



# Asian Journal of Distance Education

## Pre-Service Primary School Teachers' Attitudes Toward an Online Literacy Methods Course

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**Abstract:** This study examined pre-service primary school teachers' attitudes toward an online literacy methods course and whether these attitudes differed according to learning preferences, course grade, gender, and grade level. Understanding these differences is relevant to the design of practice-oriented online teacher education courses, where students engage with both theoretical content and applied learning activities. A cross-sectional quantitative study included 139 pre-service teachers enrolled in a primary education program in Ankara, Türkiye. Data were collected using the Visual, Aural, Read/Write, and Kinesthetic (VARK) Learning Styles Inventory and the Attitude Scale Toward the Teaching of Primary Reading and Writing Course. Because attitude scores were non-normally distributed, Kruskal–Wallis H and Mann–Whitney U tests were used. Most participants (71.9%) reported multimodal learning preferences, and the four-modality VARK profile was the most common (39.6%). Overall attitudes toward the course were positive ( $M = 4.34$ ,  $SD = 0.50$ ), although Interest was lower than Willingness and Necessity. Comparisons across 13 VARK profiles produced significant omnibus differences in Interest and Necessity but corrected pairwise comparisons indicated that these results were largely influenced by one group of three participants. No significant differences were found when profiles were regrouped by the number of preferred modalities. Attitudes differed by course grade and grade level, with small to moderate effect sizes, but not by gender. Overall, the findings indicate that course attitudes in this sample were more consistently associated with course grade and grade level than with VARK preference profiles, while also documenting substantial diversity in pre-service teachers' learning preferences.

**Keywords:** online learning, teacher education, literacy education, pre-service teachers, learning preferences, VARK, attitudes, course grade, primary education, reading and writing instruction

### Highlights

What is already known about this topic:

- Pre-service teachers generally report positive attitudes toward literacy methods courses.
- Both single- and multimodal learning preferences have been reported among pre-service teachers.
- Online delivery has created challenges for practice-oriented teacher education courses.

What this paper contributes:

- This study examines attitudes toward an online literacy methods course using VARK learning preferences and academic variables.
- Learning preferences did not produce consistent differences in course attitudes.
- Course grade and grade level showed clearer differences than learning preferences.

Implications for theory, practice and/or policy:

- Online literacy methods courses may benefit from varied learning activities that provide different ways of engaging with course content.
- Teacher education programs should strengthen practice-oriented learning in online environments.
- Future research should use longitudinal and multi-institutional designs to examine changes in course attitudes.



## Introduction

Literacy is widely understood as a core competence that supports access to information, evaluation of knowledge, critical thinking, and participation in lifelong learning, in addition to the basic ability to read and write (Özdemir & Erdoğan, 2017). For this reason, beginning reading and writing instruction in the early years of primary school is considered a critical educational process that shapes students' later academic achievement, cognitive development, and participation in social life (Yıldırım & Demirtaş, 2010). The skills developed during this period influence language development, learning in other subject areas, and lifelong learning capacities (National Reading Panel, 2000; Snow et al., 1998). Effective literacy instruction therefore depends on teachers' content knowledge and pedagogical competence (Ehri, 2020; Moats, 1999). Students' effective acquisition of these foundational skills depends largely on teachers' professional knowledge, instructional skills, and teaching competence (Martin & Dismuke, 2015). Preparing well-qualified teachers is therefore one of the main conditions for effective beginning literacy instruction.

These demands become particularly important when practice-oriented teacher education courses are delivered online. In such settings, opportunities for modelling, interaction, feedback, and guided practice may differ from those available in face-to-face instruction, making students' engagement with the course an important consideration.

In Türkiye, pre-service primary school teachers develop the theoretical knowledge and practical skills required for beginning literacy instruction through the Teaching of Primary Reading and Writing course included in undergraduate teacher education programs (Council of Higher Education [CoHE], 2018). The course introduces different approaches to teaching reading and writing and prepares teacher candidates to plan instruction in ways that respond to learners' individual characteristics (Yıldırım & Demirtaş, 2010). Because the course combines subject knowledge, instructional planning, and practice-oriented activities, it occupies an important place in primary teacher education. The way teacher candidates experience this course may influence both their current learning and their future classroom practices.

Research in teacher education shows that pre-service teachers may experience the same learning environment in different ways and that these differences cannot be explained solely by the instructional process (Vansteelandt et al., 2017). Their attitudes toward a course may be shaped by their previous experiences, academic standing, stage in the programs, and preferred ways of engaging with instructional materials. These differences may become especially visible in courses that require active participation, demonstration, practice, and reflection.

Online delivery also changed how practice-oriented courses were planned and implemented (Atik & Avcı, 2021; Çetinkaya & Elalmış, 2022; Susar Kırmızı & Büyükdağ, 2022). These changes were especially evident in courses such as Teaching of Primary Reading and Writing, where theoretical knowledge needs to be combined with opportunities to develop practical teaching skills (Arçay Koyuncu, 2022; Dudak & Biçer, 2022; Karabulut, 2022). In an online course of this kind, teacher candidates are expected to engage with explanations, examples, visual materials, demonstrations, and practice-based tasks through a digital learning environment. Their responses to these forms of instruction may vary according to their individual learning characteristics. Importantly, the literature distinguishes planned online distance education from emergency remote teaching and emphasizes that effective online provision involves deliberate design, learner engagement, and attention to the learning context rather than the simple transfer of content to digital platforms (Bozkurt & Sharma, 2020).

The course examined in the present study was delivered through the university's institutional distance education platform, with scheduled synchronous instruction and asynchronous access to recorded course materials. This structured delivery context is important for interpreting the findings because the study concerns an institutionally supported online course environment rather than the use of a videoconferencing tool alone.

The online delivery of a literacy methods course also raises questions about how teacher candidates perceive the relevance, necessity, and attractiveness of the course. A course may still be viewed as professionally important even when students find it less engaging in an online format. This distinction is particularly relevant in practice-oriented teacher education, where opportunities for observation, modelling, interaction, and immediate feedback may differ from those available in face-to-face settings. Examining course attitudes can therefore provide a clearer understanding of how pre-service teachers respond to online professional coursework.

This study was developed in response to this need. Examining how pre-service teachers' individual learning characteristics relate to their attitudes toward an online literacy methods course may contribute to the improvement of teacher education programs and to the more effective design of practice-oriented online courses. It may also help clarify whether learning preferences meaningfully distinguish students' attitudes or whether academic and program-related variables provide more useful explanations.

### **Literature**

Research on pre-service teachers' attitudes toward professional coursework has focused on the academic, personal, and instructional factors that shape how students respond to their courses. This question is especially important in literacy teacher education because the Teaching of Primary Reading and Writing course prepares future primary school teachers for one of their core professional responsibilities. The course requires students to understand the principles of beginning literacy instruction, evaluate different teaching approaches, and develop practical skills for classroom use.

When this type of course is delivered online, students' experiences may also be shaped by the way they access instructional materials, participate in course activities, and engage with practice-based tasks. The literature relevant to the present study therefore brings together three areas: attitudes toward literacy methods courses, the online delivery of practice-oriented literacy instruction, and learning preferences in teacher education.

### **Attitudes Toward Literacy Methods Courses**

Studies on the Teaching of Primary Reading and Writing course generally show that pre-service primary school teachers hold positive attitudes toward the course (Aytan, 2017; Gömleksiz, 2013; Gözükcük, 2019). These positive attitudes may be related to the course's direct connection with future teaching responsibilities. At the same time, findings concerning gender, academic achievement, and grade level are not fully consistent. Gözükcük (2019), for example, reported significant differences by gender and academic achievement, but found no significant difference by grade level.

Kızılaslan Tunçer (2013) examined the relationships among academic achievement, metacognitive awareness, thinking styles, and attitudes toward the Teaching of Primary Reading and Writing course. This study is closely related to the present research because it considered course attitudes together with individual differences. However, it focused on thinking styles, whereas the present study examines perceptual learning preferences through VARK and considers attitudes in an online course context. Research on self-efficacy in beginning reading and writing instruction also points to the importance of affective variables in teacher education (İflazoğlu Saban & Ekin, 2020; Kabaş & Yıldız, 2020; Özdemir & Erdoğan, 2017). Studies on instructional methods and attitudes toward teaching further connect these affective responses with professional development (Açıslı Çelik & Ergin, 2022; Yurdakul & Susar Kırmızı, 2013).

## Online Delivery of Practice-Oriented Literacy Courses

The online delivery of practice-oriented teacher education courses changes how students access course content and participate in instructional activities. This is especially relevant for literacy methods courses, where theoretical knowledge is usually combined with modelling, lesson planning, demonstration, and practice. Studies on online beginning reading and writing instruction have reported difficulties related to planning, interaction, implementation, and practice-based activities (Arçay Koyuncu, 2022; Atik & Avcı, 2021; Çetinkaya & Elalmış, 2022; Dudak & Biçer, 2022; Karabulut, 2022; Susar Kırmızı & Büyükdağ, 2022).

Research on online teacher education shows that the quality of online learning depends on pedagogical design, interaction, and opportunities for meaningful engagement. Reviews of online initial teacher education have identified student experiences and technology-supported pedagogical practices as established areas of research (Carrillo & Flores, 2020; Dymont & Downing, 2020). These considerations are particularly relevant to practice-oriented teacher education, where connecting theoretical knowledge with practical application can be more difficult to facilitate online (Burke & Fanshawe, 2021). Meta-analytic evidence further suggests that outcomes in teacher education depend more on how technology is used pedagogically than on the presence of technology itself (Schmid et al., 2023).

These difficulties may affect how pre-service teachers evaluate the course and take part in its activities. Students may continue to see the course as necessary for their future profession while finding some aspects of the online experience less engaging. Online courses also bring together written explanations, visual presentations, demonstrations, synchronous discussions, and independent practice tasks. Since students may respond differently to these forms of instruction, attitudes toward the course should be considered together with individual learning characteristics.

## Learning Preferences in Teacher Education

Studies show that both single and multimodal learning preferences are common among pre-service teachers (Düzgün & Kaşkaya, 2023; Leite et al., 2010; Sarp & Okumuş, 2025; Ulaş et al., 2012). Düzgün and Kaşkaya (2023) also linked learning preferences with attitudes toward online learning. These studies suggest that teacher candidates may differ in the ways they prefer to engage with instructional materials and learning activities. In the present study, VARK is used to describe these perceptual learning preferences and to examine whether course attitudes vary across preference profiles.

Previous research on the Teaching of Primary Reading and Writing course has generally examined attitudes, achievement, self-efficacy, thinking styles, or learning preferences separately (Aytan, 2017; Gömleksiz, 2013; Gözükcü, 2019; İflazoğlu Saban & Ekin, 2020; Kızılaslan Tunçer, 2013; Özdemir & Erdoğan, 2017). Research on online delivery has also reported challenges related to planning, interaction, implementation, and practice-based activities (Arçay Koyuncu, 2022; Atik & Avcı, 2021; Çetinkaya & Elalmış, 2022; Dudak & Biçer, 2022; Karabulut, 2022; Susar Kırmızı & Büyükdağ, 2022). Yet little is known about whether attitudes toward an online literacy methods course differ by learning preferences, course grade, gender, and grade level. This study examines these variables together to provide a more comprehensive understanding of the individual and academic characteristics associated with pre-service teachers' attitudes toward the course.

## Theoretical and Conceptual Background

### Individual Differences Approach

This study is based on the Individual Differences Approach, which emphasizes that learners may respond differently to the same instructional environment because of differences in their cognitive,

affective, and experiential characteristics (Cronbach & Snow, 1977; Jonassen & Grabowski, 1993). Students who take the same course may therefore differ in how they participate, interpret course content, and develop attitudes toward the learning experience.

This perspective is relevant to an online literacy methods course because students engage with the same course content through a shared digital environment, yet they may experience its activities in different ways. Written materials, visual presentations, demonstrations, discussions, and practice-based tasks may not be equally engaging for all students. Learning preferences are central to the present study, while course grade, gender, and grade level are also considered as variables that may be associated with attitudes toward the course.

### **Attitudes as an Affective Variable**

Attitude refers to the cognitive, affective, and behavioral tendencies that individuals develop toward a subject, object, or learning experience. It is regarded as an important affective variable because it may influence participation, motivation, and academic performance (Ajzen, 2005; Schunk et al., 2014). In a course context, attitudes may reflect whether students find the course interesting, necessary, and relevant to their academic or professional development.

In teacher education, attitudes toward professional courses may influence how pre-service teachers engage with course content and how they use what they have learned in later practice. These attitudes may also be connected to their developing professional identity and future teaching decisions (Darling-Hammond, 2006). For this reason, attitudes toward the online literacy methods course are examined as an important part of teacher candidates' preparation for beginning reading and writing instruction.

### **Learning Preferences and the VARK Model**

Learning preferences refer to the ways individuals tend to prefer to perceive, process, and engage with information and learning activities (Jonassen & Grabowski, 1993; Ulaş et al., 2012). One framework commonly used to describe perceptual learning preferences is the Visual, Aural, Read/Write, and Kinesthetic (VARK) model developed by Fleming (2012). The model describes four preference modalities. Visual preference emphasizes information presented through diagrams, charts, and other visual representations; aural preference emphasizes listening, discussion, and verbal explanation; read/write preference emphasizes information presented in written form; and kinesthetic preference emphasizes experience, examples, and practical activity.

VARK preferences may be expressed as single-modal or multimodal profiles (Fleming, 2012; Leite et al., 2010). A single-modal profile indicates a predominant preference for one of the four modalities, whereas a multimodal profile reflects preferences across two, three, or all four modalities. Previous studies with teacher candidates have identified both single- and multimodal preference patterns, with considerable variation across individuals and educational contexts (Düzgün & Kaşkaya, 2023; Sarp & Okumuş, 2025; Ulaş et al., 2012).

Learning preferences are relevant to the present study because the online literacy methods course involved different forms of engagement with course content. Students encountered written materials, visual presentations, oral explanations and discussions, demonstrations, and practice-oriented activities. Teacher candidates may differ in how they prefer to engage with these forms of learning, and these differences may also be reflected in how they evaluate their course experience. VARK therefore provides a structured way to describe variation in participants' reported learning preferences and to examine whether these preferences are associated with differences in course attitudes.

The present study does not treat learning preferences as indicators of ability or as determinants of academic performance. Rather, learning preferences are examined as one individual characteristic alongside course grade, gender, and grade level. This approach is consistent with the broader individual differences perspective adopted in the study, which recognizes that students participating in the same instructional environment may nevertheless differ in how they engage with and evaluate that experience (Cronbach & Snow, 1977; Jonassen & Grabowski, 1993).

Accordingly, the purpose of this study was to determine whether pre-service primary school teachers' attitudes toward an online literacy methods course differed according to learning preferences, course grade, gender, and grade level. The study also aimed to describe the distribution of VARK preference profiles and the overall level of attitudes toward the course. By considering these variables together, the study sought to determine whether reported learning preferences were associated with variation in course attitudes and how these patterns compared with differences related to academic and program-level characteristics.

The following research questions guided the study:

**RQ1.** What is the distribution of pre-service primary school teachers' learning preferences?

**RQ2.** What are pre-service primary school teachers' attitudes toward the online literacy methods course?

**RQ3.** Do pre-service primary school teachers' attitudes toward the online literacy methods course differ according to their learning preferences?

**RQ4.** Do pre-service primary school teachers' attitudes toward the online literacy methods course differ according to course grade, gender, and grade level?

## Method

This study employed a quantitative research approach to examine pre-service primary school teachers' attitudes toward an online literacy methods course. It also investigated whether these attitudes differed according to learning preferences, course grade, gender, and grade level.

## Research Design

A cross-sectional quantitative design was used because the study aimed to describe participants' learning preferences and attitudes at a single point in time and to compare attitude scores across different groups (Büyüköztürk et al., 2009; Cohen et al., 2007). Cross-sectional studies collect data once within a defined period and are suitable for examining existing differences among participants, although they do not support causal conclusions (Fraenkel et al., 2012). The data were collected after participants had completed the online literacy methods course. The findings therefore reflect their retrospective evaluations of the course rather than changes in attitudes during the semester.

## Course Context

The Teaching of Primary Reading and Writing course is a compulsory literacy methods course in undergraduate primary teacher education programs in Türkiye. It is designed to develop pre-service teachers' theoretical knowledge and practical skills in beginning reading and writing instruction. All participants had completed the course online before data collection. The course was delivered through the university's institutional distance education platform over a 14-week semester. All three weekly course hours were conducted synchronously, and students also had asynchronous access to recorded

course videos. Across the course, instructional activities included presentations, discussions, demonstrations, lesson planning, and practice or microteaching activities at different points in the semester. The online delivery of the course constituted the instructional context examined in this study.

### **Data Collecting Tools**

#### ***VARK Learning Styles Inventory***

The 16-item VARK Learning Styles Inventory developed by Fleming (2012) was used to identify participants' perceptual learning preferences. The psychometric properties of the English version were examined by Leite et al. (2010). The validity and reliability of the Turkish version were investigated by Düzgün (2018) using data from 318 teachers. In that study, the overall Cronbach's alpha coefficient was .76, item-total correlations ranged from .36 to .55, and the four-factor model produced  $\chi^2/df = 2.07$ , RMSEA = .06, and SRMR = .07. Düzgün (2018) described the overall model fit as modest. The NNFI (.41) and CFI (.43) values also indicated limited evidence for the construct validity of the Turkish version. The inventory includes four learning preference modalities: visual, aural, read/write, and kinesthetic. Participants may show a preference for one modality or a combination of two, three, or four modalities. In this study, the profiles were determined using the scoring and classification procedures proposed by Fleming (2012).

#### ***Attitude Scale Toward the Teaching of Primary Reading and Writing Course***

Participants' attitudes were measured using the Attitude Scale Toward the Teaching of Primary Reading and Writing Course developed by Arslan and Aytaç (2010). The scale contains 19 items across three dimensions: Willingness (12 items), Interest (5 items), and Necessity (2 items). Willingness reflects participants' readiness to engage with the course, Interest reflects their interest in the course content, and Necessity reflects the extent to which they perceive the course as necessary for their professional preparation. Items are rated on a five-point Likert scale, with higher scores indicating more positive attitudes. In the original development study, Cronbach's alpha was .92 for the full scale and .92, .80, and .82 for the three dimensions, respectively. The total attitude score was calculated as the mean of all 19 items. The unweighted mean of the three dimensions was not used because this method would give the two-item Necessity dimension the same weight as the 12-item Willingness dimension and would artificially increase the contribution of the shorter dimension.

### **Sampling**

The participants were pre-service primary school teachers enrolled in the Department of Primary Education at a state university in Ankara, Türkiye. Convenience sampling was used to recruit students who had completed the Teaching of Primary Reading and Writing course online and were continuing their studies during the fall semester of the 2022–2023 academic year. Participation was voluntary. Because records of the total number of eligible students invited to participate were not available, a response rate could not be calculated. The study included 139 pre-service teachers. Of these, 112 were female (80.6%) and 27 were male (19.4%). Seventy-three participants (52.5%) were in their third year, and 66 (47.5%) were in their fourth year. The questionnaires were administered after final course grades had been confirmed, so all participants had completed the course at the time of data collection.

### **Research Procedures**

Permission to use the instruments was obtained from the relevant researchers by email. The questionnaires were administered during the fall semester of the 2022–2023 academic year after the participants' final course grades had been confirmed. This timing ensured that participation in the study could not affect their academic evaluation. Ethical approval was granted by the Social and Human

Sciences Ethics Committee of Bartın University at its meeting on May 27, 2022, under protocol number 2022-SBB-0215. Approval was obtained from Bartın University because of the first author's institutional affiliation. Separate institutional permission was also obtained from the state university in Ankara where the data were collected. Participants were informed about the purpose of the study, voluntary participation, confidentiality, and the use of the data for research purposes. Informed consent was obtained before data collection.

### Validity and Reliability Measures

In the present study, Cronbach's alpha coefficients for the VARK modalities were .76 for visual, .69 for aural, .68 for read/write, and .65 for kinesthetic. Three of these coefficients were below the commonly used .70 threshold and were treated as a measurement limitation. An overall alpha coefficient was not reported because VARK uses forced and multiple-response items across distinct preference modalities, making a single total score conceptually difficult to interpret.

For the attitude scale, Cronbach's alpha was .88 for the full scale, .84 for Willingness, and .83 for Interest. Since the Necessity dimension contains only two items, the Spearman–Brown coefficient was calculated. The coefficient was .92, with an inter-item correlation of .85. The relatively high coefficient for the two-item dimension reflects the strong correlation between the two items.

A confirmatory factor analysis was conducted to examine whether the original three-factor structure of the attitude scale was supported in the current sample. The analysis tested the 12–5–2 item structure reported by Arslan and Aytaç (2010). The three-factor model showed a borderline fit:  $\chi^2(149) = 316.04$ ,  $p < .001$ ,  $\chi^2/df = 2.12$ , RMSEA = .090 (90% CI [.076, .104]), SRMR = .084, CFI = .851, NNFI = .829, GFI = .756, and AGFI = .720 (maximum likelihood estimation,  $N = 139$ ).

The  $\chi^2/df$  ratio was within an acceptable range (Wheaton et al., 1977). However, RMSEA and SRMR were slightly above the commonly used .08 criterion, while CFI, NNFI, GFI, and AGFI were below the recommended thresholds (Hooper et al., 2008; Hu & Bentler, 1999). These results indicate that the three-factor structure showed marginal fit in the current sample. The sample size was limited for a 19-item, three-factor model, with approximately 7.3 participants per item, and the Necessity dimension was represented by only two items. These measurement limitations were considered when interpreting the findings.

### Data Analysis

IBM SPSS Statistics 26.0 and LISREL 8.80 were used to organise and analyse the data. VARK profiles were classified according to Fleming's (2012) scoring procedures. Frequencies, percentages, means, and standard deviations were calculated for descriptive purposes. The distribution of attitude scores was examined using skewness, kurtosis, and the Shapiro–Wilk test. The skewness and kurtosis values for the Interest dimension fell within the  $\pm 1$  range suggested by Hair et al. (2019), whereas the values for Willingness, Necessity, and the total attitude score were outside this range. The Shapiro–Wilk test was significant for all four scores, indicating that the assumption of normality was not met. The Necessity dimension showed particularly strong negative skewness and high kurtosis. Its mean was 4.71, while both the median and mode were 5.00, indicating a ceiling effect and limited variation among participants.

Because the normality assumption was not met, non-parametric tests were used. The Kruskal–Wallis H test was applied to comparisons involving more than two groups, and the Mann–Whitney U test was used for two-group comparisons. When a Kruskal–Wallis test produced a significant result, Dunn's test with Bonferroni correction was used for pairwise comparisons. Because the analyses addressed distinct research questions and grouping variables, no single global correction was applied across all tests;

interpretation therefore emphasized corrected post hoc comparisons, effect sizes, and consistency across related analyses.

The significance level was set at .05. Effect sizes were reported alongside significance tests. For the Mann–Whitney U test, effect size was calculated as  $r = Z/\sqrt{N}$ . Values below .10 were interpreted as negligible, .10–.29 as small, .30–.49 as moderate, .50–.69 as strong, and .70 or above as very strong. For the Kruskal–Wallis H test, epsilon squared was calculated as  $\epsilon^2 = (H - k + 1)/(N - k)$ . Values of .01, .06, and .14 were interpreted as small, medium, and large effects, respectively.

Learning preference comparisons were conducted in two stages. First, the 13 VARK profiles were compared for exploratory purposes. Several groups were very small, including VA ( $n = 2$ ), VR ( $n = 2$ ), RK ( $n = 3$ ), and R ( $n = 4$ ), which limited the stability of these comparisons. In the second stage, participants were grouped according to the number of preferred modalities: one, two, three, or four. Single-modal and multimodal participants were also compared. Both sets of analyses were reported and interpreted together, with greater weight given to the grouped comparisons because of their more stable cell sizes.

### Limitations

Several features of the study limit the conclusions that can be drawn. Participants were recruited through convenience sampling from one state university, and the response rate could not be calculated. No a priori power analysis was conducted, and some comparison groups were small, particularly the DC grade group ( $n = 7$ ) and the male group ( $n = 27$ ). The uneven gender distribution also limits the interpretation of the gender comparisons.

Attitudes were measured after participants had completed the course, so the findings reflect retrospective evaluations and may be affected by recall bias. This timing also complicates the interpretation of grade-level differences. In addition, the attitude scale showed marginal model fit, and the two-item Necessity dimension had a pronounced ceiling effect. Evidence for the construct validity of the Turkish VARK inventory was limited, and three modality scores had reliability coefficients below .70.

The cross-sectional design does not support causal conclusions and cannot determine whether attitudes influenced course grades, course grades shaped later evaluations, or both were related to other factors. Given the measurement limitations of the VARK inventory in the present sample, findings involving learning preference profiles should be interpreted cautiously. In particular, the absence of statistically significant differences in the more stable grouped analyses should not be interpreted as evidence that learning preferences are unrelated to course attitudes in other populations or contexts.

### Findings

The findings show how pre-service primary school teachers experienced an online literacy methods course and whether their attitudes varied across the individual and academic characteristics examined in the study. Particular attention was given to the distribution of VARK learning preferences, overall course attitudes, and the differences associated with learning preferences, course grade, gender, and grade level. The results are presented in line with the research questions.

### *Distribution of Learning Preferences*

The first research question concerned the distribution of participants' learning preferences. To show how these preferences were represented in the sample, the frequencies and percentages of the 13 VARK profiles were calculated. Table 1 presents this distribution.

**Table 1. Distribution of learning preference profiles**

| Learning preference                 | Abbreviation | f   | %     |
|-------------------------------------|--------------|-----|-------|
| Visual                              | V            | 6   | 4.3   |
| Aural                               | A            | 10  | 7.2   |
| Read/write                          | R            | 4   | 2.9   |
| Kinesthetic                         | K            | 19  | 13.7  |
| Visual–aural                        | VA           | 2   | 1.4   |
| Visual–kinesthetic                  | VK           | 5   | 3.6   |
| Visual–read/write                   | VR           | 2   | 1.4   |
| Aural–kinesthetic                   | AK           | 8   | 5.8   |
| Aural–read/write                    | AR           | 6   | 4.3   |
| Read/write–kinesthetic              | RK           | 3   | 2.2   |
| Visual–aural–kinesthetic            | VAK          | 6   | 4.3   |
| Aural–read/write–kinesthetic        | ARK          | 13  | 9.4   |
| Visual–aural–read/write–kinesthetic | VARK         | 55  | 39.6  |
| Total                               |              | 139 | 100.0 |

Note.  $N = 139$ .

The four-modality VARK profile was the most common profile in the sample ( $n = 55$ , 39.6%). Among participants with a single-modality preference, kinesthetic was the most frequent profile ( $n = 19$ , 13.7%). When the profiles were grouped by the number of modalities, 28.1% of participants had a single-modality profile, 18.7% had a two-modality profile, 13.7% had a three-modality profile, and 39.6% had a four-modality profile. In total, 71.9% of the participants showed a preference for more than one modality, indicating that multimodal preferences were common in this group.

### **Attitudes Toward the Online Literacy Methods Course**

The descriptive statistics presented in Table 2 show that participants held generally positive attitudes toward the course. The highest mean score was recorded for Necessity ( $M = 4.71$ ,  $SD = 0.81$ ), followed by Willingness ( $M = 4.59$ ,  $SD = 0.47$ ). Interest had the lowest mean score ( $M = 3.60$ ,  $SD = 0.86$ ). The mean total attitude score was 4.34 ( $SD = 0.50$ ). This pattern suggests that participants viewed the course as professionally important and were willing to engage with it, although their level of interest was comparatively lower. The Necessity dimension should be interpreted with caution because the scores showed a clear ceiling effect, which reduced the variation among participants.

**Table 2. Descriptive statistics and normality tests for attitude scores**

| Dimension   | Items | n   | M    | SD   | Mode | Mdn  | Skewness | Kurtosis | W     | p      |
|-------------|-------|-----|------|------|------|------|----------|----------|-------|--------|
| Willingness | 12    | 139 | 4.59 | 0.47 | 5.00 | 4.75 | -1.599   | 3.445    | 0.821 | < .001 |
| Interest    | 5     | 139 | 3.60 | 0.86 | 3.40 | 3.60 | -0.318   | -0.227   | 0.973 | .008   |
| Necessity   | 2     | 139 | 4.71 | 0.81 | 5.00 | 5.00 | -3.494   | 12.284   | 0.409 | < .001 |
| Total       | 19    | 139 | 4.34 | 0.50 | 4.63 | 4.47 | -0.978   | 1.449    | 0.929 | < .001 |

Note.  $N = 139$ . Normality was assessed using the Shapiro–Wilk test

### **Attitudes by Learning Preferences**

The next step was to examine whether attitudes toward the online literacy methods course differed across the 13 VARK profiles. Because several profiles included only a small number of participants, this analysis was treated as exploratory rather than conclusive. Kruskal–Wallis H tests were conducted across the 13 profiles. Mean ranks for the RK group ( $n = 3$ ) were markedly lower than those of the other

profiles across the attitude dimensions (12.50–21.83), whereas the remaining profiles clustered closer together.

The omnibus tests showed significant differences for Interest,  $H(12) = 22.154$ ,  $p = .036$ ,  $\varepsilon^2 = .081$ , and Necessity,  $H(12) = 22.189$ ,  $p = .035$ ,  $\varepsilon^2 = .081$ . No significant differences were found for Willingness,  $p = .052$ , or the total attitude score,  $p = .051$ . Dunn's pairwise tests with Bonferroni correction were then used to locate the differences. No pairwise comparison remained significant for Interest. For Necessity, three comparisons were significant: RK–K ( $p = .020$ ), RK–VARK ( $p = .016$ ), and RK–VK ( $p = .036$ ). All three involved the RK group, which included only three participants. On its own, the significant omnibus result carries little weight, since it rests largely on one very small group.

### Grouping by Number of Modalities

The exploratory comparison suggested that the small profile groups could affect the stability of the results. To address this issue, participants were regrouped according to the number of preferred modalities: one, two, three, or four. Table 3 presents the results of this second comparison.

**Table 3.** Kruskal–Wallis H test results for attitude scores by number of preferred modalities

| Dimension   | Number of modalities | n  | Mean rank | H     | df | p    | $\varepsilon^2$ |
|-------------|----------------------|----|-----------|-------|----|------|-----------------|
| Willingness | One                  | 39 | 71.40     | 1.169 | 3  | .760 | .000            |
|             | Two                  | 26 | 71.90     |       |    |      |                 |
|             | Three                | 19 | 60.84     |       |    |      |                 |
|             | Four                 | 55 | 71.27     |       |    |      |                 |
| Interest    | One                  | 39 | 79.68     | 4.211 | 3  | .240 | .009            |
|             | Two                  | 26 | 69.17     |       |    |      |                 |
|             | Three                | 19 | 57.79     |       |    |      |                 |
|             | Four                 | 55 | 67.75     |       |    |      |                 |
| Necessity   | One                  | 39 | 69.13     | 1.815 | 3  | .612 | .000            |
|             | Two                  | 26 | 67.42     |       |    |      |                 |
|             | Three                | 19 | 64.92     |       |    |      |                 |
|             | Four                 | 55 | 73.59     |       |    |      |                 |
| Total       | One                  | 39 | 73.53     | 2.174 | 3  | .537 | .000            |
|             | Two                  | 26 | 72.15     |       |    |      |                 |
|             | Three                | 19 | 57.68     |       |    |      |                 |
|             | Four                 | 55 | 70.74     |       |    |      |                 |

*Note.*  $N = 139$ . Negative  $\varepsilon^2$  values were reported as .000.

No significant differences were found for any attitude dimension when participants were grouped by the number of preferred modalities. The  $p$  values ranged from .240 to .760, and the effect sizes were close to zero. A further comparison was made between participants with single-modal and multimodal profiles.

The single-modal ( $n = 39$ ) and multimodal ( $n = 100$ ) groups did not differ significantly on any attitude dimension: Willingness ( $U = 1895.50$ ,  $Z = 0.26$ ,  $p = .798$ ,  $r = .02$ ), Interest ( $U = 1572.50$ ,  $Z = 1.77$ ,  $p = .076$ ,  $r = .15$ ), Necessity ( $U = 1916.00$ ,  $Z = -0.23$ ,  $p = .817$ ,  $r = .02$ ), and the total attitude score ( $U = 1812.50$ ,  $Z = 0.64$ ,  $p = .520$ ,  $r = .06$ ). The largest effect was found for Interest ( $r = .15$ ), but this difference was not statistically significant. Taken together, the grouped analyses did not support a meaningful difference in course attitudes by learning preference. The significant omnibus results from the 13-profile analysis were not confirmed once the profiles were combined into larger and more stable groups.

### **Attitudes by Course Grade**

After examining learning preferences, the analysis turned to course grade. Participants' attitude scores were compared across the five course-grade groups to determine whether students with higher course grades reported different levels of willingness, interest, necessity, and overall attitude. Five course-grade groups were compared because no participant received a CC grade. Mean ranks rose with course grade in most dimensions; for Willingness they were 88.29 (AA), 70.07 (BA), 64.97 (BB), 61.93 (CB), and 28.36 (DC), and for Interest 81.99, 74.49, 70.76, 57.13, and 22.50, respectively. For Necessity, the BB group had the highest mean rank (81.62), followed by AA (71.36), BA (69.78), CB (56.87), and DC (52.86).

Significant differences were found across course-grade groups for Willingness,  $H(4) = 16.514$ ,  $p = .002$ ,  $\epsilon^2 = .093$ ; Interest,  $H(4) = 15.812$ ,  $p = .003$ ,  $\epsilon^2 = .088$ ; Necessity,  $H(4) = 13.657$ ,  $p = .008$ ,  $\epsilon^2 = .072$ ; and the total attitude score,  $H(4) = 18.465$ ,  $p = .001$ ,  $\epsilon^2 = .108$ . The effect sizes were close to the medium range. Bonferroni-corrected Dunn tests were used to identify the group differences. For Willingness, the AA group scored significantly higher than the DC group ( $p = .003$ ). For Interest, the DC group scored significantly lower than the AA ( $p = .003$ ), BA ( $p = .015$ ), and BB groups ( $p = .039$ ). For Necessity, the only significant difference was between the BB and CB groups ( $p = .010$ ). For total attitude, the DC group scored significantly lower than the AA ( $p = .001$ ) and BA groups ( $p = .026$ ), while the CB group scored lower than the AA group ( $p = .045$ ). The mean ranks generally rose with course grade. For total attitude, the mean ranks were 86.49 for AA, 72.57 for BA, 69.18 for BB, 55.78 for CB, and 23.07 for DC. Since the DC group included only seven participants, these comparisons rest on very few observations.

### **Attitudes by Gender**

Gender was then examined as another possible source of variation in course attitudes. Female and male participants were compared across the three attitude dimensions and the total score.

No significant gender differences were found for Willingness ( $U = 1476.00$ ,  $Z = 0.19$ ,  $p = .846$ ,  $r = .02$ ), Interest ( $U = 1192.50$ ,  $Z = 1.71$ ,  $p = .088$ ,  $r = .14$ ), Necessity ( $U = 1397.00$ ,  $Z = 0.89$ ,  $p = .375$ ,  $r = .08$ ), or the total attitude score ( $U = 1307.50$ ,  $Z = 1.09$ ,  $p = .277$ ,  $r = .09$ ). Female participants ( $n = 112$ ) had higher mean ranks than male participants ( $n = 27$ ) in all four comparisons, but the differences were small.

The gender distribution in the sample was uneven, with 112 female and 27 male participants. These results should therefore be interpreted as an absence of statistically detectable gender differences in this sample rather than evidence of equivalence between the groups.

### **Attitudes by Grade Level**

The final analysis focused on grade level. Third- and fourth-year participants were compared to determine whether progress through the teacher education program was associated with differences in attitudes toward the course. The results are presented in Table 4.

**Table 4. Mann–Whitney U test results for attitude scores by grade level**

| Dimension   | Group       | n  | Mean rank | Sum of ranks | U       | Z     | p    | r   |
|-------------|-------------|----|-----------|--------------|---------|-------|------|-----|
| Willingness | Third year  | 73 | 61.99     | 4525.50      | 1824.50 | -2.49 | .013 | .21 |
|             | Fourth year | 66 | 78.86     | 5204.50      |         |       |      |     |
| Interest    | Third year  | 73 | 62.75     | 4581.00      | 1880.00 | -2.24 | .025 | .19 |
|             | Fourth year | 66 | 78.02     | 5149.00      |         |       |      |     |
| Necessity   | Third year  | 73 | 66.43     | 4849.50      | 2148.50 | -1.59 | .111 | .14 |
|             | Fourth year | 66 | 73.95     | 4880.50      |         |       |      |     |

| Dimension | Group       | n  | Mean rank | Sum of ranks | U       | Z     | p    | r   |
|-----------|-------------|----|-----------|--------------|---------|-------|------|-----|
| Total     | Third year  | 73 | 61.01     | 4453.50      | 1752.50 | -2.77 | .006 | .23 |
|           | Fourth year | 66 | 79.95     | 5276.50      |         |       |      |     |

*Note.*  $N = 139$ . Third-year  $n = 73$ ; fourth-year  $n = 66$ . The smaller  $U$  value is reported.

Significant differences were found for Willingness,  $U = 1824.50$ ,  $Z = -2.49$ ,  $p = .013$ ,  $r = .21$ ; Interest,  $U = 1880.00$ ,  $Z = -2.24$ ,  $p = .025$ ,  $r = .19$ ; and the total attitude score,  $U = 1752.50$ ,  $Z = -2.77$ ,  $p = .006$ ,  $r = .23$ . In each case, fourth-year participants had higher mean ranks than third-year participants. The effect sizes were small.

For the total attitude score, third-year participants had a mean of 4.22 ( $SD = 0.56$ ), compared with 4.48 ( $SD = 0.39$ ) for fourth-year participants. No significant difference was found for Necessity,  $U = 2148.50$ ,  $Z = -1.59$ ,  $p = .111$ ,  $r = .14$ . The ceiling effect observed in this dimension may have limited its ability to distinguish between the two grade-level groups.

## Discussion

The study examined pre-service primary school teachers' attitudes toward an online literacy methods course in relation to learning preferences, course grade, gender, and grade level. Participants generally reported positive attitudes toward the course. Learning preference profiles were not associated with consistent differences in attitudes, whereas differences were observed across course-grade groups and between third- and fourth-year participants. No statistically significant gender differences were found. These results need to be read alongside the small profile groups, the retrospective timing of data collection, and the limited effect sizes found in several comparisons.

### **Attitudes Toward the Online Literacy Methods Course**

The positive overall attitude score is consistent with earlier studies of the Teaching of Primary Reading and Writing course (Aytan, 2017; Gömleksiz, 2013; Gözükcük, 2019). Participants rated Necessity and Willingness particularly highly, indicating that they generally regarded the course as relevant to their professional preparation and were willing to engage with it. Given the place of beginning literacy instruction in primary school teaching, the high Necessity score is understandable.

Interest was lower than the other two dimensions. This difference shows that participants could recognise the professional importance of the course without reporting the same level of interest in the course experience. Previous studies of online beginning literacy instruction have described difficulties related to interaction, implementation, and practice-based activities (Arçay Koyuncu, 2022; Atik & Avcı, 2021; Dudak & Biçer, 2022; Susar Kırmızı & Büyükdağ, 2022). Similar concerns have been reported in the broader online teacher education literature. Burke and Fanshawe (2021) noted that practical learning experiences and the integration of theory and practice can be particularly challenging to facilitate online, while Carrillo and Flores (2020) identified interaction, participation, and engagement as recurring concerns in online teacher education. Similarly, Quiamco et al. (2022) showed that pre-service teachers' engagement in emergency remote classes varied across cognitive, emotional, and behavioral dimensions, indicating that online course experiences cannot be reduced to a single overall response. These findings provide a relevant context for interpreting the comparatively lower interest score in the present study. Still, the present study did not compare online and face-to-face delivery and did not measure participants' views of specific online activities. The lower Interest score therefore cannot be attributed directly to the online format. This cautious interpretation is also consistent with meta-analytic evidence showing that attitudes toward technology-supported teacher education do not necessarily differ substantially from those associated with classroom instruction and that outcomes depend importantly on how technology is used pedagogically (Schmid et al., 2023).

The Necessity score also showed a pronounced ceiling effect. Most participants selected responses near the upper end of the scale, which reduced variation within this dimension. The high mean reflects a broadly shared view that the course was necessary, but comparisons involving this dimension should remain cautious because the measure had limited capacity to distinguish among participants.

### ***Learning Preference Profiles and Course Attitudes***

Most participants reported more than one learning preference, and the four-modality VARK profile was the most common. This distribution is broadly consistent with previous studies in which multimodal profiles were common among pre-service teachers (Düzgün & Kaşkaya, 2023; Leite et al., 2010; Sarp & Okumuş, 2025; Ulaş et al., 2012). The large proportion of multimodal participants also shows that many teacher candidates did not identify with a single preferred modality.

The initial comparison across 13 profiles produced significant omnibus differences for Interest and Necessity. These results did not remain stable under closer examination. No pairwise comparison was significant for Interest after the Bonferroni correction. For Necessity, all three significant comparisons involved the RK group, which consisted of only three participants. The very small group sizes in several profiles make it difficult to regard these differences as evidence of a broader pattern.

The grouped analyses provide a clearer basis for interpretation. When participants were classified according to the number of preferred modalities, no significant differences were found in any attitude dimension. The comparison between single-modal and multimodal participants also produced no significant differences, and most effect sizes were close to zero. Based on these analyses, VARK profiles did not distinguish course attitudes reliably in this sample.

This pattern is also consistent with the limited psychometric support reported for VARK scores in previous research (Leite et al., 2010). In the present study, the absence of stable differences across the grouped comparisons suggests that preference profiles should be interpreted cautiously as indicators of how students may respond to an online course. Rather than treating these profiles as strong predictors of educational responses, they may be more appropriately viewed as descriptive indicators of reported preferences whose relationship with course attitudes may vary across samples and contexts.

Taken together, these findings indicate that the diversity observed in participants' VARK profiles did not translate into consistent differences in their attitudes toward the course. Although the 13-profile analysis produced statistically significant omnibus differences for Interest and Necessity, these findings were influenced by very small profile groups and were not supported consistently by the broader grouped analyses. The comparisons based on the number of preferred modalities and single- versus multimodal preferences therefore provide a more stable basis for interpretation.

These findings suggest that reported learning preferences were not strong differentiators of Willingness, Interest, Necessity, or overall course attitude in this sample. This interpretation should nevertheless remain cautious because several VARK modality scores showed modest reliability and some profile groups were very small.

At the same time, the distribution of VARK profiles provides descriptive information about the diversity of learning preferences represented in the sample. Most participants reported multimodal preferences, indicating that their preferred ways of engaging with information were not limited to a single modality. Given that the online literacy methods course included written materials, visual presentations, oral interaction, demonstrations, and practice-oriented activities, this diversity may be relevant when considering how students engage with course content.

### ***Course Grade and Course Attitudes***

Attitude scores differed across course-grade groups in all three dimensions and in the total score. For Willingness, Interest, and total attitude, the general pattern favored participants with higher course grades. Necessity showed a less regular pattern, although the overall test was also significant. These results are consistent with Gözükcük (2019), who reported differences in attitudes according to academic achievement, and with Kızılaslan Tunçer (2013), who found a relationship between achievement and attitudes toward the course.

The association should not be interpreted as directional. More positive attitudes may have been associated with higher course grades, while students who received higher grades may also have evaluated the course more positively after completing it. Since attitudes were measured after the course grades had been finalized, both interpretations remain possible. The cross-sectional design does not allow them to be separated.

Several pairwise differences involved the DC group, which included only seven participants. This small group may have made the comparisons less stable. The effect sizes were in the small-to-moderate range rather than large. Course grade was therefore associated with course attitudes in this sample, but the results do not show that higher course grades caused more positive attitudes or that more positive attitudes caused higher course grades.

### ***Gender and Grade-Level Differences***

No statistically significant gender differences were found in Willingness, Interest, Necessity, or total attitude. This differs from Gözükcük (2019), who reported more positive attitudes among female pre-service teachers. Although female participants had somewhat higher mean ranks, the effect sizes were small and only 27 participants were male. The finding should therefore be interpreted as an absence of detectable gender differences in this sample rather than evidence that gender is unrelated to course attitudes.

Fourth-year participants reported higher Willingness, Interest, and total attitude scores than third-year participants, while no significant difference was found for Necessity. This contrasts with Gözükcük (2019), who found no grade-level difference. The pattern may reflect program progression, greater exposure to school-based experiences, or changes in how students evaluate the course over time. However, these explanations remain tentative because practical experience and time since course completion were not measured directly.

Overall, learning preferences were not associated with stable differences in attitudes toward the online literacy methods course. Course grade and grade level showed clearer, though modest, associations, and these findings should not be interpreted causally.

### ***Conclusion***

This study examined pre-service primary school teachers' attitudes toward an online literacy methods course in relation to learning preferences, course grade, gender, and grade level. Participants generally held positive attitudes toward the course. They regarded it as necessary for their professional preparation and reported high willingness to engage with it, while Interest was lower than the other attitude dimensions. This difference suggests that recognizing the professional value of a course does not necessarily correspond to an equally high level of interest in the learning experience.

Multimodal learning preferences were common, with 71.9% of participants reporting more than one preferred modality. However, VARK profiles did not produce stable differences in course attitudes. The initial comparison across 13 profiles yielded significant omnibus results for Interest and Necessity, but

these findings were not supported by the corrected pairwise comparisons or by the analyses based on broader modality groups. These findings indicate that learning preference profiles did not consistently differentiate course attitudes in this sample.

Attitudes differed across course-grade groups and between third- and fourth-year participants. Students with higher course grades generally reported more positive attitudes, and fourth-year students scored higher in Willingness, Interest, and total attitude. These associations were modest and cannot be interpreted causally. No statistically significant gender differences were found, although the unequal gender distribution limits the strength of this conclusion.

One strength of the study is that it examined VARK profiles in two stages. Reporting the original 13 profiles made the distribution visible, while regrouping participants by the number of modalities reduced the influence of very small cells. The reporting of effect sizes, corrected pairwise comparisons, ceiling effects, and measurement limitations also allowed the findings to be interpreted beyond statistical significance alone.

### ***Implications***

The lower Interest score deserves attention in the design of online literacy methods courses. Participants already viewed the course as necessary, so the main instructional issue appears to be sustaining interest and meaningful participation. Practice-oriented activities may be useful in sustaining interest and meaningful participation; however, the present study did not examine the effects of specific instructional activities. Future research should examine which forms of online practice and interaction are most strongly associated with students' interest and engagement.

The diversity of learning preferences observed in the sample may also be considered in the design of online literacy methods courses. Most participants reported multimodal preferences, while the more stable analyses showed no consistent differences in attitudes across preference groupings. Online courses may therefore benefit from providing varied opportunities for engagement with course content, including written explanations, visual examples, oral discussion, demonstrations, and applied activities. Such variety may be particularly appropriate for a group in which students report different combinations of learning preferences.

The differences associated with course grade suggest that students who experience difficulty in the course may also evaluate it less positively. The direction of this association is unclear. Students with lower course grades may warrant closer attention, although the present study does not identify which forms of instructional support would be most effective.

The higher attitudes reported by fourth-year participants may reflect differences associated with progression through the teacher education program. Teacher education programs may therefore consider linking literacy methods courses more directly with school experience and teaching practice. These connections may help students interpret course content in relation to actual classroom responsibilities.

### ***Suggestions for Future Research***

Future studies should use larger and more balanced samples from multiple universities. Measuring attitudes before and after the course would help clarify changes over time and their relationship with course grade. Research could also examine specific features of online literacy methods courses, such as video demonstrations, synchronous practice, microteaching, peer feedback, and school-linked activities. Qualitative data may further explain why students view the course as necessary while reporting comparatively lower interest.

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### Author's Contributions (CRediT)

Serkan Duzgun: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing – original draft (60%). Ibrahim Kizil: Writing – original draft (literature review and interpretation of findings), Writing – review & editing, English language editing (40%). All authors have read and approved the final manuscript.

### Sustainable Development Goals (SDGs)

This study is linked to the following SDG(s): Quality education (SDG 4).

### Authors' Disclosures

This manuscript was reviewed, edited, and refined with the assistance of ChatGPT (GPT-5.5, OpenAI, August 2026) to improve language, clarity, and readability. The AI tool was used solely to support the editorial process and did not contribute to the study design, data analysis, interpretation of the findings, or the scientific conclusions. All AI-assisted revisions were critically reviewed, verified, and, where necessary, revised by the authors. The authors take full responsibility for the accuracy, integrity, and final content of the manuscript.

### Data Accessibility Statement

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

### Ethics and Consent

This study was approved by the Social and Human Sciences Ethics Committee of Bartın University at its meeting on 27 May 2022 (meeting no. 9, protocol no. 2022-SBB-0215). Separate institutional permission was obtained from the state university in Ankara where the data were collected. All participants provided informed consent prior to participation.

### Funding Information

Not applicable.

### Acknowledgements

The authors thank the pre-service teachers who participated in this study. An earlier version of this study was presented at the 20th International Primary Teacher Education Symposium, Antalya, Türkiye, 14–17 November 2022.

### Competing Interests

The authors have no competing interests to declare.

### Article History

Received: August 4, 2026–Accepted: September 17, 2026

### Suggested citation:

Duzgun, S., & Kizil, I. (2026). Pre-Service Primary School Teachers' Attitudes Toward an Online Literacy Methods Course. *Asian Journal of Distance Education*, 21(2), 112–131.

<https://doi.org/10.5281/zenodo.22814787>



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