Usak University Journal of Educational Research, 2026, 12(2), 277-286
https://doi.org/10.29065/usakead.1890223

Uşak Üniversitesi Eğitim Araştırmaları Dergisi
Usak University Journal of Educational Research
https://dergipark.org.tr/tr/pub/usakead
e-ISSN: 2149-9985

Research Article

Examining German Preparatory Students' Attitudes Toward Web 2.0 Tools within the Technological Pedagogical Content Knowledge (TPACK) Framework

Esra Durmaz[1*], **Melike Özüdoğru**[2]

[1]Gazi University, Ankara, Turkey, esraceyhanx@gmail.com, ORCID ID: 0009-0005-2205-416X
[2]Gazi University, Ankara, Turkey, melikeozudogru@gazi.edu.tr, ORCID ID: 0000-0002-7478-3576

Article History
Received : 16.02.2026
Revised : 05.06.2026
Accepted : 19.06.2026

Keywords
German language teaching
Technological Pedagogical Content Knowledge (TPACK)
Student attitudes
Technology integration
Web 2.0 tools

Abstract

Rapid developments in digital technologies have made the integration of technology into learning processes increasingly important and have strengthened the relevance of the Technological Pedagogical Content Knowledge (TPACK) framework, which emphasizes the integration of technological, pedagogical, and content knowledge. In foreign language education, Web 2.0 tools are regarded as effective components of technology-enhanced instruction. However, experimental studies examining the effects of structured Web 2.0-based instructional programs on students' attitudes remain limited. Therefore, this study aimed to investigate the effect of a Web 2.0-based instructional program on German preparatory students' attitudes toward Web 2.0 tools. The study was designed within a quantitative research framework and employed a one-group pretest-posttest experimental design. Data were collected from students enrolled in a German preparatory class during the 2024-2025 academic year using the Web 2.0 Tools Attitude Scale in Foreign Language Learning. The data were analyzed by comparing pretest and posttest scores. The findings indicated that the program significantly increased students' belief, interest, and willingness regarding Web 2.0 tools. However, no significant change was observed in negative attitudes. The results suggest that the structured integration of Web 2.0 tools can enhance students' attitudes toward technology-supported foreign language learning. This study contributes experimental evidence to the literature and offers practical implications for instructional design and technology integration.

Teknolojik Pedagojik Alan Bilgisi Çerçevesinde Almanca Hazırlık Öğrencilerinin Web 2.0 Araçlarına Yönelik Tutumlarının İncelenmesi

Makale Geçmişi
Alındı : 16.02.2026
Düzeltildi : 05.06.2026
Kabul Edildi: 19.06.2026

Anahtar Kelimeler
Almanca dil öğretimi
Teknolojik Pedagojik Alan Bilgisi (TPACK)
Öğrenci tutumu
Teknoloji entegrasyonu
Web 2.0 araçları

Öz

Dijital teknolojilerdeki hızlı gelişmeler, öğrenme süreçlerinde teknoloji entegrasyonunu önemli hâle getirmiş ve öğretmen adaylarının teknolojiyi pedagojik ve alan bilgisiyle bütüncül biçimde kullanmalarını öngören Teknolojik Pedagojik Alan Bilgisi (TPACK) çerçevesinin önemini artırmıştır. Özellikle yabancı dil eğitiminde, etkileşimli ve öğrenci merkezli yapılarıyla öne çıkan Web 2.0 araçları, teknoloji entegrasyonunun etkili bir bileşeni olarak değerlendirilmektedir. Bununla birlikte, Web 2.0 araçlarına yönelik yapılandırılmış öğretim programlarının öğrencilerin tutumları üzerindeki etkisini inceleyen deneysel çalışmalar sınırlıdır. Bu araştırmanın amacı, Web 2.0 araçlarına yönelik geliştirilen bir öğretim programının Almanca hazırlık sınıfı öğrencilerinin Web 2.0 araçlarına yönelik tutumları üzerindeki etkisini analiz etmektir. Çalışma, nicel araştırma yaklaşımı kapsamında tek grup öntest-sontest deneysel desene göre yürütülmüştür. Araştırmanın verileri, 2024-2025 eğitim-öğretim yılında Almanca hazırlık sınıfında öğrenim gören öğrencilerden elde edilmiştir. Veri toplama aracı olarak Yabancı Dil Öğreniminde Web 2.0 Araçları Tutum Ölçeği kullanılmıştır. Veriler, öntest ve sontest puanları karşılaştırılarak analiz edilmiştir. Bulgular, uygulanan öğretim programının öğrencilerin Web 2.0 araçlarına yönelik inanç, ilgi ve istek düzeylerinde anlamlı bir artış sağladığını; ancak olumsuz tutum boyutunda anlamlı bir değişim oluşturmadığını göstermiştir. Elde edilen sonuçlar, yapılandırılmış Web 2.0 entegrasyonunun öğrencilerin teknoloji destekli dil öğrenimine yönelik tutumlarını olumlu yönde geliştirebileceğini göstermektedir. Bu çalışma, yabancı dil öğretiminde Web 2.0 araçlarının pedagojik temelli kullanımına ilişkin deneysel kanıt sunarak öğretim tasarımı ve teknoloji entegrasyonu literatürüne katkı sağlamaktadır.

[*] Sorumlu Yazar: esraceyhanx@gmail.com

Introduction

The rapid development of digital technologies has led to profound changes in educational processes. As access to information, interaction, and content production have increasingly shifted to digital environments, the nature of learning environments has also changed substantially. Technology has become not merely an instrumental component but an integral part of educational processes that reshapes the learning experience (Nazlıoğlu, 2024). This change is particularly evident in foreign language education, where digital tools increase learners' exposure to the target language and create more interactive and participatory learning environments (Kaynar, 2019; McLoughlin & Lee, 2007). In this context, Web 2.0 technologies are considered important pedagogical tools that promote student-centered learning through user-generated content, social interaction, collaboration, and immediate feedback (Başkaya & Tursunovic, 2017; Kaynar, 2019; Munoz & Towner, 2009; O'Reilly, 2010; Tosun, 2025; Yapıcı, 2022). The interactive structure of Web 2.0 tools supports active learning by enabling learners to become not only consumers but also producers of knowledge (Ajjan & Hartshorne, 2008). Accessible anytime and anywhere, these digital tools facilitate continuous and active exposure to the target language and foster a socially enriched language acquisition process (McLoughlin & Lee, 2007).

As technological developments continue to advance at a remarkable pace, there is a growing need for pre-service teachers who can purposefully adapt to evolving technologies, use them effectively and efficiently, evaluate their outcomes, and understand the relationship between technology, society, and the environment (Aydın & Silik, 2018). The effective and pedagogically meaningful use of technology-supported learning environments requires the integration of technology with pedagogical and content knowledge. In this regard, the Technological Pedagogical Content Knowledge (TPACK) framework offers a holistic model that emphasizes the interaction among technological, pedagogical, and content knowledge (Koehler & Mishra, 2009). The TPACK approach highlights that technology should not be viewed merely as a technical tool but as a pedagogical component that reshapes the learning experience. Since instructional practices involving Web 2.0 technologies require the integration of technological, pedagogical, and content knowledge, they are conceptually aligned with the TPACK framework (Hall, 2015; Hunutlu & Küçük, 2022). From this perspective, pedagogically structured Web 2.0 applications can be expected to enrich learning experiences and positively influence students' attitudes toward technology-supported learning. Therefore, the pedagogically structured use of Web 2.0 tools within the TPACK framework is important not only for enhancing the quality of instructional processes but also for improving students' attitudes toward these tools and technology-supported learning.

Attitude is a multidimensional construct that encompasses individuals' cognitive, affective, and behavioral tendencies toward a specific object or learning experience and is closely associated with participation, motivation, and achievement (Schunk et al., 2014). Positive attitudes toward technology and learning tools support active engagement in the learning process and enhance the effectiveness of technology-supported learning environments (Schindler et al., 2017). Therefore, examining the effect of Web 2.0 tools on learners' attitudes is important not only for understanding affective outcomes but also for evaluating the effectiveness of pedagogical technology integration.

A review of the literature reveals numerous studies showing that the use of Web 2.0 tools across different disciplines, particularly in foreign language education, positively influences students' attitudes toward learning, motivation, and participation (Akbaba & Kılıç, 2022; Akçay & Şahin, 2012; Almalı & Yeşiltaş, 2020; Başkaya & Tursunovic, 2017; Can, 2021; Çoban & Adıgüzel, 2022; Salman & Akay, 2022; Sarı, 2019; Yapıcı, 2022; Zengin, 2025). Studies conducted in English language teaching contexts indicate that Web 2.0-supported instructional practices enhance students' attitudes and promote greater participation in learning (Çoban & Adıgüzel, 2022; Salman & Akay, 2022). Similarly, WebQuest-based instruction in Turkish language courses has been shown to significantly improve students' attitudes (Akçay & Şahin, 2012). Web 2.0-supported teaching in science education has also been found to positively influence students' attitudes (Akbaba & Kılıç, 2022; Can, 2021; Sarı, 2019), while technology-supported instruction in social studies has been associated with increased student participation and more positive attitudes toward learning (Almalı & Yeşiltaş, 2020). Overall, these studies suggest that Web 2.0 tools can strengthen learning processes through their interactive, participatory, and learner-centered features.
Additionally, in the field of German as a foreign language, the need for technology-supported and pedagogically grounded instructional practices has become increasingly evident in recent years (Göçerler, 2025). Web 2.0 applications are reported to provide interactive learning experiences and immediate feedback (Tekin, 2025), as well as to contribute to the integrated development of the four fundamental language skills, listening, speaking, reading, and writing, through the intensive use of visual and auditory input (Demircioğlu-Diren & Horzum, 2023; Sağlık & Yıldız, 2021). Similarly, studies on the use of Web 2.0 tools in teaching German as a foreign language reveal that these tools can support language learning by offering interactive, multimedia-based, and learner-centered environments (Çıldır & Koçak, 2022; Yalçın, 2020). Research on Web 2.0-supported German language instruction further suggests that these tools can foster students' active participation, motivation, and interest in the course (Çıldır & Koçak, 2022; Yıldırım & Karahan, 2023).

Despite these interactive and feedback-rich affordances, the pedagogically grounded use of Web 2.0 tools in German language teaching remains limited (Yalçın, 2020). The restricted use of technology-based learning materials in German instruction may hinder vocabulary acquisition (Karataş, 2025) and the development of core language skills, potentially affecting students' attitudes toward learning. Furthermore, the predominance of traditional, teacher-centered, and textbook-driven instructional approaches limits opportunities for active language use and immediate feedback (Karaman, 2023). In contrast, studies in English language education have demonstrated that the use of Web 2.0 tools can positively influence students' attitudes and foster more favorable perceptions of the learning process (Çoban & Adıgüzel, 2022; Salman & Akay, 2022). These findings highlight the pedagogical potential of Web 2.0 applications for supporting students' attitudes toward learning in German language education.

In addition, the growing diversity of Web 2.0 tools makes it increasingly challenging to identify pedagogically appropriate and high-quality applications and to evaluate them systematically (Tatlı, Akbulut, & Altınışık, 2016). For this reason, the effective use of digital tools in German language teaching should not be limited to teachers' familiarity with these tools. Rather, such tools need to be integrated into the instructional process in accordance with the linguistic objectives of German language teaching, students' proficiency levels, and appropriate pedagogical methods. At this point, the TPACK framework provides an important theoretical basis for enabling German language teachers to design instructional processes more effectively by integrating technological, pedagogical, and content knowledge. In support of this view, Özen and Aykul (2022) found that German language teachers' skills in using Web 2.0 tools were related to their technological pedagogical content knowledge. Similarly, Ünal, Bozbıyık, and Acar (2019) emphasized the importance of identifying teachers' effective communication behaviors in line with pedagogical goals and raising awareness of this issue in German language teaching. Accordingly, the integration of Web 2.0 tools into German language teaching should be considered within the TPACK framework, which emphasizes the meaningful interaction among technological, pedagogical, and content knowledge in instructional design. In this regard, informing pre-service teachers about effective Web 2.0 tools within the TPACK framework and developing their ability to integrate technological and content knowledge in instructional materials is considered essential.

This study seeks to address this gap by examining the effect of an instructional program including the use of Web 2.0 tools developed within the TPACK framework on German preparatory students' attitudes. Specifically, the study seeks to determine students' levels of negative attitude, belief, and interest-willingness toward Web 2.0 tools and to analyze changes in these dimensions following the implementation of the instructional program. In this sense following research questions were suggested.

1. What are the levels of negative attitude, belief, and interest–willingness toward Web 2.0 tools among German preparatory students?

2. Do students' attitudes toward Web 2.0 tools differ significantly before and after the instructional program?

Method

This study employed a one-group pretest-posttest quasi-experimental design to determine German preparatory students' attitudes toward Web 2.0 tools and to examine the effect of a Web 2.0-based instructional program on these attitudes (Creswell & Creswell, 2023). In this design, measurements of the dependent variable were collected from the same group before the intervention (pretest) and after the intervention (posttest), and the statistical significance of the difference between the two measurements was tested (Büyüköztürk, 2020). Although the absence of a control group introduced certain limitations in terms of internal validity, this design was preferred due to the practice-based nature of the study, the difficulty of establishing a control group in an educational setting, and the limited number of students enrolled in German preparatory classes.

Participants

In this study, participants were determined through purposive sampling. In purposive sampling, the researcher includes individuals or groups who are directly related to the research problem and are considered capable of providing detailed information about the research topic (Büyüköztürk et al., 2020; Patton, 2014; Yıldırım & Şimşek, 2011). The sample comprised 48 students enrolled in the German preparatory program at Gazi University. Of the participants, 29 (60.4%) were female and 19 (39.6%) were male. Their ages ranged from 18 to 42, with a mean age of 20.33 years. Criterion sampling which is one of the purposive sampling strategies was employed (Creswell & Creswell, 2023). Only students who were enrolled in the German preparatory program, regularly attended the intervention sessions, and completed both pretest and posttest measurements were included in the study. Sample homogeneity was ensured by selecting participants from the same instructional program and with comparable language proficiency levels.

Data Collection and Instruments

Data were collected using a Demographic Information Form and the Web 2.0 Tools Attitude Scale in Foreign Language Learning. All instruments were administered face-to-face in paper-and-pencil format by the first researcher. Participants' demographic characteristics were gathered through the demographic information form.

Demographic Information Form

Participants' gender, age, grade level, and educational background were collected using the demographic information form.

Web 2.0 Tools Attitude Scale in Foreign Language Learning

Students' attitudes toward Web 2.0 tools were measured using the Web 2.0 Tools Attitude Scale in Foreign Language Learning developed by Şahin Toptaş (2023). Exploratory factor analysis revealed a three-factor structure explaining 62% of the total variance, indicating acceptable construct validity. The scale consists of 22 items across three subdimensions: negative attitude (9 items), belief (6 items), and interest-willingness (7 items). The instrument uses a five-point Likert scale ranging from 1 = Never to 5 = Always. Cronbach's alpha reliability coefficients were reported as .89 for negative attitude, .91 for belief, and .87 for interest–willingness, indicating high internal consistency. In this study, Cronbach's alpha internal consistency coefficients were calculated to examine the reliability of the scale. The reliability coefficients were found to be .92 for the 9-item Negative Attitude dimension, .97 for the 6-item Belief dimension, and .91 for the 7-item Interest and Desire dimension. These coefficients indicate that all subdimensions demonstrated high internal consistency reliability. Confirmatory factor analysis results showed acceptable model fit ($\chi^2/df = 1.63$, RMSEA = .057, SRMR = .049, CFI = .94, TLI = .93) (Şahin Toptaş, 2023), supporting the construct validity of the scale.

Research Ethic

The study received ethical approval prior to the data collection phase. Participants provided informed consent, and confidentiality and anonymity were ensured throughout the study. Ethical board approval was granted (No: 2024 - 46, Number E-77082166-604.01-849043).

Intervention Procedure

The intervention was carried out during the 2024–2025 academic year. It consisted of six sessions conducted over six weeks, with each session lasting approximately 60 minutes. The instructional program was structured within the TPACK framework. During the experimental process, the researchers assumed different roles in the development and implementation stages of the program. In the development phase, they structured the content in line with the aim of the study, the needs of German preparatory students, and the TPACK framework. Within this scope, Web 2.0 tools were incorporated into the program by aligning them with technological knowledge, pedagogical knowledge, and content knowledge related to German language teaching. In the implementation phase, the first researcher was responsible for conducting the program, delivering the sessions in the planned sequence, introducing the tools, demonstrating practical examples, and guiding students during the activities.

In the first session, participants were informed about the purpose, scope, and procedures of the study, and the pretest was administered. In the second session, the concept of Web 2.0, the role and contributions of Web 2.0 tools in education, and the importance of technology in foreign language learning were addressed. Related concepts were explained, and participants' views on these topics were examined through discussion and question-and-answer activities. In the third session, Web 2.0 tools that can be used in foreign language learning were introduced. Within this scope, the functions, areas of use, and contributions of tools such as Quizlet, Deutsch.info, ChatGPT, Deutsch für dich, Genially, Deutsche Welle, Nicos Weg, Deutsch Akademie Trainer, and Wordwall to foreign language learning were emphasized. In the fourth session, practical examples of how to use these Web 2.0 tools were demonstrated, and the researcher acted as a facilitator throughout the process. In the fifth session, examples of using Web 2.0 tools, particularly ChatGPT, to develop interactive speaking skills in foreign language learning were presented. Following the presentations, in-class discussions were conducted, and peer feedback was provided. In the sixth and final session, the implementation process was concluded, participants' awareness and opinions regarding Web 2.0 tools were evaluated, and the posttest was administered to determine changes in attitudes before and after the intervention. All sessions were conducted in accordance with the instructional plan, and the intervention process was standardized.

Data Analysis

In this study, prior to the main analyses, the normality assumption was evaluated through the Shapiro-Wilk test and skewness and kurtosis values. Since the data met the assumption of normality, paired-samples t-tests were conducted to examine whether there were statistically significant differences between the pretest and posttest scores (Büyüköztürk, 2020). The analyses were performed separately for the total attitude score and each subdimension. Effect sizes were calculated using Cohen's d and interpreted according to the conventional

benchmarks of small (.20), medium (.50), and large (.80). The data were analyzed using IBM SPSS Statistics version 25. The level of statistical significance was set at .05.

Findings

This section presents the findings obtained from the analysis of the data collected during the research process. Descriptive statistics for the pretest and posttest scores were presented in Table 1.

Table 1. *Descriptive Statistics for Attitude Scale Subdimensions of German Preparatory Students (N = 48)*

Dimensions	M	SD
Negative Attitude Pre-test	1.56	0.67
Negative Attitude Post-test	1.51	0.60
Belief Pre-test	3.76	1.15
Belief Post-test	4.50	0.53
Interest and Willingness Pre-test	3.43	1.03
Interest and Willingness Post-test	4.18	0.75

Pre- and post-intervention levels of negative attitude, belief, and interest-willingness among German preparatory students were examined. As shown in Table 1, negative attitude scores showed only a slight decrease after the intervention, whereas belief and interest-willingness scores increased more noticeably. These findings suggest that the Web 2.0-based instructional program was effective in improving students' belief in and interest-willingness toward Web 2.0 tools.

The paired samples t-test results examining changes in attitude, belief, and interest-willingness scores of German preparatory students are presented in Table 2.

Table 2. *Paired Samples t-Test Results for Changes in Attitude, Belief, and Interest-Willingness Scores of German Preparatory Program Students*

Dimensions	Mean difference (Post–Pre)	SD	t	df	p	Cohen's d
Negative Attitude (Post-Pre-test)	-.52	4.69	-.77	47	.45	.11
Belief (Post-Pre-test)	4.60	6.64	4.80	47	.00	.69
Interest and Motivation (Post-Pre-test)	5.17	5.89	6.08	47	.00	.88

No statistically significant difference was found between the pretest and posttest negative attitude scores of German preparatory students, $t(47) = -0.77$, $p = .445$. In contrast, belief levels increased significantly after the intervention, $t(47) = 4.80$, $p < .001$. Similarly, a significant increase was observed in interest–willingness levels, $t(47) = 6.08$, $p < .001$.

To control the possibility of Type I error arising from multiple comparisons, a Bonferroni correction was applied ($\alpha = .05/3 = .017$), and the differences in the belief and interest-willingness dimensions remained statistically significant (Field, 2018). Examination of effect sizes based on Cohen's d (1988) indicated that the change in negative attitude $d = 0.77 / \sqrt{48} = 0.77 / 6.93 = 0.11$ was negligible. The effect size for belief ($d = 0.69$) indicated a moderate effect, whereas the effect size for the interest-willingness dimension ($d = 0.88$) indicated a large effect (Field, 2018).

Discussion and Conclusion

This study examined the effect of a Web 2.0-based instructional program on German preparatory students' attitudes toward Web 2.0 tools. The findings indicated that students' negative attitude levels were already low prior to the intervention, whereas their belief and interest-willingness levels were at a moderate level. Following the intervention, no statistically significant change was observed in the negative attitude dimension; however, significant increases were found in the belief and interest-willingness dimensions. Effect size analysis further showed a negligible change in negative attitudes, a moderate improvement in belief, and a large increase in interest-willingness. These findings suggest that the Web 2.0-based intervention was particularly effective in strengthening the positive dimensions of attitude rather than reducing negative attitudes. These results may be explained by the characteristics of the German preparatory class context and the nature of Web 2.0-supported instruction. German preparatory students are generally at the initial stage of learning German and may experience certain difficulties related to vocabulary acquisition, pronunciation, grammar structures, and limited

opportunities for active language use. In this context, Web 2.0 tools may have provided students with more interactive, visual, auditory, and practice-oriented learning experiences, thereby increasing their belief in the usefulness of these tools and their willingness to use them in the language learning process.

The significant increase observed in the belief dimension indicates that students developed more positive perceptions of the educational value and functionality of Web 2.0 tools after the intervention. This finding is consistent with previous studies showing that Web 2.0-supported learning environments can positively influence students' attitudes toward learning by promoting interaction, collaboration, active participation, and learner-centered experiences (Akbaba & Kılıç, 2022; Akçay & Şahin, 2012; Almalı & Yeşiltaş, 2020; Can, 2021; Karaca & Özenç, 2025; Keskin, 2021; Salman & Akay, 2022; Sarı, 2019; Türegün-Çoban & Adıgüzel, 2022). In the literature, Web 2.0 tools are reported to enhance students' interest and motivation, make lessons more engaging through visual and activity-based structures, and support more favorable perceptions of technology-supported learning (Akbaba & Kılıç, 2022; Can, 2021; Keskin, 2021; Salman & Akay, 2022; Sarı, 2019; Türegün-Çoban & Adıgüzel, 2022). Findings from different disciplines also support this interpretation. WebQuest-based instruction in Turkish language education has been found to improve students' attitudes (Akçay & Şahin, 2012), Web 2.0-supported teaching in science education has been shown to positively influence students' attitudes (Akbaba & Kılıç, 2022; Can, 2021; Sarı, 2019), and technology-supported instruction in social studies has been associated with increased student participation and more positive attitudes toward learning (Almalı & Yeşiltaş, 2020). Taken together, these studies suggest that Web 2.0 tools can contribute to attitudinal development by supporting diverse learning styles, providing interactive learning environments, and encouraging active engagement.

In the present study, the improvement in students' belief levels may be explained by the pedagogically structured nature of the instructional program. Rather than introducing digital tools merely at a technical level, the program integrated Web 2.0 tools into German language learning activities in line with instructional objectives and students' learning needs. Through tools such as Quizlet, Wordwall, Genially, Deutsch.info, Deutsche Welle, Nicos Weg, and ChatGPT, students were exposed to activities supporting vocabulary learning, interactive practice, listening, speaking, and immediate feedback. As students experienced the practical contribution of these tools to their German learning process, their beliefs regarding the usefulness and educational value of Web 2.0 tools may have been strengthened.

Similarly, the significant increase in the interest-willingness dimension may be associated with the interactive, multimedia-based, and learner-centered nature of the intervention. Learning German in a preparatory class may sometimes be perceived as challenging due to the unfamiliar linguistic structure of the language, difficulties in vocabulary acquisition and pronunciation, and the intensive nature of preparatory programs. In this context, Web 2.0 tools may have made the learning process more enjoyable, participatory, and concrete (Çiftci & Sağlam, 2023). In particular, multimedia-supported activities, immediate feedback, gamified practices, and opportunities for active participation may have increased students' interest in the course and their willingness to engage with technology-supported language learning activities. The large effect size obtained for the interest-willingness dimension indicates that the intervention had a strong practical contribution to students' affective engagement.

The findings are also meaningful in the specific context of German as a foreign language. The significant increases in belief and interest-willingness indicate that Web 2.0 tools can strengthen students' positive attitudes toward technology-supported German language learning when they are integrated into instruction in a pedagogically meaningful way. This interpretation is consistent with studies showing that Web 2.0 tools enhance students' interest, motivation, active participation, and listening comprehension in German language courses (Çıldır & Koçak, 2022; Yıldırım & Karahan, 2023). In addition, previous research indicates that Web 2.0-supported practices can contribute to reading, listening, and speaking skills, while mobile applications and interactive Web 2.0 tools can support German lexical competence by enabling students to use vocabulary actively and contextually (Aktaş, 2023; Kazhan et al., 2020; Kolcubaşı & Karakuş-Tayşi, 2024). Therefore, the present findings suggest that Web 2.0 tools should not be regarded merely as technological supplements but as pedagogical tools that support language skills, course participation, and positive learning attitudes.

The effectiveness of Web 2.0 tools, however, depends on their alignment with instructional objectives, learner needs, and German language learning content. This interpretation is consistent with the TPACK framework, which emphasizes the integrated use of technological, pedagogical, and content knowledge in designing meaningful learning experiences (Koehler & Mishra, 2009). Accordingly, Özen and Aykul's (2022) finding that German language teachers' skills in using Web 2.0 tools are related to their technological pedagogical content knowledge supports the view that Web 2.0 tools should be integrated into German language teaching within a pedagogically and content-informed framework. In this respect, the findings of the present study indicate that the positive impact of Web 2.0 tools on students' attitudes may be closely related to how these tools are selected, structured, and integrated into the instructional process.

In contrast, the lack of a significant change in negative attitudes remains noteworthy. This result may be associated with a floor effect, as students' negative attitude levels were already low prior to the intervention. In

other words, the initially low level of negative attitudes may have limited the possibility of observing a statistically significant decrease after the intervention. It is also possible that increased awareness of digital learning resources and students' perceptions of their ability to use these tools in their own learning processes contributed more strongly to the development of positive attitudes than to the reduction of negative ones. Moreover, negative attitude components may be more resistant to short-term interventions, and the limited duration of the program or the sensitivity of the measurement instrument may have influenced this outcome. The literature suggests that technology-based interventions often strengthen the positive dimensions of attitude, whereas deeply rooted negative attitudes may require longer and more intensive interventions (Ertmer & Ottenbreit-Leftwich, 2010; Schindler et al., 2017; Schraw & Lehman, 2001; Tamim et al., 2011). Therefore, technology-supported instructional practices may not affect all dimensions of attitude equally.

In conclusion, the results of this study demonstrate that Web 2.0-based instructional practices can positively influence students' attitudes toward technology-supported learning in the context of German as a foreign language. In particular, the intervention appears to have strengthened students' belief in the educational value of Web 2.0 tools and increased their interest and willingness to use these tools in the language learning process. However, reducing negative attitudes may require longer-term and more sustained instructional practices. Given that most research on Web 2.0 tools has focused on English language teaching and other disciplines, this study contributes to the literature by providing experimental evidence within the German language context.

Conclusion, Limitations and Suggestions

This research examined the effect of a Web 2.0-based instructional program, structured within the Technological Pedagogical Content Knowledge (TPACK) framework, on German preparatory students' attitudes toward Web 2.0 tools. The findings revealed that while students' negative attitudes did not change significantly, their beliefs and interest-willingness toward Web 2.0 tools increased significantly after the intervention. Effect size analysis indicated a negligible change in negative attitudes, a moderate improvement in beliefs, and a large increase in interest–willingness. These results suggest that structured and pedagogically grounded technology integration can positively influence the cognitive and affective positive dimensions of students' attitudes toward technology-supported language learning. However, this study has several limitations.

The findings of this study should be interpreted in light of several methodological constraints. First, the study employed a one-group pretest-posttest quasi-experimental design without a control group. Although this design allowed examination of change over time, it limits the ability to draw strong causal inferences. Therefore, future studies should employ control-group or randomized experimental designs to strengthen causal interpretation and reduce internal validity threats. Longitudinal research is recommended to examine whether attitude changes persist over time and whether negative attitudes can be transformed through sustained and scaffolded interventions. Also, the sample consisted of a relatively small group of students from a single university and from a German preparatory program. This limits the generalizability of the findings to broader populations, different proficiency levels, or other educational contexts. Research with larger, more diverse, and multi-institutional samples would enhance external validity and provide a clearer understanding of how technology-supported instruction functions across different contexts, proficiency levels, and learner profiles. In addition, the intervention duration was relatively short. While significant improvements were observed in belief and interest-willingness dimensions, negative attitudes did not change significantly, which may indicate that deeper attitudinal change requires longer and more sustained exposure to technology-integrated learning environments. Moreover, the study relied on self-report measures, which may be influenced by social desirability bias and may not fully capture actual behavioral change in technology use. In this sense, combining quantitative and qualitative methods such as interviews, classroom observations, learning analytics may offer deeper understanding of how students experience technology-supported learning and why certain attitude dimensions change more than others. Finally, future studies should examine the relationship between technology-supported instruction and learning outcomes, such as language achievement, skill development, and engagement, to determine whether positive attitudinal change translates into improved academic performance.

Acknowledges

This study was presented as an oral presentation at the 6th International Symposium of Scientific Research and Innovative Studies (ISSRIS'26), and its abstract was published in the symposium abstract book.

Ethics Committee Permission Statement

The study received ethical approval prior to the data collection phase. Participants provided informed consent, and confidentiality and anonymity were ensured throughout the study. Ethical board approval was granted (No: 2024 - 46, Number E-77082166-604.01-849043).

References

Akbaba, K. & Ertaş-Kılıç, H. (2022). Web 2.0 uygulamalarının öğrencilerin fene ve teknoloji kullanımına yönelik tutumlarına etkisi. *Erzincan Üniversitesi Eğitim Fakültesi Dergisi, 24*(1), 130-139. https://doi.org/10.17556/erziefd.880542

Akçay, A., & Şahin, A. (2012). Webquest (Web Macerası) öğrenme yönteminin Türkçe dersindeki akademik başarı ve tutuma etkisi. *Eğitim Bilimleri Araştırmaları Dergisi, 2*(2), 33-45. https://izlik.org/JA28BC85GK

Aktaş, E. (2023). The effect of Web 2.0 based technology applications on speaking skills and speaking anxiety in teaching Turkish as a foreign language: Voki example. *Frontiers in Psychology, 14*, 1183037. https://doi.org/10.3389/fpsyg.2023.1183037

Almalı, H., & Yeşiltaş, E. (2020). Sosyal bilgiler eğitiminde coğrafya konularının web 2.0 teknolojileri kullanılarak öğretiminin öğrencilerin akademik başarı ve tutumlarına etkisi. *Türkiye Bilimsel Araştırmalar Dergisi, 5*(2), 165-182. https://izlik.org/JA56XB97YK

Aydın, F., & Silik, Y. (2018). Teknoloji okuryazarliği: tarihsel bir betimleme. *Ihlara Eğitim Araştırmaları Dergisi*, *3*(2), 107-126.

Başkaya, K., & Tursunovıc, M. (2017). Yabancı dil olarak Türkçe öğretiminde işbirlikli öğrenme ve padlet. *Aydın Tömer Dil Dergisi*, *2*(2), 79-96. https://izlik.org/JA59RK96DC

Büyüköztürk, Ş., Kılıç Çakmak, E., Akgün Ö., Karadeniz, Ş., & Demirel, F. (2020). *Eğitimde bilimsel araştırma yöntemleri.* Ankara: Pegem Akademi Yayıncılık

Can, B. (2021). *Fen bilimleri dersinde web 2.0 destekli kavramsal karikatür kullanımının akademik başarı ve tutuma etkisi* [Yayımlanmamış yüksek lisans tezi]. Necmettin Erbakan Üniversitesi, Konya.

Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, Quantitative, and mixed methods approaches.* SAGE Publications Ltd.

Çıldır, M., & Koçak, M. (2022). Web 2.0 araçlarının ikinci yabancı dil almanca dersinde kullanılmasına yönelik öğrenci görüşleri. *Alman Dili ve Kültürü Araştırmaları Dergisi*, *4*(7), 52-88. https://doi.org/10.55143/alkad.1033123

Çiftci, S., & Sağlam, A. (2023). Yabancı dil eğitiminde web 2.0 araçları kullanımının yararları ve zorlukları üzerine bir inceleme. *International Journal of Social and Humanities Sciences Research (JSHSR), 10*(91), 234–241. https://doi.org/10.26450/jshsr.3431

Çoban, B. T., & Adıgüzel, A. (2022). Uzaktan eğitim İngilizce dersi kelime öğretiminde web 2.0 araçları kullanımının öğrenci başarısına ve tutuma etkisi. *IBAD Sosyal Bilimler Dergisi, 12*, 164-180. https://doi.org/10.21733/ibad.961403

Demircioğlu-Diren, D. & Horzum, M. B. (2023). Eğitimde dijital teknoloji kullanımı. A. Okur ve GH. Demirdöven (Ed.), *Yabancı dil olarak dijital türkçe öğretimi* (s.1-35). Sakarya: Sakarya Üniversitesi Yayınları.

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. J*ournal of Research on Technology in Education, 42*(3), 255–284. https://doi.org/10.1080/15391523.2010.10782551

Field, A.P. (2018) *Discovering Statistics Using IBM SPSS Statistics*. (5th Ed.) SAGE Publications.

Göçerler, H. (2025). Yabancı dil öğretiminde yeni medya teknolojileri ve kullanım önerileri. *Alman Dili ve Kültürü Araştırmaları Dergisi*, *7*(2), 142-160. https://doi.org/10.55143/alkad.1692999

Hall, A. N. (2015). *Technological, pedagogical and content knowledge (TPACK) for Web 2.0 tools* [Doctoral dissertation, Morehead State University]. ProQuest Dissertations and Theses Global.

Hunutlu, Ş., & Küçük, S. (2022). Examining EFL teachers' TPACK perceptions, Web 2.0 tools usage, workload, and technostress levels. *International Journal of Computer-Assisted Language Learning and Teaching (IJCALLT)*, *12*(1), 1-19. https://doi.org/10.4018/IJCALLT.315306

Karaca, A., & Özenç, E. G. (2025). Dil bilgisi öğretiminde web 2.0 araçlarıyla oluşturulmuş oyunların başarı ve tutuma etkisi. *Yaşadıkça Eğitim, 39*(2), 473-489. https://doi.org/10.33308/26674874.2025392871

Karaman, F. (2023). Ortaöğretimde Almanca öğretiminde teknoloji kullanımına ilişkin öğretmen ve öğrencilerin görüşleri: Teknoloji temelli yöntemsel bir yaklaşımın ihtiyaç analizi. *Journal of Literature and Humanities, 70*, 92-103. https://doi.org/10.5152/AUJFL.2023.22028

Karataş, F. (2025). Yabancı dil öğrenmede tek çekim video kullanımı: başlangıç düzeyi almanca öğrencilerinin deneyimleri. *Diyalog Interkulturelle Zeitschrift Für Germanistik*, *13*(1), 151-169. https://doi.org/10.37583/diyalog.1714916

Kaynar, T. (2019). *Web 2.0 araçlarının yabancı dil öğretiminde kullanımı* [Yayımlanmamış yüksek lisans tezi]. Marmara Üniversitesi, İstanbul.

Kazhan, Y. M., Hamaniuk, V. A., Amelina, S. M., Tarasenko, R. O., & Tolmachev, S. T. (2020). The use of mobile applications and Web 2.0 interactive tools for students' German-language lexical competence improvement. *CTE Workshop Proceedings, 7*, 392–415. https://doi.org/10.55056/cte.376

Keskin, A. (2021). *Web 2.0 uygulamalarının öğrencilerin Türkçe dersindeki akademik başarılarına ve Türkçe dersine yönelik tutumlarına etkisi* [Yayımlanmamış yüksek lisans tezi]. Düzce Üniversitesi, Düzce.

Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)?. *Contemporary issues in technology and teacher education*, *9*(1), 60-70.

Kolcubaşı, A., & Karakuş-Tayşi, E. (2024). The impact of comprehension activities supported by Web 2.0 tools on students' reading and listening comprehension achievement. *Educational Process: International Journal, 13*(4), 42–60. https://doi.org/10.22521/edupij.2024.134.3

McLoughlin, C., & Lee, M. J. W. (2007). Social software and participatory learning: Pedagogical choices with technology affordances in the Web 2.0 era. In R. Atkinson, C. McBeath, S.-K. A. Soong, & C. Cheers (Eds.), *ICT: Providing choices for learners and learning* (pp. 664–675). Centre for Educational Development, Nanyang Technological University.

Munoz, C. L., & Towner, T. L. (2009). Opening Facebook: How to use Facebook in the college classroom. In I. Gibson, R. Weber, K. McFerrin, R. Carlsen, & D. A. Willis (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2009* (pp. 2623–2627). Association for the Advancement of Computing in Education (AACE).

Nazlıoğlu, E. (2024). *Meslek derslerinin öğretiminde Web 2.0 araçlarının kullanımının akademik başarı ve motivasyona etkisinin incelenmesi: Meslek lisesi bilişim teknolojileri bölümü örneği* [Yayımlanmamış yüksek lisans tezi]. Bursa Uludağ Üniversitesi, Bursa.

O'Reilly, T. (2010). What is Web 2.0? Design patterns and business models for the next generation of software. In H. Donelan, K. Kear, & M. Ramage (Eds.), *Online communication and collaboration: A reader* (pp. 225–236). Routledge.

Özen, E., & Aykul, M. (2022). Almanca öğretmenlerinin Web 2.0 araçları kullanım beceri düzeylerinin teknolojik pedagojik alan bilgileri ile ilişkisi: Eskişehir ili uygulaması. *2nd International Conference on Educational Technology and Online Learning – ICETOL 2022 Full Paper Proceedings* içinde (ss. 171-180).

Patton, M. Q. (2014). *Qualitative research & evaluation methods: Integrating theory and practice*. Sage publications.

Sağlık, Z. Y., & Yıldız, M. (2021). Türkiye'de dil öğretiminde web 2.0 araçlarının kullanımına yönelik yapılan çalışmaların sistematik incelemesi. *Eğitim ve Toplum Araştırmaları Dergisi*, 8(2), 418-442. https://doi.org/10.51725/etad.1011687

Salman, M., & Akay, C. (2022). Web 2.0 araçlarının ortaokul öğrencilerinin yabancı dilde kelime öğrenme stratejilerine ve başarılarına etkisinin incelenmesi: Bir karma yöntem araştırması. *Educatione, 1*(2), 362-388. https://izlik.org/JA94MA98PZ

Sarı, E. (2019). *Web 2.0 uygulamalarına göre tasarlanmış fen bilimleri dersinin etkinliğinin incelenmesi* [Yayımlanmamış yüksek lisans tezi]. Düzce Üniversitesi, Düzce.

Schindler, L. A., Burkholder, G. J., Morad, O. A., & Marsh, C. (2017). Computer-based technology and student engagement: A critical review of the literature. *International Journal of Educational Technology in Higher Education, 14*(25), 1-28. https://doi.org/10.1186/s41239-017-0063-0

Schraw, G., & Lehman, S. (2001). Situational interest: A review of the literature and directions for future research. Educational *Psychology Review, 13*(1), 23–52. https://doi.org/10.1023/A:1009004801455

Schunk, D. H., Meece, J. L. & Pintrich, P. R. (2014). *Motivation in Education: Theory Research and Applications*. Pearson, Boston.

Tamim, R. M., Bernard, R. M., Borokhovski, E., Abrami, P. C., & Schmid, R. F. (2011). What forty years of research says about the impact of technology on learning: A second-order meta-analysis and validation study. *Review of Educational Research, 81*(1), 4–28. https://doi.org/10.3102/0034654310393361

Tatlı, Z., Akbulut, H. İ., & Altınışık, D. (2016). Öğretmen adaylarının teknolojik pedagojik alan bilgisi özgüvenlerine web 2.0 araçlarının etkisi. *Turkish Journal of Computer and Mathematics Education, 7*(3), 659-678. https://doi.org/10.16949/turkbilmat.277878

Tekin, M. (2025). *Web 2.0 araçları kullanımının ilkokul öğrencilerinin matematik dersine yönelik görüşlerinin değerlendirilmesi.* [Yayımlanmamış yüksek lisans tezi]. Karamanoğlu Mehmetbey Üniversitesi, Karaman.

Tosun, İ. E. (2025). *Hücre ve bölünmeler ünitesi için geliştirilen Web 2.0 aracının öğrencilerin akademik başarılarına uzamsal görsel algılarına ve kavramsal öğrenmelerine etkisi.* [Yayımlanmamış doktora tezi]. Bursa Uludağ Üniversitesi, Bursa.

Ünal, D. Ç., Bozbıyık, M., & Acar, Y. (2019). Almanca öğretiminde sinif içi etkileşimsel yetiye ilişkin bir ihtiyaç analizi ve durum tespiti. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *34*(1), 1-26. https://doi.org/10.16986/HUJE.2018040663

Yalçın, C. (2020). Yabancı dil olarak Almanca öğreniminde web 2.0 araçlarının kullanımı. *International Journal of Language Academy*, (33), 344-357. https://doi.org/10.29228/ijla.43170

Yapıcı, H. (2022). Web 2.0 ve yabancı dil öğreniminde sosyal ağlar. *Yabancı dil öğretiminde teknoloji uygulamaları* (s. 73). Nobel Akademik Yayıncılık.

Yıldırım, A., & Şimşek, H. (2011). *Sosyal bilimlerde nitel araştırma yöntemleri.* Ankara: Seçkin Yayıncılık.

Yıldırım, L., & Karahan, E. (2023). Effect of web 2.0 gamification tools on listening comprehension skills in a second foreign language german course. *Digital Education Review*, *43*, 37-67.

Zengin, E. (2025). *Hayat bilgisi dersinde Web 2.0 araçlarının öğrencilerin kendi kendine öğrenme düzeylerine ve tutumlarına etkisi*. [Yayımlanmamış yüksek lisans tezi]. Bursa Uludağ Üniversitesi, Bursa.