies according to their level of internet use are given in Table 7.

Table 7. One-Way Analysis of Variance Results of Elementary Teachers' Efficacy in Using Practical Content Development Technologies according to Internet Usage Levels

| Scale and subdimensions | Level of Internet Usage | n | $\overline{X}$ | s | F | p | Difference |
|---|---|---|---|---|---|---|---|
| Content dimension | Weak | 34 | 1.162 | 0.222 | | | 1-2; 1-3; |
| | Medium | 74 | 1.814 | 1.151 | 16.978 | .000 | 2-3 |
| | Good | 48 | 2.889 | 1.598 | | | |
| Product dimension | Weak | 34 | 1.102 | 0.175 | | | 1-2; 1-3; |
| | Medium | 74 | 1.537 | 0.628 | 7.597 | .000 | 2-3 |
| | Good | 48 | 2.317 | 1.047 | | | |
| Collaboration dimension | Weak | 34 | 1.654 | 0.514 | | | 1-2; 1-3; |
| | Medium | 74 | 2.564 | 0.976 | 13.453 | .000 | 2-3 |
| | Good | 48 | 3.885 | 1.230 | | | |
| Scale total | Weak | 34 | 1.278 | 0.199 | | | 1-2; 1-3; |
| | Medium | 74 | 1.940 | 0.601 | 5.074 | .000 | 2-3 |
| | Good | 48 | 3.00 | 0.881 | | | |

Table 7 shows that classroom teachers' perceptions of the sub-dimensions of their competencies in using applied content development technologies differed in the content dimension (F=16.97; p<0.05), product dimension (F=7.59; p<0.05), collaboration dimension (F=13.45; p<0.05) and total scale dimension (F=5.07; p<0.05) according to their level of internet usage .In summary, as the level of internet usage of primary school teachers increases, their competencies in using practical content development technologies increase in the sub-dimensions and total scale scores of the scale. It was determined that the digital competencies of teachers with good internet usage levels were higher than those of teachers with poor internet usage levels. From this point of view, it can be stated that as the level of internet usage of classroom teachers increases, their competencies in using practical content development technologies also increase linearly.

*t-Test Analysis Results of Elementary Teachers' Perceptions on the Sub-Dimensions of Competencies of Using Practical Content Development Technologies according to the Status of Taking a Course or Course Related to Content Development*

The results of t-test analyses of elementary teachers' perceptions about the sub-dimensions of their competencies in using practical content development technologies according to their taking a course or a course related to content development are given in Table 8. The perceptions of classroom teachers' competencies of using applied content development technologies on the sub-dimensions of the scale show a significant difference in the content dimension (t= -9.67; p<0.05), product dimension (t= -7.30; p<0.05), collaboration dimension (t= -6.77; p<0.05) and total scale (t= -9.51; p<0.05) according to the status of taking a course or course on content development. It can be stated that the difference increased in all sub-dimensions and total scale scores. It can be said that the

competencies of teachers who have taken a course on content development to use practical content development technologies are higher than those who have not taken a course on digital content development competencies.

Table 8. t-Test Analysis Results of Elementary Teachers' Perceptions of the Sub-Dimensions of Competencies for Using Practical Content Development Technologies according to the Status of Taking A Course or Course related to Content Development

| Scale and subdimensions | Taking a course related to content development | n | $\bar{X}$ | s | t | p |
|---|---|---|---|---|---|---|
| Content dimension | I did not take a course | 77 | 1.42 | 0.49 | | |
| | I take a course | 77 | 2.50 | 0.84 | -9.675 | .000 |
| Product dimension | I did not take a course | 77 | 1.24 | 0.42 | | |
| | I take a course | 77 | 2.03 | 0.84 | -7.303 | .000 |
| Collaboration dimension | I did not take a course | 77 | 2.13 | 0.96 | | |
| | I take a course | 77 | 3.35 | 0.30 | -6.777 | .000 |
| Scale total | I did not take a course | 77 | 1.56 | 0.47 | | |
| | I take a course | 77 | 2.60 | 0.83 | -9.518 | .000 |

## Discussion

The aim of this study was to examine primary school teachers' competencies in using practical content development technologies and to analyze these competencies in terms of some variables. It was observed that primary school teachers' competence in using practical content development technologies was quite low. There are similar findings in the literature. Napal Fraile et al. (2018) observed that the digital competence levels of pre-service teachers were low.

The teachers who participated in the research answered "not sufficient" to the items related to the competences in the product, content, and collaboration sub-factors, which are the sub-factors of the scale of competences in using applied content development technologies. The competence of primary school teachers in using applied content development technologies should be increased. When the literature was analyzed, similar results to those in this study were found. Related studies have stated that teachers' competences in using internet-based technologies are low and they need support (Yılmaz, 2007; Ulaş & Ozan, 2010). In-service training is necessary to overcome these deficiencies of teachers. It is stated in the literature that this situation arises from the inadequate content of the courses given within the scope of in-service training (Ceylan & Gündoğdu 2017; Çebi & Reisoğlu, 2020; Dias-Trindade & Moreira, 2020; Gökmen, Akgül, & Kartal, 2014). However, this may also be due to the fact that teachers do not make individual efforts to improve their competences in using practical content development technologies. On the other hand, different results are also found in the literature. In the studies conducted by zbek (2020) and ztürk (2019), it was observed that teachers' skills in using technology and digital content were at a good level.

In this study, the classroom teachers' competences in using practical content development technologies did not

show a significant difference according to gender in terms of sub-dimensions and the overall scale. Similar results have been found in the literature (Barut, 2015; Çinarer, et al., 2016; Kıymet & Çakır, 2023). On the other hand, different results from the results of this study are also found in the literature. Casillas et al. (2020) and Gullien-Gamez et al. (2020) found that the digital competence of male pre-service teachers was higher than that of female pre-service teachers. It is also stated in the literature that due to the continuous development of digital technologies, it is important for a successful education system that teachers' digital competences are updated and developed regardless of gender (Gökmen et al., 2014).

According to the findings of this study, primary school teachers' competences in using practical content development technologies show a significant difference according to age. In the overall scale and in all sub-dimensions, the averages of the teachers aged between 21 and 30 regarding their competence to use practical content development technologies are higher than those aged 31 and above. Hsu and Chen's (2018) statement that younger teachers have more technological knowledge and Meyer and Xu's (2009) statement that older teachers have difficulty keeping up with new technologies support the results obtained. This may be due to generational differences in terms of their acquaintance with digital technology.

In this study, the technology use competences of teachers from generation Y (born between 1981 and 1999) and Z (2000 and later), who have been in close relationship with technological resources from the moment they were born, were found to be higher. Similar results have been reported in the literature (Karaçolak, 2022; Vedi, 2013; Sezgin et all. 2017). In the study conducted by Alkiş (2022), primary school teachers' motivation to access digital technologies and their digital pedagogical competencies in the COVID process were examined depending on the age and seniority of the primary school teachers. According to the findings, teachers with 6-11 years of seniority received higher scores than other groups. In this sense, there is an inverse relationship between age and digital competence. There are different results regarding the age variable in the literature. The study conducted by Ozçiftçi (2014) revealed that the age variable of primary school teachers did not show a statistically significant difference in the use of computer technologies in education. Conducting more research on this subject in the future may help eliminate the inconsistency in age.

When analyzed according to the educational level, it is seen that the averages of the teachers with graduate-level education on practical digital content development competencies are higher than those with undergraduate-level education. The same situation is also observed in the subdimensions of the scale. Similar findings have been found in the literature (Karaçolak, 2022; Şahin & Arcagök, 2014; Silva et al., 2019). It was observed that teachers with graduate level education had higher technology use competencies in all dimensions and in general compared with teachers with undergraduate level education. In the study conducted by Güneş and Buluç (2017) on the use of technology by classroom teachers, it was found that teachers with postgraduate education used technology more in the education process. In their studies, Korkmaz (2020), Aksoy et al., (2021), and Mazlum (2022) found that the digital literacy of teachers with higher education levels was higher than that of undergraduate graduates. However, Arslan (2019) found that teachers' digital literacy levels did not differ significantly according to their level of education.

A significant difference was found in the classroom teachers' competence in using applied content development technologies according to their foreign language levels. It was determined that the digital content development competences of teachers with a good foreign language level were higher than those of teachers with a low foreign language level. From this point of view, it can be stated that as the foreign language level of classroom teachers increases, their competences in using practical content development technologies also increase. In Ceylan and Gündoğdu's (2017) study on the e-content development skills of teachers from different branches, participants from the English branch think that they are advantageous in gaining technopedagogical content knowledge. This is because technology-related resources are mostly in foreign languages. In addition, participants without foreign language proficiency had difficulty using tools such as infographics and edpuzzle, which are Web 2.0 tools without Turkish language support. Maden (2018) stated in his study that teachers are reluctant to participate in international projects, especially technology-oriented international projects, because of difficulties experienced in a foreign language. Since Web 2.0 tools are generally based on English-oriented content and resources, it is obvious that teachers who do not speak a foreign language will have difficulty in fully utilizing the resources offered by these tools, understanding the guides and finding alternative resources. It was determined that the competences of primary school teachers in using practical content development technologies increased in all dimensions and in general as the level of internet usage increased, and the competences of teachers with good internet usage levels were higher than those of teachers with poor internet usage levels.

The practical digital content development competences of teachers who took a course/course on content development were higher than those who did not take a course. In all dimensions of the scale and in general, it was observed that classroom teachers had high competences in using digital content development. In line with the findings of the study, suggestions can be made for future studies on this subject. After determining that teachers' digital content development competences are at a low level, their professional and personal development should be supported and they should be encouraged to reach good and excellent levels in these areas. In the literature, it is stated that to increase teachers' digital competencies, curricula should be developed and teachers should be supported in the use of digital tools and digital content development (Tosunoğlu, 2021).

Digital content preparation platforms should be introduced to teachers and encouraged to gain competence in this field. Teachers should be knowledgeable, skilled, and up-to-date about the use of technology in the teaching process. Therefore, it is important that teachers' digital content development competences are continuously and regularly supported and encouraged by the school administration. In the planned trainings, practical applications that require teachers to use technology more than theoretical knowledge can be included. Practical courses can be given to prospective teachers studying in the classroom teaching program at the Faculty of Education to effectively use technology in teaching and develop digital content. For teachers to develop their digital competence, in-service courses should be better equipped to improve their digital competence.

## Conclusion

The variety and use of technology in the educational environment is becoming increasingly widespread. A qualified teacher should have a personality that is in a state of constant renewal and development, which is directly

proportional to the development of science and technology. Therefore, it is valuable for elementary teachers to become digitally literate and to know how to use this technology in teaching. The aim of this study was to investigate the competence of elementary teachers in the use of practical technologies for content development. This study is descriptive in the general survey type. The "Personal Information Form" and the "Competence Scale for Using Practical Content Development Technologies" were used to collect the research data. According to the results of the research, elementary teachers' competence in the use of practical content development technologies was very low. It was found that the competences of the teachers with a good level of Internet use were higher than those of the teachers with a poor level of Internet use.

Nowadays, teachers interact with student groups that are intertwined with technology in the learning-teaching process. Teachers may have problems finding the digital content they want for the behaviors they want to create in their students. Considering the needs for original digital content and material designs for the individual needs of students, teachers' knowledge levels, opportunities, school and their own opportunities, training they have received, etc. It is important to determine and improve their competencies in preparing digital content and using content development technologies. In this regard, teachers should be constantly supported and encouraged to improve themselves.

## Recommendations

Teachers' competencies in digital content development should be encouraged to reach good and excellent levels by supporting their professional and personal development. Digital content preparation platforms should be shown to teachers, and they should be encouraged to gain competence in this regard. Practical courses for using technology effectively in teaching and developing digital content can be offered in the classroom teaching program at the Faculty of Education.

## References

Aksoy, N. C., & Karabay, E. Aksoy, E. (2021). The Investigation of the Digital Literacy Levels of Classroom Teachers. *Journal of Selcuk Communication*, *14*(2), 859–894. doi: 10.18094/josc.871290.

Alkış Küçükaydın, M. (2022). Digital Pedagogical Competencies and Motıvational Access to Digital Technologies of Primary School Teachers During the Pandemic Process. *Journal of National Education*, *51*(235), 2651–2668. doi: 10.37669/milliegitim.92780.

Arslan, S. (2019). *Examining the digital literacy levels of teachers working in primary and secondary schools in terms of various variables* [Master's thesis, Sakarya University]. Sakarya. https://acikerisim.sakarya.edu.tr/handle/20.500.12619/74495

Aslan Efe, H., & Baysal, Y. E. (2017). Determining Science Teachers' Levels of Motivation and Self-Regulation Regarding Use of Educatıon Technologies. *European Journal of Education Studies, 16*(63). http://dx.doi.org/10.5281/zenodo.582346

Avcı, Z.Y., Ergulec, F., Karakaya Özyer, K. & Eren E. (2020). Revise and Update of Competencies About Using Practical Tools for Content Development Scale. *Kastamonu Education Journal*, *28*(3), 1418-1428. doi:

10.24106/kefdergi.4063.

Avcı, B. & Güven, M. (2021). Identifying Training Needs of Inservice Teachers for Online Education. *The Journal of Buca Faculty of Education, 51*, 345-367, doi: 10.53444/deubefd.882866.

Ay, F. & Aksu, T. (2023). Examining teachers job satisfaction and burnout levels during the covid-19 pandemic. *E-International Journal of Educational Research, 14*(2), 365-383. doi: https://doi.org/10.19160/e-ijer.1246566

Ayan, E. (2018). *Investigation of Teachers' uses of Education Information Network Content and E-Content Development*. [Master's thesis, Hacettepe University]. Ankara. http://www.openaccess.hacettepe.edu.tr:8080/xmlui/handle/11655/5384?show=full

Balaman, F., & Tüysüz, C. (2011). Researching the Effect of Blended Learning Model on the Science and Technology Course Success, Attıtudes and Motıvatıons of 7class Students. *Western Anatolian Journal of Educational Sciences*, *2*(4), 75-90.

Bartsch, R. A., & Cobern, K. M. (2003). Effectiveness of PowerPoint presentations in lectures. *Computers & Education, 41*(1), 77-86. doi:10.1016/S0360-1315(03)00027-7

Barut, L. (2015). *Relationship between science and technology teachers' attitudes toward the use of technology in education and their perceptions of computer self-efficacy*. [Master's thesis, Kahramanmaraş Sütçü Imam University].

Başaran, M., Ülger, I, Demirtaş, M., Kara, E., Geyik, C. & Vural, Ö. (2021). Investigation of Teachers' Use of Technology in the Distance Education Process. *International Journal of Society Researches, 17*(37), 4619-4645. https://doi.org/10.26466/opus.903870.

Byrne, B. M. (2010). *Structural equation modeling with AMOS: Basic concepts, applications, and programming* (2nd ed.). New York: Taylor and Francis Group.

Cabero-Almenara, J., Gutiérrez-Castillo, J. J., Palacios-Rodríguez, A., & Barroso-Osuna, J. (2020). Development of the teacher digital competence validation of DigCompEdu check-in questionnaire in the university context of Andalusia (Spain). *Sustainability, 12*(15), 6094. doi: 10.3390/su12156094

Casillas Martin, S., Cabezas Gonzalez, M. & Garcia Penalvo, F. J. (2020). Digital competence of early childhood education teachers: attitude, knowledge and use of ICT. *European Journal of Teacher Education*, *43*(2), 210-223. doi: 10.1080/02619768.2019.1681393

Ceylan, V. K., & Gündoğdu, K. (2017). E-Content Development Skills of Teachers: An In-Service Training Experience. *Journal of Education and Humanities: Theory and Practice, 8*(15), 48-74. https://dergipark.org.tr/tr/pub/eibd/issue/31879/350397

Çebi, A. & Reisoğlu, İ. (2020). Digital Competence: A Study from the Perspective of Pre-service Teachers in Turkey. *Journal of New Approaches in Educational Research (NAER Journal)*, *9*(2), 294-308. doi: 10.7821/naer.2020.7.583

Çınarer, G., Yurttakal, A. H., Ünal & S. Karaman. (2016). Inspection of Attitudes of Teachers About Education and Technological Tools According to Variables Example of Yozgat Province. *EEB 2016 Electrical-Electronics and Computer Symposium*. Tokat. https://www.researchgate.net/publication/323726989_

Çokluk, Ö., Büyüköztürk, Ş. & Şekercioğlu, G., (2014). *Multivariate Statistics for Social Sciences: SPSS and LISREL Applications*. (3rd Edition) Ankara: Pegem Academy.

Dias-Trindade, S. & Moreira, J. A. (2020). Assessment of high school teachers on their digital competences.

*MAGIS, Revista Internacional de Investigación en Educación*. *13*, 1-21.

European Commission [EC] (2017). Digital competence framework for citizens (DigComp 2.1). *Publications Office of the European Union*. Retrieved from

http://publications.jrc.ec.europa.eu/repository/bitstream/JRC83167/lb-na-26035-enn.pdf

Falloon, G. (2020). From digital literacy to digital competence: The teacher digital competency (TDC) framework. *Educational Technology Research Development*, *68*, 2449-2472 doi:10.1007/s11423-020-09767-4

Gokmen, O., Akgun, O. & Kartal, F. (2014). Opinions of Teachers' About In-Service Training and Interactive Boards Used in Fatih Project. *Journal of National Education*, *44*(204), 42-62.

Guillen-Gamez, F. D., Mayorga-Fernandez, M. J., Bravo-Agapito, J. & Escribano-Ortiz, D. (2020). Analysis of teachers' pedagogical digital competence: Identification of factors predicting their acquisition. *Technology, Knowledge and Learning*, *26*, 481–498. doi: 10.1007/s10758-019-09432-7

Gültekin, S.(2016). *The effect of curriculum design of teaching principles and methods course based on critical thinking on learning products*. [Master's thesis, Balıkesir University]. Balıkesir. https://tez.yok.gov.tr/UlusalTezMerkezi/TezGoster?key=OykDDeWBWTL9-Wm52sZBrAWYzmSiH1Gxc2dxCcre-nhnr7k_8M_zZBFA6ZgvyS9A

Gunes, A. M. & Buluc, B. (2017). The Relationship Between Classroom Teachers' Technology Use and Their Self Efficacy Beliefs. *Tubav Science Journal*, *10*(1), 94-113.

Hamli, S., & Hamli, D. (2021). The Effect of Using Web 2.0 Tools in Lessons on Academic Achievement. *Journal of Education and Management Sciences in Practice*, *1*(1), 1-16.

Hsu, L., & Chen, Y.-J. (2018). Teachers' Knowledge and Competence in the Digital Age: Descriptive Research within the TPACK Framework. *International Journal of Information and Education Technology*, *8*(6), 455-458. doi: 10.18178/ijiet.2018.8.6.1081

Kabaran, G. G. (2020). *Development of an in-service training programme for digital material design and evaluation of its effectiveness*. [Doctoral dissertation, Muğla Sıtkı Koçman University]. https://tez.yok.gov.tr/UlusalTezMerkezi/TezGoster?key=fl0Kw4p1rmMDotyKRdYv1N2s9xWPCOvO4X0IXrt1QBmZrjYUkxx-_ur37t1JtfBn

Karaçolak, M. (2022). *Elementary teachers' perceptions of technology uses competences*. [Master's thesis, Pamukkale University]. Denizli.

https://gcris.pau.edu.tr/bitstream/11499/38963/1/Mustafa%20Kara%C3%A7olak%20tezsiz.pdf

Karasar, N., 2009. *Scientific research method*. Ankara: Nobel Publications.

Kaya, Z. (2006). *Instructional Technologies and Material Development*, Ankara: PegemA Publishing.

Kayabasi, Y. & Ozerbas M. A. (2017). Teachers' Perspectives of Learning Objects Usage Level in Learning-Teaching Processes. *TÜBAV Science, 10*(2) 2017 126–141.

Kiymet, C. & Cakir, R. (2023). Investigation of Secondary School Students' Attitudes Towards Emergency Distance Education, Digital Citizenship and Experiences. *MSKU Journal of Education, 10*(2), 205-225. doi: 10.21666/muefd.1099797

Kokoc, M., Erdogdu, F. & Cakiroglu U. (2016). Investigation of the Relationship Between E-content Development Skills and Academic Achievement of Information Technologies Teacher Candidates. *International Congresses on Education Book of Proceedings (*s. 832-838). Sarajevo/Bosnia & Herzegovina: ERPA.

Korkmaz, M. (2020). *Determining the digital literacy levels of elementary teachers*. [Master's thesis, Osmangazi University]. Eskişehir. http://openaccess.ogu.edu.tr:8080/xmlui/handle/11684/2719

Mazlum, Y. (2022). *Investigation of Teachers' Cognitive Flexibility and Digital Literacy*. [Master's thesis, Hacettepe University]. Ankara.

http://www.openaccess.hacettepe.edu.tr:8080/xmlui/handle/11655/26645

Metin, E. (2018). Teacher Training Using Technology in Education: A Case Study. *Journal of STEAM Education*, *1*(1), 79-103. https://dergipark.org.tr/en/pub/steam/issue/37516/427032

Ministry of National Education(MoNE). (2017). *Ministry of National Education General Qualifications for Teaching Profession. General Directorate of Teacher Training and Development.* Ankara. Retrieved December 4 2023, from

https://oygm.meb.gov.tr/meb_iys_dosyalar/2017_12/11115355_YYRETMENLYK_MESLEYY_GEN EL_YETERLYKLERY.pdf

Ministry of National Education(MoNE) (2020). *Digital literacy teacher's guide*. meb.gov.tr. (in Turkish). Retrieved May 18 2023 from http://cdn.eba.gov.tr/kitap/digital/#p=1

Ministry of National Education (MoNE) (2022). *Digital Transformation in Education*. Retrieved December 12 2023, from http://sanliurfa.meb.gov.tr/edd/gallery.html.

Meyer, K., & Xu, Y. J. (2009). A casual model of factors influencing faculty use of technology. *Journal of Asynchronous Learning*, *13*(2), 57-70. doi: https://doi.org/10.24059/olj.v13i2.1668

Napal Fraile, M., Penalva-Velez, A. & Mendioroz Lacambra, A. M. (2018). Development of digital competence in secondary education teachers' training. *Education Sciences*, *8*(3), 104. doi: 10.3390/educsci8030104

OECD, (2013). *Teachers for the 21st Century. Using Evaluation to Improve Teaching*. https://digcitcommit.org/

Oguguo B.C.E., Ezechukwu, R.I., Nannim, F.A., & Offor, K.E. (2023). Analysis of Teachers in the Use of Digital Resources in Online Teaching and Assessment in COVID Times. *Innoeduca*, *9*(1), 81-96. doi: 10.24310/innoeduca.2023.v9i1.15419

Ozbek, Y. (2020). *Elementary teachers' skills of using digital content and technology*. [Master's thesis, Pamukkale University]. Denizli.

Ozciftci, M. (2014). *Relationship between elementary teachers' lifelong learning tendencies and their self-efficacy toward educational technology standards*. [Master's thesis, Amasya University]. Amasya. https://tez.yok.gov.tr/UlusalTezMerkezi/TezGoster?key=48XPj7KKQhKUgntkUiKO3AP-qY-onopK6GcYC8QpJwIiyhAdIL_MnWhiUpSVk-5m

Ozisli, O., & Bagci, H. (2022). Impact of Knowledge and Technology Use by Teachers on Job Satisfaction: A Field Study. *Sakarya University Journal of Education*, *12*(3). doi: 10.19126/suje.1141774

Ozturk, C., Keskin, S. & Keskin, Y. (2013). Use of materials/technology in elementary school fourth and fifth grade social study lessons. *Marmara University Atatürk Faculty of Education Journal of Educational Sciences*, *19*, 107-120. https://dergipark.org.tr/tr/download/article-file/1673

Ozturk, E. (2019). *Primary school teachers' use of digital content in their lessons*. [Master's thesis, Adnan Menderes University]. Aydın.

http://adudspace.adu.edu.tr:8080/jspui/bitstream/11607/3877/1/591044.pdf

Redecker, C. (2017). *European Framework for the Digital Competence of Educators: DigCompEdu.* In: Punie, Y. (ed). EUR 28775 EN. Publications Office of the European Union, Luxembourg. doi:

10.2760/159770Resnick,L.B.

Sarımanoğlu, N. U. (2019). *Difficulties encountered by teachers in the use of educational technology in classrooms*. Ministry of National Education General Directorate of Innovation and Educational Technologies. Retrieved December 6 2023, from https://yegitek.meb.gov.tr/meb_iys_dosyalar/2020_03/26131950_ogretmenlerinsiniflardaegitimteknolo jisikullanimindakarsilastiklariguclukler.pdf

Sezgin F., Erdoğan F. O., & Erdoğan, B.H. (2017). Technology Self-Efficacy of Teachers: A Holistic Analysis on Teacher and Student Views. *Educational Technology Theory and Practice*, *7*(1), Retrieved September 8 2023, from https://dergipark.org.tr/tr/pub/etku/issue/27428/288494

Silva, J., Usart, M., & Lázaro-Cantabrana, J. L. (2019). Teacher's digital competence among final year Pedagogy students in Chile and Uruguay. Communicar. *Media Education Research Journal*, *27*(2), 33–43. doi: 10.3916/c61-2019-03

Sahin, M. (2015). The Analysis of the Views of Teachers Related to the Functions of Teaching Materials During the Teaching-Learning Process. *Kastamonu Education Journal*, *23*(3), 995-1012.

Sahin, C. & Arcagok, S. (2014). Examınation of the Teachers' Lifelong Learning Competences Levels in Terms of Some Variables. *Journal of Adiyaman University Graduate School of Social Sciences*, *7*(16), 394-417. doi:10.14520/adyusbd.705

Taş, M. A. (2019). *Teacher competences*. In A. Metin Taş, B. Aslan, and F. Hazir Bikmaz (Editor), A Gift to Prof. Dr. Mehmet Ali Kısakürek (pp. 75-82). Ankara: Ankara University Press House.

Turkish Education Association, (2009). *Teacher Competencies Summary Report*. Retrieved April 11 2023, fromhttps://www.ted.org.tr/wp-content/uploads/2019/04/Ogretmen_Yeterlik_Kitap_Ozet_rapor.pdf

Tekin, A. & Polat, E. (2016). A Scale for E-Content Preparation Skills: Development, Validity and Reliability. *Eurasian Journal of Educational Research (EJER)*, *62*, 143-160 doi:10.14689/ejer.2016.62.9

Tosunoğlu, E. (2021). Digital-Based Practices in Teaching Specially Gifted Students: Examining the Trends in Research Made in the Last 10 Years. . *Instructional Technology and Lifelong Learning*, *2*(1), 53-74. doi: 10.52911/itall.869692

Ulaş, A. H. & Ozan, C. (2010). The Qualification Level of Primary School Teachers' Use of Educational Technology. *Ataturk University Journal of Institute of Social Sciences*, *14*(1), 63-84. Retrieved April 5 2023, from https://dergipark.org.tr/tr/download/article-file/32197

Vedi̇, B. (2013). *Evaluation of primary and secondary school administrators' levels of use of computer technology*. [Master's thesis, Okan University]. Istanbul.

Yaşlıoğlu, M. M. (2017). Factor Analysis and Validity in Social Sciences: Application of Exploratory and Confirmatory Factor Analyses. *Istanbul University Journal of the School of Business, 46*, 74-85.

Yılmaz, M. (2007). Instructional Technology in Training Primary School Teacher. *Journal of Gazi Education Faculty*, *27*(1), 155-167. Retrieved January 15 2023, from https://dergipark.org.tr/en/download/article-file/77173

Yüksel, B.S. (2019). *Examining the Educational Technology Usage Levels of Elementary Teachers in terms of Individual Innovativeness Characteristics*. [Master's thesis, Adnan Menderes University]. Aydin. http://adudspace.adu.edu.tr:8080/jspui/bitstream/11607/3803/1/562741.pdf

# Author Information

**Ecem Tunca**

https://orcid.org/0009-0007-8206-4807

Information Technologies Teacher

Eskişehir

Turkiye

Contact e-mail: *ecemtunca97@gmail.com*

**Fazilet Güler Köse**

https://orcid.org/0009-0000-0887-3496

Primary School Teacher

Kocaeli

Turkiye

**Aynur Geçer**

https://orcid.org/0000-0002-6121-0664

Kocaeli University

Department of Computer Education and Instructional

Technology

Kocaeli

Turkiye