INTRODUCTION

Today’s societies focus on raising ideal individuals through education and also aim to provide individuals with the knowledge and life skills needed to thrive in the modern world as well as to be prepared for the future. The education system includes many factors and stakeholders that affect success such as teachers, students, syllabus, schools, and administrators. Among these, teachers have a critical role since they are responsible for the correct implementation of curricula, textbooks, and other teaching materials in a classroom environment as well as they manage and evaluate students’ learning processes.

As a result of technological developments, major changes have occurred in a wide variety of fields such as medicine, engineering, science, banking, tourism, social sciences, and media in recent years. Although education is one of the fields that the impact of technology most obvious, it also stands out as a field that radical changes were not clearly seen after technology integration compared to other fields (Oliver, 2002). Initially, some factors such as insufficient funds allocated to increase the technological equipment in educational environments, low motivation of teachers towards the use of technology and inadequate technology competency were considered as the main reasons for this deficiency (Cox et al., 1999). However, although the lack of technological resources in schools has been met to a great extent and individuals use web technologies such as the internet and apps more intensively in their daily lives, the reasons for the existence of such problems is the fact that the use and teaching of technology in schools are mostly carried out by teachers who specialize in computer and instructional technologies and teachers from other disciplines refrain from using technology in teaching practices due to their lack of knowledge in instructional technologies (Demetriadis et al., 2003; Gür, et al., 2010; Hu et al., 2003).

Continuous innovations in technology inevitably affect the structure of educational environments and the methods and techniques implemented during learning/teaching activities (Kuş, 2005). Although the use of technology in education is considered as an indicator of quality (Çakır & Yıldırım, 2009), technology should be combined with proper pedagogical approaches to use it in education (Şad & Özhan, 2012; Şad & Göktaş, 2014). Successful integration

ARTICLE INFO

Article history
Received: April 14, 2021
Accepted: July 16, 2021
Published: July 31, 2021
Volume: 9  Issue: 3

Conflicts of interest: None
Funding: None

ABSTRACT

This study aims at examining social studies teacher candidates’ self-efficacy beliefs for technological pedagogical content knowledge through multiple variables and presenting new perspectives for researchers and practitioners. A causal-comparative research design was adopted for this study. Among non-random sampling methods, convenience sampling was used to select participants. The sample of the study consists of 349 3rd and 4th year college students (teacher candidates) studying at three state universities in Turkey’s Central Anatolia Region in the 2018–2019 academic year. The Technological Pedagogical Content Knowledge (TPACK) scale was used for collecting data in this study. T-test and one-way analysis of variance (ANOVA) was employed to analyze data. According to the obtained results, the social studies teacher candidates’ self-efficacy beliefs for technological pedagogical content knowledge can be considered above average. No significant differences were found between participants’ self-efficacy beliefs for TPACK and some independent variables such as gender, year in college, GPA score, personal computer ownership, and Instructional Technology and Material Development course score. On the other hand, it was determined that perceived technology competency and the use of content sharing platforms for professional purposes were important predictors for social studies teacher candidates’ self-efficacy beliefs about TPACK.

Key words: Social Studies, Teacher Candidates, TPACK Self-Efficacy Belief, Digital Literacy, Causal-Comparative Research

Social Studies Teacher Candidates’ Self-Efficacy Beliefs for Technological Pedagogical Content Knowledge (TPACK)

Hayati Adalar•

Department of Social Studies Education, Faculty of Education; Manisa Celal Bayar University, Manisa, Turkey

Corresponding author: Hayati Adalar, E-mail: <adalarhayati@gmail.com>

INTERNATIONAL JOURNAL OF EDUCATION & LITERACY STUDIES
ISSN: 2202-9478
www.ijels.aiac.org.au
of technology into educational practices requires sufficient knowledge of pedagogy, technology, and content (Jang & Tsai, 2012). This process also called technology integration in education, is defined as using technology effectively and efficiently in educational environments including education programs and educational infrastructure (Yalın et al., 2007).

The functional use of technology in education can only be possible if teachers, as the main actors of educational activities, have sufficient technological knowledge and skills and combine this technological knowledge and skills with course content and proper pedagogical approaches. Teachers should know how to integrate recent technological developments into their classrooms. Accordingly, teachers need to appropriately combine technology, pedagogy, and course content (Mishra & Koehler, 2006).

Niess (2005) highlighted that to improve student learning, teacher education programs need to be revised to integrate technology into teaching strategies at the knowledge and practice level and to use it effectively. The “technology integration” term is increasingly considered as “information and communication technologies (ICT) integration” in the literature, the differences in definitions of what the integration process are also stood out. In the literature, it can be seen that, while the focus of some definitions is to enhance and enrich students’ learning by technology (Lim et al., 2003), the focus of some other is to being used technology effectively by instructor or making technology an integral part of curriculum (Fluck, 2003). There are different technology integration models and approaches that effectively and efficiently integrate technology into educational practices (Toledo, 2005; Mishra & Koehler, 2006; Wang & Woo, 2007; Wang, 2008; Vanderlinde & Braak, 2010). Systemic Planning Model for ICT Integration (Wang & Woo, 2007), Technological Pedagogical Content Knowledge Model (Mishra & Koehler, 2005), Five Stage Model of Computer Technology Integration (Toledo, 2005), Generic Model of Pedagogy, Social Interaction and Technology (Wang, 2008), E-capacity Model (Vanderlinde & Braak, 2010), Concentric Circles Model (Tondeur et al., 2008), 5W 1H Unified Integration Model (Haşlaman et al., 2008) and Technology Integration Planning Model (Roblyer, 2006) some of these integration models and approaches that draw attention in the literature. Among these approaches, the Technological Pedagogical Content Knowledge (TPACK) introduced by Mishra and Koehler (2006) is a widely accepted model of technology integration in education. Technological Pedagogical Content Knowledge refers to the knowledge of teaching education programs, content, and syllabus. Additionally, it also includes the knowledge of the relationship of the discipline with other disciplines, recent developments in the discipline, key concepts, tools and structures of the discipline as well as integration of content with technology (Turkish Education Association [TED], 2009). In other words, technological pedagogical content knowledge refers to the knowledge of information and communication technologies as well as the proper and purposeful use of this knowledge in classroom activities (Kaya et al., 2010). The TPACK model, also known as the techno-pedagogical education model (Çoklar et al., 2007), consists of three primary components: Content Knowledge (CK), Pedagogical Knowledge (PK), and Technological Knowledge (TK). As seen in Figure 1, the techno-pedagogical education approach includes three main components and three sub-components by overlapping main components. And the techno-pedagogical education approach lies at the intersection of all three of these main knowledge components (Mishra & Koehler, 2006) (Figure 1).

The Components of TPACK, its definitions and sample questionnaire items in the scale used in the research are explained in Table 1.

As the process of integration of ICT into education in Turkey is examined, it can be said that there was a change for CT (Computer Technology) equipments and internet connection in all classrooms with “FATIH Project” which increases opportunities and improves the technology movement from CT classes in 2000s and 2010s. The main objectives of this project are to provide equality of opportunity in the social field in general, to guide the quality of ICT in the country in terms of quality and quantity, and to provide all students with access to information and communication technologies (FATIH Project, 2012; Turkey’s Ministry of National Education [MEB], 2014). With the support of the internet infrastructure and smart board provided to schools within the scope of the FATIH Project, the course contents carried out in schools can be accessed in learning object and e-book format both online and offline with the e-content management system called Education Informatics Network [EBA] (Başak & Ayvacı, 2017). Undoubtedly, the ability of teachers to adapt to this integration process in terms of technological and pedagogic competencies was seen as an important factor for this project to reach its goal. It has been one of the most emphasized topics in the last 10 years in Turkey as well that gaining digital competencies to become members of online teacher networks such as EBA, e-Twining, Scientix, FCL (Toker et al., 2021) and to effectively use different technological applications and software such as:

![Figure 1](image-url)
Table 1. Definitions and sample survey items of TPACK components (Mishra & Koehler, 2006)

| Knowledge Types   | Definition                                                                 | Sample Survey Items                                                                 |
|-------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Technological Knowledge (TK) | Continually changing and evolving knowledge base that includes knowledge of technology for information processing, communications, and problem solving and focuses on the productive applications of technology in both work and daily life. | I know how to solve my own technical problems when using technology. |
| Pedagogical Knowledge (PK) | Knowledge of nature of teaching and learning, including teaching methods, classroom management, instructional planning, assessment of student learning, etc. | I am able to guide my students to adopt appropriate learning strategies. |
| Content Knowledge (CK) | Knowledge of the subject matter to be taught (e.g., social science, mathematics, language, arts, etc.) | I have sufficient knowledge about my field. |
| Technological Content Knowledge (TCK) | Knowledge of the relationship between subject matter and technology including knowledge of technology that has influenced and is used in exploring a given content discipline. | I have knowledge about the technologies for understanding and applying social studies. |
| Pedagogical Content Knowledge (PCK) | Knowledge of the pedagogies, teaching practices, and planning processes that are applicable and appropriate to teaching a given subject matter. | I can choose effective teaching approaches that will guide the student's thinking and learning in social studies course. |
| Technological Pedagogical Knowledge (TPK) | Knowledge of the influence of technology on teaching and learning as well as the affordances and constraints of technology with regard to pedagogical designs and strategies. | I think critically about how I will use technology in my classroom. |
| Technological Pedagogical and Content Knowledge (TPACK) | Knowledge of the complex interaction among the principle knowledge domains (content, pedagogy, technology). | I know how to teach by combining technology, pedagogy, and content knowledge domains successfully. |

Table 1 presents the definitions and sample survey items of the TPACK components. The TPACK model, developed by Mishra and Koehler (2006), is a framework that integrates the technological, pedagogical, and content knowledge of teachers. It is essential for educators to develop these competencies to effectively integrate technology into their teaching practices. The table highlights the importance of understanding the interplay between technological, pedagogical, and content knowledge in shaping the educational outcomes. The definitions and survey items provided can serve as a valuable resource for educators and researchers to assess and enhance their technological pedagogical content knowledge (TPACK).
that should be taken to improve teacher candidates’ TPACK competencies.

METHOD

Research Design

Among quantitative research models, a causal-comparative research design was adopted for this study. The causal-comparative research model aims to determine whether there is a difference between two or more variables. This type of studies tries to identify the causes and results of differences among groups, without manipulating participants and situations (Karasar, 2012; Büyüköztürk et al., 2014). Accordingly, the current study aims to identify the social studies teacher candidates’ self-efficacy beliefs for TPACK knowledge and to determine the relationship between the variables.

Population and Sample

The accessible population of the study includes the social studies teacher education students at three state universities in Turkey’s Central Anatolia Region. Among non-random sampling methods, convenience sampling was used for the selection of participants. In the convenience sampling method, the researcher chooses a sampling group that is close and easy to access. This sampling method brings speed and practicality to the research (Yıldırım & Şimşek, 2016). In this context, in order to collect data, universities that are close to each other in terms of distance were determined, taking into account easy accessibility. The sample of the study consists of 349 3rd and 4th year college students (teacher candidates) studying at the relevant college programs in the 2018–2019 academic year. While taking this sample into consideration in the study, the reason why the 1st and 2nd grades were excluded from the sample is that technology-based teaching profession knowledge courses (for example: Instructional Technology and Material Development, Teaching Principles and Methods and Social Studies Teaching I-II) are given starting from the 3rd grade in education faculties in Turkey. It was thought that these courses could be an important factor in shaping the technological pedagogical content knowledge of teacher candidates. This phenomenon was also an important factor when deciding on the independent variables shared below and discussed in the research within the scope of the research. Although they are from different universities, the success of the students who take courses with the same content according to a common program and the possible contributions of these courses to their technological competencies should be considered and discussed. The demographic properties of the teacher candidates who participated in the study are shown in Table 2.

As seen in Table 2, among social studies teacher candidates, the number of male participants was slightly higher than females (53%), the number of 3rd year students (57.6%) was higher than 4th year students (42.4%). It was determined that most of the participants’ Grade Point Average [GPA] to a 4.0 scale were varied between 2.51 and 3.00 (51.9%). A majority of the participants owned a personal computer (71.3%) and perceived themselves as technology competent (64.2%). Furthermore, they used content sharing platforms for professional purposes sometimes (42.7%) and their Instructional Technology and Material Development (ITMD) course score was generally varied between 61 and 80 (41.5%).

Data Collection Tool

The Technological Pedagogical Content Knowledge scale developed by Schmidt et al. (2009) for primary school teachers was used for collecting data in this study. The original TPACK scale consists of 46 items and its adaptation into Turkish was conducted by Kaya and Dağ (2013) and factor structure was examined through exploratory and confirmatory factor analysis. A total of 352 primary school teacher candidates from three large state universities participated in that study. Accordingly, it was found that Cronbach’s alpha reliability coefficients for sub-scales were varied between 0.77 and 0.88. The results obtained in that study conducted with the Turkish sample indicated that the factor structure of the Turkish version of the scale is similar to the original scale and the scale is suitable for use in Turkey (Kaya & Dağ, 2013). For the current study, the required permissions were obtained for the use of the Turkish version in social studies teacher candidates. In the next stage, expert opinions received from the researcher who conducted the adaptation into Turkish and accordingly, the items belong to Mathematics, Science, and Literacy categories were excluded (since they are not directly related to the social studies course) and the Technological Pedagogical Content Knowledge scale for social studies teacher candidates (TPACK-S) was obtained. The final form

| Variable                                      | n   | %   |
|----------------------------------------------|-----|-----|
| Gender                                       |     |     |
| Male                                         | 185 | 53.0|
| Female                                       | 164 | 47.0|
| Year in College                              |     |     |
| 3rd year                                     | 201 | 57.6|
| 4th year                                     | 148 | 42.4|
| Grade Point Average                          |     |     |
| 0.00-2.50                                    | 101 | 28.9|
| 2.51-3.00                                    | 181 | 51.9|
| 3.01-4.00                                    | 67  | 19.2|
| Owning a personal computer                   |     |     |
| Yes                                          | 249 | 71.3|
| No                                           | 100 | 28.7|
| Perceived technology competency              |     |     |
| Competent                                    | 224 | 64.2|
| Incompetent                                  | 125 | 35.8|
| Use of content sharing platforms for          |     |     |
| professional purposes                        |     |     |
| Rarely                                       | 88  | 25.2|
| Sometimes                                    | 149 | 42.7|
| Often                                        | 87  | 24.9|
| ITMD course score                            |     |     |
| 21-40                                        | 42  | 12.1|
| 41-60                                        | 52  | 14.9|
| 61-80                                        | 145 | 41.5|
| 81-100                                       | 110 | 31.5|
| Total                                        | 349 | 100 |

Table 2. Demographic properties of the teacher candidates
of the survey was a 5-point Likert type scale with 30 items
consists of 7 factors. The participants answered the items
by marking a scale ranging from 1 to 5: (1) Strongly disagree;
(2) Disagree; (3) Neither agree nor disagree; (4) Agree;
(5) Strongly agree. Since the TPACK-S scale did not include
negative items, no reverse-coded items were used. TPACK-S
scale used in the present study consisted of technological
knowledge (6 items), pedagogical knowledge (7 items), con-
tent knowledge (3 items), technological content knowledge
(2 items), pedagogical content knowledge (2 items), technol-
ogical pedagogical knowledge (6 items), and technological
pedagogical content knowledge (4 items) sub-scales.
Since the number of items changed, the construct validity
and consistency coefficients of the TPACK-S scale should
be assessed again. Therefore, factor analysis was conducted
on the items to assess the construct validity of the TPACK-S
scale. As the Kaiser-Meyer-Olkin (KMO) value was 0.953
and the Bartlett test was significant (p<0.001), the data was
decided as suitable for factor analysis (Büyüköztürk, 2003).
The first factor analysis conducted by SPSS software re-
vealed that the items of the scale grouped under 7 factors
and these seven factors explained 65.885% of the total vari-
ance. Considering these results, it can be considered that
the TPACK-S scale has sufficient construct validity. The
Cronbach’s alpha was calculated for the internal consistency
of the scale. Cronbach’s alpha value of the total scale was
calculated as 0.953; and varied between 0.74 and 0.87 for
all sub-scales. Based on these values, the reliability of the
scale was considered high. In this process, the expert support
was received from the researchers who adapted the scale into
Turkish for the applicability of the scale to social studies
teacher candidates before data collection.

Analysis of Data
T-test and One-way analysis of variance (ANOVA) were con-
ducted between the components consisting of participants’
technological pedagogical content knowledge and indepen-
dent variables for normally distributed unrelated samples. To
evaluate if the data were normally distributed, the Shapiro-
Wilk normality test was used for sample sizes below 30 and
kurtosis and skewness coefficients were calculated for sam-
ple above 30. The results of the normality tests showed that
all normality assumptions were met. It was observed that the
skewness and kurtosis coefficients ranged from -1.126 to
+1.523 in the analyses that were adjusted separately consid-
ering all independent variables. “A kurtosis value between ±1.0
is considered excellent for most psychometric purposes, but a
value between ±2.0 is in many cases also acceptable, depend-
ing on the particular application.” (George & Mallery, 2014).
This finding showed that parametric tests can be used for
data analysis in the study. Levene’s test was used to examine
the equality of the variances, the precondition for One-way
analysis of variance (ANOVA). Accordingly, Levene’s test
results were found to be at the P>.05 level in all independent
variables applied ANOVA test. It was found that Levene’s
statistic results “0.71; p=.975” for GPA, “1.219; p=.302”
for ITMD course score, “1.219; p=.302” for use of content
sharing platforms for professional purposes. Scheffe’s Post
Hoc test was used as the post-hoc test. Scheffe’s procedure
was developed to examine all possible linear combinations
of group means. In general, this method was preferred since
it is flexible and can keep α error rate under control (con-
servative) when there are so many groups to compare and it
does not take into account whether each group has the same
number of observations (Scheffe, 1953).

FINDINGS
Social Studies Teacher Candidates’ Competencies
Regarding Overall TPACK and its Sub-components
At first, social studies teacher candidates’ average scores on
the competencies regarding overall TPACK and its sub-com-
ponents. The obtained results are presented in Table 3.
As seen in Table 3, social studies teacher candi-
dates’ self-efficacy beliefs for overall TPACK (3.66) were
above average. On the other hand, it can be argued that
they had higher mean scores for the sub-components of
Technological Knowledge (3.47), Pedagogical Knowledge
(3.74), Content Knowledge (3.71), Technological Content
Knowledge (3.73), Pedagogical Content Knowledge
(3.67), Technological Pedagogical Knowledge (3.67), and
Technological Pedagogical Content Knowledge (3.76).

Social Studies Teacher Candidates’ TPACK
Competences According to Gender
Independent samples t-test was used whether there is a sig-
ificant difference between female and male teacher candi-
dates’ scores for overall TPACK and its sub-components.
The results are shown in Table 4.
As seen in Table 4, no significant difference exists be-
 tween female and male social studies teacher candidates’
overall TPACK scores [t_{(173)}=.073; p>.05]. Based on these
results, it can be argued that female and male social studies
teacher candidates had similar levels of overall TPACK. The
gender variable was examined for each TPACK sub-compo-
ment separately. Accordingly, regarding teacher candidates’
competencies for all tests were found to be statistically in-
significant (p>.05). In other words, social studies teacher
candidates’ self-efficacy beliefs for overall TPACK and its
sub-components did not differ with gender.

Table 3. Social studies teacher candidates’ self-efficacy
beliefs for overall TPACK and its sub-components

|                          | n  | M   | Ss |
|--------------------------|----|-----|----|
| General Technological Pedagogical Content Knowledge | 349 | 3.66 | .56 |
| Technological Knowledge  | 349 | 3.47 | .93 |
| Pedagogical Knowledge    | 349 | 3.74 | .79 |
| Content Knowledge        | 349 | 3.71 | .93 |
| Technological Content Knowledge | 349 | 3.73 | .86 |
| Pedagogical Content Knowledge | 349 | 3.67 | .87 |
| Technological Pedagogical Knowledge | 349 | 3.67 | .77 |
| Technological Pedagogical Content Knowledge | 349 | 3.76 | .80 |
Table 4. Social studies teacher candidates’ self-efficacy beliefs for overall TPACK and its sub-components according to gender

| Gender                  | n  | M     | Ss  | df  | t     | p    |
|-------------------------|----|-------|-----|-----|-------|------|
| General                 |    |       |     |     |       |      |
| Male                    | 185| 3.67  | .72 | 347 | .073  | .942 |
| Female                  | 164| 3.66  | .56 |     |       |      |
| Technological           |    |       |     |     |       |      |
| Pedagogical             |    |       |     |     |       |      |
| Content Knowledge       |    |       |     |     |       |      |
| Male                    | 185| 3.51  | .93 | 347 | 1.169 | .243 |
| Female                  | 164| 3.40  | .77 |     |       |      |
| Pedagogical             |    |       |     |     |       |      |
| Knowledge               |    |       |     |     |       |      |
| Male                    | 185| 3.72  | .79 | 347 | -.548 | .584 |
| Female                  | 164| 3.76  | .66 |     |       |      |
| Content Knowledge       |    |       |     |     |       |      |
| Male                    | 185| 3.69  | .93 | 347 | -.513 | .608 |
| Female                  | 164| 3.74  | .68 |     |       |      |
| Pedagogical             |    |       |     |     |       |      |
| Knowledge               |    |       |     |     |       |      |
| Male                    | 185| 3.71  | .86 | 347 | -.555 | .579 |
| Female                  | 164| 3.75  | .73 |     |       |      |
| Pedagogical             |    |       |     |     |       |      |
| Content Knowledge       |    |       |     |     |       |      |
| Male                    | 185| 3.64  | .87 | 347 | -.918 | .359 |
| Female                  | 164| 3.72  | .73 |     |       |      |
| Pedagogical             |    |       |     |     |       |      |
| Knowledge               |    |       |     |     |       |      |
| Male                    | 185| 3.67  | .77 | 347 | -.050 | .961 |
| Female                  | 164| 3.68  | .63 |     |       |      |
| Technological           |    |       |     |     |       |      |
| Pedagogical             |    |       |     |     |       |      |
| Knowledge               |    |       |     |     |       |      |
| Male                    | 185| 3.78  | .80 | 347 | .339  | .735 |
| Female                  | 164| 3.75  | .63 |     |       |      |

Social Studies Teacher Candidates’ TPACK Competencies According to Year in College

To examine whether there is a significant difference between teacher candidates’ overall TPACK and its sub-components scores according to their year in college, independent samples t-test was used. The obtained results are listed in Table 5.

As seen in Table 5, social studies teacher candidates’ self-efficacy beliefs for overall TPACK did not vary according to the year in college \((t_{347} = .093; p > .05)\). While 3rd year social studies teacher education students’ average overall TPACK score was \((M=3.66)\), it was \((M=3.67)\) for 4th year students. These findings indicate that 3rd year and 4th year social studies teacher education students’ self-efficacy beliefs for TPACK were similar. Furthermore, the effect of year in college was examined for all TPACK sub-components. Accordingly, the analysis results showed that social studies teacher candidates’ self-efficacy beliefs for overall TPACK and its sub-components did not differ with the year in college.

Social Studies Teacher Candidates’ TPACK Competencies According to Personal Computer Ownership

Independent samples t-test was employed to determine if significant differences exist among teacher candidates’ scores for overall TPACK and its sub-components according to their perceived technology competency, independent samples t-test was applied. The obtained results are given in Table 5.

Data presented in Table 6 showed that social studies teacher candidates’ self-efficacy beliefs for overall TPACK did not significantly vary according to variable ‘personal computer ownership’ \((t_{347} = 1.382; p > .05)\). Based on these findings, it can be stated that social studies teacher candidates who had a personal computer and those who did not have displayed similar levels of overall technological pedagogical content knowledge. The variable ‘personal computer ownership’ was analyzed separately for each TPACK sub-component. Accordingly, teacher candidates’ self-efficacy beliefs for each TPACK sub-component for all tests were found to be statistically insignificant. On the other hand, the relationship between teacher candidates’ self-efficacy beliefs for “Technological Knowledge (TK)” and personal computer ownership status was found to be statistically significant \((t_{347} = 2.984; p < .05)\).

Social Studies Teacher Candidates’ TPACK Competencies According to Their Perceived Technology Competency

To examine whether there is a significant difference between teacher candidates’ overall TPACK and its sub-components scores according to their perceived technology competency, independent samples t-test was applied. The results are presented in Table 7.

According to the analysis results shown in Table 7, social studies teacher candidates’ self-efficacy beliefs for overall TPACK did not significantly vary according to their
perceived technology competency \( t_{(347)} = 4.890; p=0.00 \). This finding points out that social studies teacher candidates’ perceived technology competency is a significant variable to explain their levels of technological pedagogical content knowledge. The variable ‘perceived technology competency’ was examined separately for other TPACK sub-components. Accordingly, teacher candidates’ self-efficacy beliefs for Technological Knowledge, Content Knowledge, Technological Content Knowledge, Pedagogical Content Knowledge, and Technological Pedagogical Content Knowledge were found to be statistically significant according to perceived technology competency (\( p<0.05 \)). On the other hand, no statistically significant difference was found among Pedagogical Knowledge (PB) scores \( t_{(347)} = 1.557; p>0.05 \). Based on these results, it can be argued that participants’ perceived technology competency is an important predictor of social studies teacher candidates’ self-efficacy beliefs for TPACK competency.

### Social Studies Teacher Candidates’ TPACK Competencies According to Grade Point Average

To examine whether there is a significant difference among teacher candidates’ scores of overall TPACK and its sub-components according to their grade point average (GPA) scores, one-way analysis of variance (ANOVA) was performed. The obtained results are presented in Table 8.

| Competency                  | Personal Computer Ownership |        |         |         |        |        |
|-----------------------------|-----------------------------|--------|---------|---------|--------|--------|
| General                     | Yes                         | 249    | 3.69    | .68     | 347    | 1.382  | .168  |
| Technological Knowledge     | No                          | 100    | 3.59    | .57     |        |        |
| Pedagogical Knowledge       | Yes                         | 249    | 3.55    | .89     | 347    | 2.984  | .003  |
| Technological Knowledge     | No                          | 100    | 3.25    | .74     |        |        |
| Pedagogical Knowledge       | Yes                         | 249    | 3.73    | .75     | 347    | -.190  | .849  |
| Content Knowledge           | No                          | 100    | 3.75    | .69     |        |        |
| Pedagogical Knowledge       | Yes                         | 249    | 3.74    | .83     | 347    | .571   | .568  |
| Content Knowledge           | No                          | 100    | 3.67    | .77     |        |        |
| Technological Knowledge     | Yes                         | 249    | 3.76    | .83     | 347    | 1.302  | .194  |
| Content Knowledge           | No                          | 100    | 3.64    | .71     |        |        |
| Pedagogical Knowledge       | Yes                         | 249    | 3.70    | .84     | 347    | .950   | .343  |
| Knowledge                   | No                          | 100    | 3.61    | .73     |        |        |
| Technological Knowledge     | Yes                         | 249    | 3.71    | .71     | 347    | 1.385  | .167  |
| Pedagogical Knowledge       | No                          | 100    | 3.59    | .69     |        |        |
| Pedagogical Knowledge       | Yes                         | 249    | 3.78    | .78     | 347    | .718   | .473  |
| Knowledge                   | No                          | 100    | 3.72    | .65     |        |        |

As seen in Table 8, teacher candidates’ mean scores of overall TPACK according to GPA varied between (M=3.67) and (M=3.40). It was found that teacher candidates with lower GPA scores had relatively lower scores of overall TPACK compared to those with higher GPA scores. Statistical analysis showed that no significant difference exists between teacher candidates’ GPA scores and their self-efficacy beliefs about TPACK and its sub-components (\( p>0.05 \)). Based on these findings, it can be argued that teacher candidates’ self-efficacy beliefs for TPACK and its sub-components did not differ significantly according to their GPA scores.

As seen in Table 9, social studies teacher candidates’ self-efficacy beliefs for overall TPACK were varied between (M=3.86) and (M=3.40) according to the use of content sharing platforms. While the lowest mean score
Table 8. Social Studies Teacher Candidates’ Self-Efficacy Beliefs for Overall TPACK and Its Sub-Components According to Their GPA Scores

| GPA | n  | M   | Ss  | F   | p   | Difference |
|-----|----|-----|-----|-----|-----|------------|
| General | 0.00-2.50 | 101 | 3.64 | .67 | .079 | .924 | - |
| Technological Pedagogical Content Knowledge | 2.51-3.00 | 181 | 3.67 | .65 | | | |
| Pedagogical Knowledge | 3.01-4.00 | 67 | 3.66 | .63 | | | |
| Technological Knowledge | 0.00-2.50 | 101 | 3.48 | .93 | .071 | .931 | - |
| Pedagogical Knowledge | 2.51-3.00 | 181 | 3.47 | .83 | | | |
| Content Knowledge | 3.01-4.00 | 67 | 3.43 | .83 | | | |
| Pedagogical Knowledge | 0.00-2.50 | 101 | 3.69 | .74 | .405 | .668 | - |
| Content Knowledge | 2.51-3.00 | 181 | 3.77 | .74 | | | |
| Knowledge | 3.01-4.00 | 67 | 3.73 | .72 | | | |

Social Studies Teacher Candidates’ TPACK Competencies According to ITMD Course Scores

As seen in Table 10, social studies teacher candidates’ mean scores of self-efficacy beliefs for overall TPACK were varied between ($M=3.55$) and ($M=3.70$) according to their scores in the ITMD course they took in the 3rd year, semester. It was determined that teacher candidates with lower course scores displayed lower self-efficacy beliefs for overall TPACK compared to those who had higher course scores. In other words, as teacher candidates’ ITMD course scores increase their overall TPACK scores increase. Moreover, similar results were obtained for all sub-components. However, statistical analysis showed that these differences were not significant ($p>.05$). Therefore, it can be argued that social studies teacher candidates’ self-efficacy beliefs for overall TPACK and its sub-components did not significantly differ by their ITMD course scores.

DISCUSSION AND CONCLUSION

Research findings revealed that social studies teacher candidates’ self-efficacy beliefs for overall TPACK is generally at a sufficient level (3.66). Regarding the sub-dimensions of the TPACK-S scale, it was determined that the teacher candidates displayed generally sufficient levels self-efficacy beliefs for sub-dimensions of TK (3.46), PK (3.74), CK (3.71), PCK (3.67), TCK (3.73), TPK (3.67), and TPACK (3.76). When the mean scores of the TPACK sub-components are examined; while teacher candidates’ lowest mean score was obtained in technological knowledge (3.46) sub-dimension, they displayed the highest scores in pedagogical knowledge (3.74) and content knowledge (3.71) sub-components. Compared with the results reported in previous studies, our findings were consistent with many studies (Lee & Tsai, 2010; Dereli, 2017; Ünlü et al., 2017; Çifçi & Dikmenli, 2018; Kaya & Yazıcı, 2019; Aydoğmuş & Karadağ, 2020). For example, Ünlü et al. (2017) found that social studies teacher candidates had sufficient levels of TPACK competencies (3.88). Furthermore, the results obtained in a study by Kaya and Yazıcı (2019) revealed that social studies teachers exhibited relatively high mean scores for techno-pedagogical education (3.74). On the other hand, similar to our findings, Ünlü et al. (2017) also found that teacher candidates’ technological knowledge competencies was the lowest (3.14) compared to other knowledge categories and the authors stated that the reason for this deficiency could be explained by the statement of the teacher candidates, “we cannot follow technology sufficiently and we use technology only as much as we need”. While TPACK self-efficacy beliefs of teacher candidates were found to be high in almost most of the studies conducted in Turkey, it is quite significant that the TK self-efficacy beliefs, which point to the perception of technology competence in the sub-components of the scale, were relatively low. The emergence of such a result in our study can be explained by the fact that teacher candidates’ belief in technology efficacy and their level of using technology for educational purposes may be relatively low despite their positive perspectives on technology (Sahin et al., 2009; Aksoğan & Bulut Özek, 2020). In other words, potentially, to an increase in technology use in the classroom as well as an increased likelihood that this technology use will be based on knowledge of pedagogy and content (Abbitt, 2011).
Table 9. Social studies teacher candidates’ self-efficacy beliefs for overall TPACK and its sub-components according to the use of content sharing platforms

| Using Content Sharing Platforms for Professional Purposes | n   | M   | Ss  | F     | p     | Difference |
|----------------------------------------------------------|-----|-----|-----|-------|-------|------------|
| General Technological Pedagogical Content Knowledge      |     |     |     |       |       |            |
| Never                                                    | 25  | 3.40| .76 | 5.785 | .001  | 1-4        |
| Rarely                                                   | 88  | 3.51| .66 |       |       |            |
| Sometimes                                                | 149 | 3.68| .61 |       |       |            |
| Often                                                    | 87  | 3.86| .63 |       |       |            |
| Technological Knowledge                                   |     |     |     |       |       |            |
| Never                                                    | 25  | 3.13| .91 | 7.674 | .000  | 1-4        |
| Rarely                                                   | 88  | 3.23| .82 |       |       |            |
| Sometimes                                                | 149 | 3.48| .82 |       |       |            |
| Often                                                    | 87  | 3.77| .86 |       |       |            |
| Pedagogical Knowledge                                    |     |     |     |       |       |            |
| Never                                                    | 25  | 3.46| .88 | 2.986 | .031  | 1-4        |
| Rarely                                                   | 88  | 3.62| .74 |       |       |            |
| Sometimes                                                | 149 | 3.79| .69 |       |       |            |
| Often                                                    | 87  | 3.86| .72 |       |       |            |
| Content Knowledge                                        |     |     |     |       |       |            |
| Never                                                    | 25  | 3.41| 1.06| 1.444 | .230  |            |
| Rarely                                                   | 88  | 3.68| .75 |       |       |            |
| Sometimes                                                | 149 | 3.76| .75 |       |       |            |
| Often                                                    | 87  | 3.73| .88 |       |       |            |
| Technological Content Knowledge                           |     |     |     |       |       |            |
| Never                                                    | 25  | 3.52| .88 | 4.171 | .006  | 1-4        |
| Rarely                                                   | 88  | 3.57| .86 |       |       |            |
| Sometimes                                                | 149 | 3.72| .77 |       |       |            |
| Often                                                    | 87  | 3.95| .72 |       |       |            |
| Pedagogical Content Knowledge                             |     |     |     |       |       |            |
| Never                                                    | 25  | 3.36| .87 | 8.118 | .000  | 1-3        |
| Rarely                                                   | 88  | 3.42| .83 |       |       |            |
| Sometimes                                                | 149 | 3.72| .76 |       |       |            |
| Often                                                    | 87  | 3.95| .75 |       |       |            |
| Technological Pedagogical Knowledge                      |     |     |     |       |       |            |
| Never                                                    | 25  | 3.40| .86 | 5.646 | .001  | 1-4        |
| Rarely                                                   | 88  | 3.53| .74 |       |       |            |
| Sometimes                                                | 149 | 3.67| .67 |       |       |            |
| Often                                                    | 87  | 3.90| .61 |       |       |            |
| Technological Pedagogical Content Knowledge              |     |     |     |       |       |            |
| Never                                                    | 25  | 3.73| .84 | 3.829 | .010  | 1-4        |
| Rarely                                                   | 88  | 3.65| .76 |       |       |            |
| Sometimes                                                | 149 | 3.70| .75 |       |       |            |
| Often                                                    | 87  | 3.99| .67 |       |       |            |

to multiple variables. The obtained results pointed out that gender differences were not significant in social studies teacher candidates’ self-efficacy beliefs for TPACK. Similar results were also obtained for the sub-components of TPACK and accordingly, it was determined that social studies teacher candidates’ competencies regarding TPACK and its sub-components did not differ by gender. Similar findings were reported in previous studies (Koh et al., 2010; Yağcı, 2015; Kaya et al., 2011; Tokmak et al., 2013; Aydoğan & Karadağ, 2020). Furthermore, Kaya et al. (2011) found that teacher candidates’ self-efficacy beliefs for Web-TPACK did not significantly differ by gender. Additionally, the study conducted by Tokmak et al. (2013) indicated that there were no significant gender differences in TPACK. However, some studies reported opposite results. For instance, Yağcı (2015) and Karadeniz and Vatanartıran (2015) reported gender-related differences in favor of male participants regarding pedagogical knowledge. Similarly, Chai et al. (2010) conducted a study in Singapore with 1185 teacher candidates and they determined gender differences in perceptions of TPACK in favor of female students. This results should be considered usual. Today, both male and female teacher candidates are able to easily access technological tools. Therefore, no difference is expected in terms of gender when teacher/teacher candidates are integrating technological tools into their lessons and using them. In addition, this finding related to gender can be explained by the inclusion of teacher candidates into the same training in the education faculties in terms of General Qualifications for Teaching Profession. Otherwise, some differences may occur due to
micro and macro factors such as the quality of the education received and the quality of technology integration that may vary from country to country.

According to the analysis results on the impact of year in college, we found that students’ technological pedagogical content knowledge competencies did not significantly differ by year in college. Similar results were obtained for TPACK sub-components and therefore, it can be argued that social studies teacher candidates’ competencies of TPACK and its sub-dimensions did not vary by year in college. Although there have been many studies on TPACK, only a limited number of studies have examined the impact of year in college. Nevertheless, the obtained results in previous studies by Koh and Chai (2011), Öztürk (2013), Tokmak et al. (2013) and Aytaş (2020) were consistent with our findings regarding the impact of the variable ‘year in college’. Aytaş (2020) highlighted that teacher candidates’ year in college was not effective on their information and communication technology skills and explained this finding with the fact that the pre-service teachers have similar technology experiences since they are at rather similar ages. In the literature, it is pointed out that there is a weak relationship between TPACK and age (Lee & Tsai, 2010; Cheng, 2017). The fact that the 3rd and 4th grade teacher candidates are close to each other in age could also explain why their TPACK self-efficacy beliefs did not differ by teaching level. Also, as pointed out in some sources in the literature (Lin et al., 2013; (Hsu et al., 2017), the relationship between age and TPACK levels may be more evident for in-service teachers; while years of teaching experience may be a variable that should also be considered.

| Table 10. Social studies teacher candidates’ self-efficacy beliefs for overall TPACK and its sub-components according to ITMD course scores |
|------------------|-----|---|---|---|---|---|
| ITMD course score | n   | M  | Ss | F  | p  | Difference |
| General Technological | 21-40 | 42 | 3.55 | .67 | .731 | .534 | - |
| Pedagogical Content Knowledge | 41-60 | 52 | 3.60 | .60 | 1.103 | .348 | - |
| 61-80 | 145 | 3.68 | .62 | | |
| 81-100 | 110 | 3.70 | .70 | | |
| Technological Knowledge | 21-40 | 42 | 3.35 | .84 | 1.103 | .348 | - |
| 41-60 | 52 | 3.32 | .71 | | |
| 61-80 | 145 | 3.53 | .87 | | |
| 81-100 | 110 | 3.49 | .92 | | |
| Pedagogical Knowledge | 21-40 | 42 | 3.68 | .79 | 1.200 | .095 | - |
| 41-60 | 52 | 3.70 | .66 | | |
| 61-80 | 145 | 3.73 | .71 | | |
| 81-100 | 110 | 3.79 | .77 | | |
| Content Knowledge | 21-40 | 42 | 3.67 | .76 | 1.199 | .216 | - |
| 41-60 | 52 | 3.74 | .78 | | |
| 61-80 | 145 | 3.70 | .85 | | |
| 81-100 | 110 | 3.74 | .80 | | |
| Technological Content Knowledge | 21-40 | 42 | 3.62 | .72 | 1.691 | .100 | - |
| 41-60 | 52 | 3.63 | .89 | | |
| 61-80 | 145 | 3.76 | .76 | | |
| 81-100 | 110 | 3.79 | .83 | | |
| Pedagogical Content Knowledge | 21-40 | 42 | 3.43 | .85 | 2.237 | .094 | - |
| 41-60 | 52 | 3.56 | .81 | | |
| 61-80 | 145 | 3.74 | .72 | | |
| 81-100 | 110 | 3.73 | .88 | | |
| Technological Pedagogical Knowledge | 21-40 | 42 | 3.53 | .75 | .821 | .383 | - |
| 41-60 | 52 | 3.64 | .72 | | |
| 61-80 | 145 | 3.70 | .67 | | |
| 81-100 | 110 | 3.72 | .72 | | |
| Technological Pedagogical Content Knowledge | 21-40 | 42 | 3.66 | .77 | .461 | .175 | - |
| 41-60 | 52 | 3.72 | .72 | | |
| 61-80 | 145 | 3.77 | .71 | | |
| 81-100 | 110 | 3.81 | .80 | | |
The analysis results showed that social studies teacher candidates’ overall TPACK levels did not significantly vary by personal computer ownership. A literature survey revealed that some studies have examined the relationship between personal computer ownership and self-efficacy levels regarding TPACK. Our results were consistent with the obtained findings in those studies (Şaad & Naqlıç, 2015; Aydoğmuş & Karadağ, 2020). Aydoğmuş and Karadağ (2020) emphasized that teacher candidates mostly own a personal computer today and naturally, they had high levels of information and communication technology skills. So, experience level may not have significantly affected their information and communication technology skills. On the other hand, the current study showed that a statistically significant relationship exists between teacher candidates’ levels of “Technological Knowledge (TK)” and personal computer ownership. The mean self-efficacy score of teacher candidates who had a personal computer regarding technological knowledge was (3.55) higher than those who did not have a personal computer (3.25). This finding was partly consistent with the results found by Çifçi and Dikmenli (2018). It was noteworthy that statistically significant differences were found for TPACK and other sub-components except pedagogical knowledge in favor of participants who had a personal computer. In fact, this result of the research can also be explained by the fact that all teacher candidates can do most of the tasks that require computers with their smartphones. Because, “smartphones today have features that are comparable to an average computer, and this handheld mobile device can engage students in far more dynamic ways than a laptop or tablet computer” (Hingorani et al., 2012). Therefore, it can be said that teacher candidates who do not have a personal computer have filled this gap with their personal smartphones.

Perceived technology competency was also examined as a variable in the present paper. Accordingly, the obtained results showed that social studies teacher candidates’ self-efficacy beliefs for overall TPACK significantly differ by perceived technology competency. Mean self-efficacy belief score of teacher candidates who perceived themselves as technology incompetent regarding overall TPACK (3.78) was higher than those who perceived themselves as technology competent (3.44). This finding indicated that perceived technology competency is an important predictor of social studies teacher candidates’ self-efficacy beliefs for TPACK. Furthermore, all TPACK sub-components were examined and accordingly, it was found that teacher candidates’ self-efficacy beliefs for all TPACK sub-components except pedagogical knowledge significantly differ by perceived technology competency. Similarly, the studies conducted by Öztürk (2013) and Karalar and Aslan-Altan (2016) with primary teacher candidates indicated that self-efficacy levels of the participants regarding TPACK and its sub-components significantly differ by perceived technology competency in favor of teacher candidates who feel themselves competent in technology. These results also point to the importance of teachers’ having digital literacy. In our age, which is described as the age of technology, one of the important responsibilities of social studies teachers is to contribute to the growth of digitally literate individuals. However, the prerequisite for teachers to raise digital literate individuals is that they can combine their digital literacy with pedagogical content knowledge and use them effectively and efficiently in their classroom practices (Angeli & Valanides, 2009; Koehler & Mishra, 2008; Mishra & Koehler, 2006; Niess, 2008).

The results of the analysis examining the impact of teacher candidates’ GPA on the mean scores obtained from the overall TPACK-S scale and its sub-components showed that no statistically significant difference exists among participants’ scores by their GPA. Considering the fact that a majority of the courses determining students’ academic success (GPA) are content knowledge and pedagogical knowledge related courses, such a result can be expected. In fact, self-efficacy is significantly associated with student achievement. Erdogan and Sahin (2010) indicated that the TPACK is a significant predictor of student achievement. As the TPACK requires confidence in combining different knowledge components successfully, it is related to self-efficacy beliefs (Sahin et al., 2009). Mutlu (2016) highlighted a similar finding and argued that teacher candidates’ self-efficacy beliefs for TPACK are expected to be affected by their GPA therefore, selective courses increasing technological knowledge of students should be offered more in the curriculum.

Moreover, social studies teacher candidates’ self-efficacy beliefs for overall TPACK were also examined according to the variable ‘using content sharing platforms for professional purposes’. Teacher candidates’ mean scores varied between ($M=3.40$) and ($M=3.86$) according to the variable using content sharing platforms for professional purposes (i.e. Facebook and content sharing sites) in favor of those who have more intention to use content sharing platforms. According to the analysis results, these differences were found to be statistically significant for overall TPACK and its sub-dimensions except content knowledge (CK) sub-dimension. These findings indicated that there is a significant relationship between teacher candidates’ self-efficacy beliefs for overall TPACK and its sub-components and their tendency to use content sharing platforms for professional purposes. This can be considered a mutually reinforcing relation. It can be argued that as teacher candidates use content sharing platforms for professional purposes, their TPACK competencies increase and accordingly, the increase in these competencies increases their intention to use such content sharing platforms. To the best of our knowledge, there have been no studies that directly examine the relationship between teachers’ or teacher candidates’ self-efficacy beliefs for TPACK and their use of content sharing platforms for professional purposes. On the other hand, Tatlı et al. (2016) found that teacher candidates’ competencies regarding Web 2.0 tools have significant impact on their self-confidence in TPACK. Furthermore, Kabakçı-Yurdakul (2011) determined a significant relationship between teacher candidates’ use of information and communication technologies and their TPACK levels.

Another finding obtained in the current study is that no significant difference exists between social studies teacher
candidates’ scores in the instructional technology and material development (ITMD) course which they took during college education and their TPACK mean scores. It was determined that teacher candidates’ overall TPACK mean scores varied between ($M=3.55$) and ($M=3.70$), and higher ITMD course scores were related to the higher TPACK scores. Similar results were obtained for other TPACK sub-components however, these differences were found to be statistically insignificant. These findings pointed out that the ITMD course has a very limited impact on teacher candidates’ self-efficacy beliefs for TPACK. The literature survey showed that only a limited number of studies have examined such relationships (Bakaç & Özen, 2017; Aktepe et al., 2018; Akgün, 2020). Bakaç and Özen (2017) determined a significant positive relationship at the medium level between teacher candidates’ self-efficacy beliefs regarding material design and their TPACK levels. Furthermore, the same study indicated that teacher candidates’ self-efficacy beliefs for TPACK had a positive impact on their self-efficacy beliefs for material design. Kılıç et al. (2019) highlighted that TPACK-based combined learning environments are important in developing teacher candidates’ TPACK. In fact, the ITMD course which is included in the teacher education college programs is expect to make an important contribution to teacher candidates’ self-efficacy beliefs about TPACK. Consequently, the findings presented in the current study can provide valuable insight to researchers and practitioners since the obtained results revealed the need to examine the content and feature of that course in further studies and to improve teacher candidates’ self-efficacy beliefs for TPACK.

**RECOMMENDATIONS FOR FUTURE RESEARCH**

To better understand how TPACK development in teacher education, we are needed to more longitudinal studies. Triangulated study designs that include performance measures that spanning several years in this field will help us to not only better understand how TPACK, but also know what contextual factors are driving and hindering this growth. Considering the rapid technological developments and the variety and functionality of Web 2.0 tools, the number of courses that promote teacher candidates’ TPACK skills and develop their competencies regarding the effective use of technology in teaching and research practices should be increased in the curriculums of teacher education programs. Courses related to technological and pedagogical content and their implementation, especially instructional technologies and material design and Social Studies I-II courses might be enriched with TPACK combined teaching environments. Digital literacy can be included in teacher education programs in the context of many positive effects it provides to students in the classroom and in the following years. To observe different dynamics in technology-oriented learning environments, teacher candidates’ experiences regarding the use of technology in the classrooms, school support for this or their concerns about technology use should be included, especially during internships. Thus, digital literacy skills of teacher candidates can improve. Considering the Covid-19 pandemic situation, online training and seminars can be provided to teachers and teacher candidates on the effective use of content and media sharing platforms. More comprehensive research may be conducted to determine effective integration methods of technology into educational practices for both social studies teachers and teachers from other disciplines.

**REFERENCES**

Abbitt, J. T. (2011). An investigation of the relationship between self-efficacy beliefs about technology integration and technological pedagogical content knowledge (TPACK) among preservice teachers, Journal of Digital Learning in Teacher Education, 27(4), 134-143, DOI: 10.1080/21532974.2011.10784670.

Akbaba, B., Öztürk, F., Adalar, H., & Ekiçi, M. (2019). Öğrenme ve öğretme arac olarak infografik tasarımı. Araştırmalar ve Deneyim Dergisi, 4(1), 38-53. Retrieved from https://dergipark.org.tr/en/pub/adeder/issue/46840/587865.

Akçaoğlu, M., Gümiş, S., Bellibaş, M. S., & Boyer, D. M. (2014). Policy, practice, and reality: Exploring a nation-wide technology implementation in Turkish schools. Technology, Pedagogy and Education, 24(4), 477-491.

Akgün, F. (2020). Pedagojik formasyon eğitimini alan öğretmen adaylarının öğretim materyallerinden yararlanmaları ve öğretmen teknolojilerine yönelik tutumlarının incelenmesi. Trakya Eğitim Dergisi, 1(2), 412-428. DOI: 10.24315/tred.639074.

Aksögan, M. & Bulut Özek, M. (2020). Öğretmen adaylarının teknolojiye bakış açısı arasındaki ili. kü♠ Mersin Üniversitesi Öğretim Fakültesi Dergisi, 11(2), 301-311.

Aktepe, V., Uzonöz, A. & Gündüz, M. (2018). Öğretim teknolojisi ve matyalar tasarımı (ÖTMT) dersinin öğretmen adaylarının mesleki kazanımlarını etkisine ilişkin farklı değişkenlere göre farklı kullanılmalarını incelenmesi. MANAS Sosyal Araştırmalar Dergisi, 72(2), 31-43.

Albion, P. R. (1999). Self-efficacy beliefs as an indicator of teachers’ preparedness for teaching with technology, Computers in the Social Studies, 7(4). Retrieved from http://www.cssjournal.com/albion.html.

Angeli, C. & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: Advances in technological pedagogical content knowledge (TPCK). Computers & Education, 52, 154-168.

Aydemir, M. (2019). Yenilenen sosyal bilgileri dersi öğretim programının dijital vatandaşlık ve alt boylarını açısından incelenmesi. Uluslararası Güncel Eğitim Araştırmaları Dergisi, 4(2), 15-38.

Aydoğanış, M. & Karadağ, Y. (2020). Öğretmen adaylarının bilgi ve iletişim teknolojileri (BİT) yeterlilikleri: Ondokuz Mayıs Üniversitesi örneği. Mersin Üniversitesi Eğitim Fakültesi Dergisi, 16(3), 686-705.

Aytaş, Ö. (2020). Öğretmen adaylarının bilgi ve iletişim teknolojileri becerileri ile derste teknoloji kullanımın yönelik eğitimlerinin incelenmesi (Yayılmamış yük-
sek lisans tezi). Frat Üniversitesi Eğitim Bilimleri Enstitüsü, Elazığ.

Bakaç, E. & Özen, R. (2017). Öğretmen adaylarının materyal tasarımı öz-yeterlik inanç düzeylerinin teknolojik pedagojik alan yeterlikleri bağlamında incelenmesi. Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi, 18(2), 613-632.

Başak, M. H. & Ayvacı, H. Ş. (2017). A comparison is aimed at the integration of the technology in education system; as an example of “Turkey and South Korea”. Education and Science, 42(190), 465-492.

Bozkus, K. & Karacabey, M. F. (2019). FATİH projesi ile eğitimde bilişim teknolojilerinin kullanımı: Ne kadar yol alındı? Yaşadıkça Eğitim, 33(1), 17-32.

Braun, J. A. (1999). Ten ways to integrate technology into middle school social studies. The Clearing House, 72(6), 345-351.

Bull, G., Hammond, T. & Ferster, B. (2008). Developing Web 2.0 tools for support of historical inquiry in social studies. Computers in the Schools, 25(3-4), 275-287.

Büyükoztürk, Ş. (2003). Sosyal Bilimler için Veri Analizi El Kitabı. Pegema Yayıncılık.

Büyükoztürk, Ş., Kılıç, E., Akgün, Ö. E., Karadeniz, Ş. & Demirel, F. (2014). Bilişimsel araştırma yöntemleri. Pegem Akademi.

Çakır, R. & Yıldırım, S. (2009). Bilgisayar öğretmenleri okullardaki teknoloji entegrasyonu hakkında ne düşünürler? İlköğretim Online, 8(3), 952-964.

Çelik, T. (2020). Dijital çağa sosyal bilgiler öğretmeni yetiştirme: bir eylem araştırması. Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, (38), 211-229. DOI: 10.30794/pauned.541913.

Cheng, K.-H. (2017). A survey of native language teachers’ technological pedagogical and content knowledge (TPACK) in Taiwan. Computer Assisted Language Learning, 30(7), 692–708. doi:10.1080/09588221.2017.1349805.

Chong, E., & Xie, B. (2011). The use of theory in social studies of Web 2.0. Proceedings of the 44th Annual Hawaii International Conference on System Sciences. Los Alamitos, CA: IEEE Computer Society Press. doi:10.1109/HICSS.2011.436.

Cox, M., Preston, C., & Cox, K. (1999, September). What factors support or prevent teachers from using ICT in their classrooms? Paper presented at the British Educational Research Association Annual Conference, University of Sussex at Brighton.

Çiftçi, T. & Dikmenli, Y. (2018). Coğrafya ve Sosyal Bilgiler Öğretmen Adaylarının Teknolojik Pedagojik Alan Bilgisi Özdeğerlendirme Düzenlerinin Farklı Değerlendirmeleri Göre Incelenmesi. Adıyaman Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, (28), 1-30. DOI: 10.14520/adysbd.332816.

Çoklar A.N., Kılıçer, K. & Odabaşı, H.F. (2007). Eğitimde teknoloji kullanımına eleştirel bir bakış: Teknopedagojik Alan Bilgisi Özdeğerlendirme Düzenlerinin Farklı Değerlendirmeleri Göre Incelenmesi. Adıyaman Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, (28), 1-30. DOI: 10.14520/adysbd.332816.

Demetriadi, S., Barbas, A., Molohides. A., Palaiogeorgiou, G., Psillos, D., Vlahavas, J. & Baptista, L. E. et al. (2003). Cultures in negotiation: teachers’ acceptance/resistance attitudes considering the infusion of technology into schools. Computers & Education, 41(1), 19-37.

Demirer, V. & Dikmen, C. H. (2018). Öğretmenlerin FATİH Projesine yönelik görüşlerinin teknolojik pedagojik alan bilgisi bağlamında incelenmesi. İlköğretim Online, 17(1), 26-46.

Dereli, İ. (2017). Sosyal bilgiler öğretmen adaylarının teknopedagojik alan bilgisi ve teknolojiye yönelik inançlarının incelenmesi. (Yayılmamış Yüksek Lisans Tezi). Kastamonu Üniversitesi, Kastamonu.

Eryılmaz, S., Adalar, H. & İcinak, A. (2015). E-Learning as a teaching strategy actively used in FATİH Project. European Journal of Educational Research, 4(1), 38-47. doi: 10.12973/eu-jer.4.1.38.

Farmer, L. (2011). Teaching Digital Citizenship. In C. Ho & M. Lin (Eds.), Proceedings of E-Learn 2011-World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education (pp. 99-104). Honolulu, Hawaii, USA: Association for the Advancement of Computing in Education (AACE). Retrieved from https://www.learntechlib.org/primary/p/38680/.

FATİH Projesi. (2012). FATİH Projesi Nedir?. Retrieved from http://www.fatihprojesi.com

George, D., & Mallery, P. (2014). IBM SPSS statistics 21 step by step: A simple guide and reference (13th ed.). Pearson.

Gleason, B. & von Gillern, S. (2018). Digital citizenship with social media: Participatory practices of teaching and learning in secondary education. Educational Technology & Society, 21(1), 200–212.

Görmez, E. (2017). “İlkokul sosyal bilgiler programının dijital vatandaşlık ve alt boyutları açısından yeterliliği,” II. Uluslararası Sosyal Bilimler Sempozyumu, Antalya, pp.72.

Gür, B. S., Özgoğlu, M. & Başer, T. (2010). Okullarda bilgisayar entegrasyonu ve kişilerin katılımı. Sosyal Bilimler Enstitüsü, Elazığ.

Harris, J., Mishra, P., & Koehler, M. (2009). Teachers’ technological pedagogical content knowledge and learning activity types: Curriculum-based technology integration reframed. Journal of Research on Technology in Education, 41(4), 393-416.

Haslam, T., Kuskaya-Mumcu, F., & Kocak-Usluel, Y. (2008). Integration of ICT Into The Teaching-Learning Process: Toward A Unified Model. In J. Luca & E. Weippl (Eds.), Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications. 2384-2389. AACE.

Heafner, T. (2004). Using technology to motivate students to learn social studies. Contemporary Issues in Technology and Teacher Education, 4(1), 42-53.

Hingorani, K.K., Woodard, D., & Danesh, N.A. (2012). Exploring how smartphones supports students’ lives. Issues in Information System, 13(2) 33-40.
Kaya, M. & Yazıcı, H. (2019). Sosyal bilgiler öğretmen Kaya, S. & Dağ, F., (2013). Sınıf öğretmenlerine yönelik Kaya, Z., Emre, İ. & Kaya, O. N. (2010). Sınıf öğretmeni Karasar, N. (2012). Karahan, B., (2010). Primary school Karalar, H. & Aslan-Altan, B. (2016). Sınıf öğretmeni aday Kabakçı-Yurdakul, I. (2011). Öğretmen adaylarının te Kabil, F. (2012). Preservice secondary mathematics teachers’ pedagogical content knowledge of composite Karadeniz, Ş. & Vatanartıran, S. (2015). Bilişim Teknolojileri Öğretmen Adaylarının Teknolojik Karılık, M. & Dağ, F., (2013). Sınıf öğretmenlerine yönelik teknolojik pedagojik içerikbilgisi ör.. Holcomb, L., Candy B. & John K. L. (2011). Supersizing social studies through the use of Web 2.0 technologies. Social Studies Research and Practice, 6(3), 102–11.

Hu, P. J., Clark, T. H. K., & Ma, W. W. (2003). Examining technology acceptance by school teachers: A longitudinal study. Information & Management, 41(2), 227-241.

İşıkşal, M., (2006). A study on pre-service elementary mathematics teachers’ subject matter knowledge and pedagogical content knowledge regarding the multiplication and division of fractions. Orta Doğu Teknik Üniversitesi, Fen Bilimleri Enstitüsü, Yayınlanmamış Doktora tezi, Ankara.

Jang, S. J. & Tsai, M. F. (2012). Exploring the TPACK of Taiwanese elementary mathematics and science teachers with respect to use of interactive whiteboards. Computers & Education, 59(2), 327-338.

Kabakçı-Yurdakul, I. (2011). Öğretmen adaylarının teknopedagojik eğitime yönelik yeterlik düzeylerinin ve bu düzeylerinin bilgi ve iletişim teknolojilerini (BİT) kullanım düzeyleri açısından farklılaştırma durumunun incelenmesi. H. Ü. Eğitim Fakültesi Dergisi, 40, 397-408.

Karalar, H. & Aslan-Altan, B. (2016). Sınıf öğretmen adaylarının teknolojik pedagojik alan bilgisi yeteneklerinin ve öğretmen öz-yeterliklerinin incelenmesi. Cumhuriyet International Journal of Education-CIJ, 5 (USOS Özel Sayı), 15 – 30.

Karadeniz, Ş. & Vatanartıran, S. (2015). Primary school teachers’ pedagogical content knowledge. Elementary Education Online, 14(3), 1017-1028.

Karahan, B., (2010). Preservice secondary mathematics teachers’ pedagogical content knowledge of composite and inverse function. Orta Doğu Teknik Üniversitesi, Fen Bilimleri Enstitüsü, Yayınlanmamış Doktora tezi, Ankara.

Karasar, N. (2012). Bilimsel araştırma yöntemleri. (12. Baskı) Ankara: Nobel Yayın Dağıtım.

Kaya, Z., Emre, İ. & Kaya, O. N. (2010). Sınıf öğretmeni adaylarının Teknolojik Pedagojik Alan Bilgisi (TPAB) açısından öz-güven seviyelerinin belirlenmesi. C. Demirli ve ark. (Ed.), 9. Ulusal Sınıf Öğretmenleri Semposiyumu içinde (s. 643-651). Elazığ: Fırat Üniversitesi.

Kaya, Z., Özdemir, T. Y., Emre, İ. & Kaya, O. N. (2011). Bilişim Teknolojileri Öğretmen Adaylarının Teknolojik Pedagojik Alan Bilgisi ÖZ Yeterlik Seviyelerinin Belirlenmesi. 5th International Computer and Instructional Technologies Symposium, Fırat University, Elazığ-Turkey.

Kaya, S. & Dağ, F., (2013). Sınıf öğretmenlerine yönelik teknolojik pedagojik içerikbilgisi öğrenci'nin Türkiye'ye uyarlanması. Kurum ve Uygulamada Eğitim Bilimleri, 13(1), 291-306.

Kaya, M. & Yazıcı, H. (2019). Sosyal bilgiler öğretmenlerinin teknopedagojik eğitime yeterliklerine ilişkin görüşleri. Erzurum Teknik Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, (9), 105-136.

Kılıç, A., Aydemir, S. & Kazanç, S. (2019). Teknolojik pedagojik alan bilgisi (TPAB) temeli harmanlanmış öğrenme ortamının fen bilimleri öğretmen adaylarının TPAB ve sınıf iç uygulama becerilerine etkisi. Elementary Education Online, 2019; 18(3): pp. 1208-1232. doi:10.17051/ilkonline.2019.611493.

Koh, J.H.L., Chai, C.S. & Tsai, C.C. (2010). Examining the technological pedagogical content knowledge of Singapore pre-service teachers with a large-scale survey. Journal of Computer Assisted Learning, 26(6), 563–573.

Koh, J.H.L., & Chai, C.S. (2011). Modeling pre-service teachers’ technological pedagogical content knowledge (TPACK) perceptions: The influence of demographic factors and TPACK constructs. In G.Williams, N. Brown, M. Pittard, B. Cleland (ED.) Changing Demands, Changing Directions. Proceedings ascilite Hobart 2011, 17, 735-746.

Koehler, M., & Mishra, P. (2008). Introducing TPKC. In AACTE Committee on Innovation and Technology (Eds.), The handbook of technological pedagogical content knowledge for teaching and teacher educators (pp. 3-29). Lawrence Erlbaum Associates, Publishers.

Kuş, B. B. (2005). Öğretmenlerin bilgisayar öz-yeterlilik inançları ve bilgisayar destekli öğretme yönelik tutumları. (Yayılmamamış Yüksek Lisans Tezi). Hacettepe Üniversitesi, Ankara.

Lee, M.H. & Tsai, C.C. (2010). Exploring Teachers’ Perceived Self Efficacy and Technological Pedagogical Content Knowledge with Respect to Educational Use of the World Wide Web. Instructional Science: An International Journal of the Learning Sciences, 38(1), 1-21.

Lim, C.P. et al. (2003). Creating a conducive learning environment for the effective integration of ICT: Classroom management issues. Journal of Interactive Learning Research, 14(4), 405–423.

Milli Eğitim Bakanlığı [MEB]. (2018). Sosyal bilgiler dersi öğretim programı (İlkokul ve Ortaokul 4, 5, 6 ve 7. Sınıflar). Ankara.

Milli Eğitim Bakanlığı [MEB]. (2014). 2013 faaliyet raporu. Retrieved from https://sbg.meb.gov.tr/meb_1ys_do-syalar/2014_04/30032306_meb_2013_idare_faylettı_raporu.pdf.

Mishra, P. & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for integrating technology in teacher knowledge. Teachers College Record, 108(6), 1017-1054.

Mutlu, N. (2016). Yabancı diller eğitimi bölümü öğrencilinin teknolojik pedagojik alan bilgisi ve yeterliliklerinin incelenmesi. International Conference on Quality in Higher Education, Sakarya-Turkey, November 24-25.

Niess, M. L. (2008). Preparing teachers to teach science and mathematics with technology: Developing a technology pedagogical content knowledge. Teaching and Teacher Education, 25(5), 509-523.

Niess, M. L. (2008). Guiding pre-service teachers in developing TPKC. In AACTE Committee on Innovation and Technology (Eds.), The handbook of technological pedagogical content knowledge for teaching and teacher educators (pp. 3-29). Lawrence Erlbaum Associates, Publishers.
Technology (Eds.), Handbook of Technological Pedagogical Content Knowledge (TPACK) For Educators (pp. 3-29). Routledge.

Oliver, R. (2002). The role of ICT in higher education for the 21st century: ICT as a change agent for education. Proceedings of the Higher Education for the 21st Century Conference, Miri, Sarawak: Curtin University.

Özbek, D. (2020). Öğretmen adaylarının bilimin doğasına yönelik teknolojik alan bilgilerinin gelişimini ders imecesi modelli yardımıyla incelemesi. Trabzon Üniversitesi, Lisansüstü Eğitim Enstitüsü, Yayınlanmamış Doktora tezi.

Öztürk, E. (2013). Sınıf öğretmeni adaylarının teknolojik pedagojik alan bilgileri ve bazı değişkenler açısından değerlendirilmesi. Uşak Üniversitesi Sosyal Bilimler Dergisi, 6(2), 223-228.

Roblyer, M.D. (2006). Integrating educational technology into teaching. (5th ed.). Pearson Merrill Prentice Hall.

Schmidt, D. A., Baran, E., Thompson, A. D., Koehler, M. J., Mishra, P., & Shin, T. (2009). Technological Pedagogical Content Knowledge (TPACK): The development and validation of an assessment instrument for preservice teachers. Journal of Research on Technology in Education, 42(2), 123-149.

Şad, S.N. & Göktaş, Ö. (2014). Preservice teachers’ perceptions about using mobile phones and laptops in education as mobile learning tools. British Journal of Educational Technology-BJET, 45(4), 606-618.

Şad, S.N. & Özhan, U. (2012). Honeymoon with iwb: a qualitative insight in primary students’ views on instruction with interactive whiteboard. Computers and Education, 59(4), 1184-1191.

Sahin, I., Aktürk, A. & Schmidt, D. (2009). Relationship of preservice teachers’ technological pedagogical content knowledge with their vocational self-efficacy beliefs. In C. D. Maddux (Ed.), Research Highlights in Technology and Teacher Education 2009, (pp. 293-301). AACE.

Scheffe, H. (1953). A method of judging all contrasts in the analysis of variance. Biometrika, 40, 87-104.

Şimşek, Ö. (2016). Öğretmen adaylarının teknolojik pedagojik alan bilgisi öz-yeterliliklerinin uluslararası eğitim teknolojisi standartlarına (ISTE-T 2008) bağlamında incelenmesi. Dicle Üniversitesi, Eğitim Bilimleri Enstitüsü, Yayınlanmamış Doktora tezi.

Tatlı, Z., İşpek-Ackbut, H., & Altuğ, B. (2016). The impact of Web 2.0 tools on pre-service teachers’ self-confidence levels about TPACK. Turkish Journal of Computer and Mathematics Education, 7(3), 659-678.

Toker, T., Akgün, E., Cömert, Z. & Edip, S. (2021). Eğitimciler için dijital yeterlilik ölcüğü: Uyarlama, geçerlilik ve güvendiği çalışması. Milli Eğitim Dergisi, 50(230), 301-328. DOI: 10.37669/millegitim.801607.

Tokmak, H., Konokman, G. & Yelken, T. (2013). Mersin üniversitesi okul öncesi öğretmen adaylarının teknolojik pedagojik alan bilgisi tpab özgüven algilalarının incelemesi. Akhi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi, 14(1), 35-51.

Toledo, C. (2005). A five-stage model of computer technology integration into teacher education curriculum. Contemporary Issues in Technology and Teacher Education, 5(2), 177–191.

Tondeur, J. Valcke, M. & van Braak, J. (2008). A multidimensional approach to determinants of computer use in primary education: teacher and school characteristics. Journal of Computer Assisted Learning, 24, 494–506.

Türk Eğitim Derneği (2009). Öğretmen yeterlikleri, Adım Okan Matbaacılık.

Ünlü, İ., Kaşkaya, A. ve Coşkun, M. K. (2017). Sosyal bilgiler öğretmen adaylarının teknolojik pedagojik alan bilgisi yeterliliklerinin çeşitli değişkenlere göre incelenmesi. Erzincan Üniversitesi Eğitim Fakültesi Dergisi. Cilt 19 Sayı 1. Doi. 10.17556/erziefd.295611.

Vanderlinde, R. & van Braak, J. (2010). The e-capacity of primary schools: Development of a conceptual model and scale construction from a school improvement perspective, Computers & Education, 55(2), 541-553.

Wang, Q. & Woo, H.L. (2007). Systematic planning for ICT integration in topic teaching. Educational Technology and Society, 10(1), 148-156.

Wang, Q. (2008). A generic model for guiding the integration of ICT into teaching and learning. Innovations in Education and Teaching International, 45(4), 411-419.

Yalin, H. I., Karadeniz, S. & Sahin, S. (2007). Barriers to information and communication technologies integration into elementary schools in Turkey, Journal of Applied Sciences, 7(24), 4036-4039.

Yağcı, M. (2015). Pedagojik formasyon eğitimini alan öğretmen adaylarının teknopedagojik eğitim yeterliliklerinin çeşitli değişkenler açısından incelemesi. Kastamonu Üniversitesi Kastamonu Eğitim Dergisi, 24(3), 1327-1342.

Yıldırım, A., & Şimşek, H. (2016). Sosyal bilimlerde nitel araştırma yöntemleri. Seçkin