The Effectiveness of a Digital Literacy-Integrated Syllabus for Arabic-speaking Courses in Teacher Education Universities in China

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Received: December 3, 2024 Accepted: January 28, 2025 Online Published: February 7, 2025

doi:10.5430/jct.v14n1p202 URL: https://doi.org/10.5430/jct.v14n1p202

Abstract

As digital literacy becomes crucial in modern education, its integration into language education is necessary to prepare preservice teachers to meet 21st-century challenges. This study evaluates the impact of a digital literacy-integrated syllabus for Arabic-speaking courses on the digital literacy and Arabic language acquisition of Chinese preservice teachers in China. This paper presents a Phase 3 evaluation of the Design and Developmental Research (DDR) approach. A one-group pretest and posttest design was employed, with 32 Chinese preservice teachers pursuing Arabic language education at three teacher education universities in Yunnan, Ningxia, and Gansu provinces in China. The participants engaged in 2-week online lessons based on a developed syllabus. This syllabus, designed during Phase 2 design and development of DDR, explicitly included digital literacy objectives and teacher-student interaction strategies and learning activities. It was adapted from Yunnan Normal University's syllabus for an Arabic-speaking course. Qualitative data were collected through individual online interviews with five randomly selected participants after completing the 2-week lessons. Quantitative results showed significant improvements in digital literacy across technical, cognitive, attitudinal, and social-emotional domains. Additionally, the findings indicated that the syllabus enhanced preservice teachers' engagement and interest in learning to speak and understand Arabic. However, addressing challenges in the implementation is important to maximize its benefits. These findings contribute to the growing field of technology-enhanced Arabic language education for preservice teachers in China.

Keywords: pre-service teacher education, digital literacy, learning Arabic as a second language, syllabus design

1. Introduction

The Arabic language has cultural, religious, and historical importance worldwide, and there is a growing interest in learning it as a second language, particularly in non-Arabic-speaking countries. In China, the demand for Arabic is relatively high, especially in provinces with large Muslim populations, such as Ningxia, Gansu, and Yunnan. Forty-two percent of Hui people live in Gansu and Ningxia provinces, 6% live in Yunnan, and the remaining half are scattered across the country (Pew Research Center, 2023). Furthermore, the Chinese government's Belt and Road initiative has increased this trend, developing Arabic as a critical language to support economic exchanges with Arabic-speaking countries. Furthermore, Arabic language education in China has gained increased attention in foreign language planning (An & Zheng, 2022). Five universities in Yunnan, Ningxia, and Gansu provinces now offer 4-year undergraduate programs in Arabic to prepare a new generation of preservice teachers. Al-Nahdi and Zhao's study (2022) revealed that Chinese university students exhibit a high instrumental motivation toward learning Arabic to gain social or economic benefits. Thus, Arabic speaking skills are important.

Speaking skills play a crucial role in second language acquisition because learners are required to actively use the target language, practice communication, and develop their ability to express themselves. Developing speaking skills is the most crucial part of learning a foreign or second language because learners' ability to carry on a conversation in the target language is a key indicator of success (Nunan, 1995). However, previous research has shown that Chinese Arabic learners face challenges in speaking proficiency (Gu & Ismail, 2024) and experience speaking anxiety (Kouihi, 2019; Lian, 2021). This foreign language anxiety hinders learners' ability to engage confidently in communication, thereby affecting their Arabic-speaking acquisition process.

Studies have shown that digital literacy practices positively impact Arabic language learning outcomes (Ilmiani & Miolo, 2021; Moghazy, 2021; Ritonga et al., 2021), particularly in improving Arabic speaking skills (Sarip et al., 2024; Shao et al., 2022). Digital tools and resources offer second-language learners opportunities to engage with Arabic dynamically and authentically, fostering interaction with native speakers through online platforms and real-time communication (Moghazy, 2021). Moreover, some learners prefer to practice Arabic speaking with AI tools rather than with peers or instructors in the classroom. AI technologies, such as Talkpal AI, provide second language learners with a low-stress speaking learning environment using real-time conversation (Dikaprio & Diem, 2024). Feedback from an AI robot might reduce learners' stress and fear of receiving negative evaluations, and this can reduce foreign language speaking anxiety (Shao et al., 2022).

Although digital technology has transformed global educational practices in recent years (Akhmedov, 2022; Sarip et al., 2024), Arabic language study programs at teacher education universities in China have not kept pace with this digital shift, particularly in the integration of digital literacy with speaking instruction. The expansion of technology means digital literacy is a crucial ability for individuals to participate effectively in the digital world (Warschauer & Matuchniak, 2010). Chiu et al. (2023) pointed out that the ability to learn with technologies such as AI depends on the digital literacy of both teachers and students (Chiu et al., 2023). According to Ng (2012), digital literacy includes technology skills (using technological tools), social skills (communicating and socializing), and cognitive skills (thinking critically when managing information). YaNa (2018) found that the main challenge in preparing Arabic language instructors in China is insufficient professional training. A previous study by Mustapa et al. (2021) indicated that preservice teachers are not ready to effectively integrate digital tools into Arabic teaching practice due to insufficient support. This gap leaves preservice teachers underprepared for technology-enhanced classrooms, and these skills are essential for fostering learners in the 21st century (Fannakhosrow et al., 2022). This gap is compounded by the lack of structured, digital literacy-integrated syllabi for Arabic language instruction, with Arabic programs largely focused on religious teachings and traditional language skills (Tan & Ding, 2014). For instance, Northwest Normal University offers courses on Arabic literature, translation theory, and economic Arabic. However, these programs overlook the critical digital literacy required for effective language teaching in the 21st century. In response, the Ministry of Education of China's 2022 "Digital Literacy of Teachers" document emphasized the need for improving digital literacy across five key aspects: digital knowledge and skills, digital awareness, digital application, digital social responsibility, and professional development. The digital literacy of preservice teachers should be considered in teacher training in China (Lin et al., 2023).

In response to this growing need, this study evaluated a developed digital literacy-integrated syllabus for Arabic-speaking courses tailored to the needs of preservice teachers learning Arabic in China. This developed syllabus aims to improve both digital literacy and Arabic language speaking proficiency. The research questions of the study are as follows:

(1) What are the digital literacy levels of pre-service teachers before and after the implementation of the developed digital literacy-integrated syllabus for the Arabic-speaking courses?

(2) Is there any statistically significant difference in the digital literacy scores among pre-service teachers before and after the implementation of the developed digital literacy-integrated syllabus for the Arabic-speaking courses?

(3) What are the perspectives of pre-service teachers on the strengths and weaknesses of the developed digital literacy-integrated syllabus for Arabic-speaking courses?

The findings contribute to the growing attention of research on the integration of digital literacy into Arabic language education and provide practical insights for curriculum designers and educators in language teacher preparation programs in China.

2. Methods

2.1 Research Design

The Design and Development Research (DDR) approach (Richey & Klien, 2007) was used in the study in Phase 1 (needs analysis), Phase 2 (design and development), and Phase 3 (evaluation). This paper focuses on Phase 3, which involved implementing and evaluating the developed digital literacy-integrated syllabus for the Arabic-speaking courses for Chinese preservice teachers in China. With support from experts in the Arabic language, digital technology, and curriculum design, this study developed a digital literacy-integrated syllabus for the Arabic-speaking courses in Phase 2, integrated digital literacy objectives, and outlined teacher-student interaction strategies and learning activities. It was adapted from Yunnan Normal University's syllabus for an Arabic-speaking course for

second-year preservice teachers. The curriculum development model (Richard, 2001), Bloom's taxonomy (Bloom et al., 1956), and digital literacy model (Ng, 2012) were used in the design and development phase. The developed syllabus was implemented in the evaluation phase after being reviewed by two experts. This paper represents Phase 3, which involved evaluating the developed syllabus through a one-group pre-test and post-test design to measure its effectiveness in improving digital literacy and Arabic language proficiency.

Kirkpatrick's four-level training evaluation model (1996) was used as a framework for this study because it specifically addresses the evaluation of training programs. This aligns with the study's focus on evaluating the effectiveness of the developed syllabus. Kirkpatrick's model (1996) has four levels: reaction, learning, behavior, and results. However, this study only focused on the reaction and learning level. The reaction level focused on participants' feelings and satisfaction. This study used interviews with preservice teachers learning Arabic in China to gather perspectives on the developed digital literacy-integrated syllabus. The learning level examined the extent to which participants improved their skills and knowledge and changed their attitudes after the training. The study used a one-group pretest and posttest design to assess the digital literacy scores among preservice teachers before and after the implementation of the syllabus.

2.2 Implementation

The developed syllabus consisted of 10 units. According to experts' consensus, "Unit 5: Chatting With Arabs" and "Unit 10: Study on the Internet" were selected for implementation (See Appendix A and Appendix B). Two experts reviewed the lesson plans. Each lesson plan had six parts: goals, objectives, materials and equipment, procedures, evaluation, and homework (Brown & Lee, 2015). The goals, objectives, and evaluation parts integrated specific requirements for Arabic speaking skills and digital literacy. Furthermore, the developed syllabus integrated teaching methods such as digital materials and content, group presentations, AI-interactive speaking practice, online discussions, traditional lectures, and role-playing conversation exercises in the classroom. Table 1 provides an overview of the durations of the different implementation phases.

Table 1. Duration of the Implementation Phase

Implementation phase	Duration
Pretest	(Self Digital Literacy Assessment (10 minutes)
Course	a. An Arabic-speaking online lesson for Unit 5 through the Tencent Meeting platform (90 minutes).
	b. An Arabic-speaking online lesson for Unit 10 through the Tencent Meeting platform (90 minutes).
Posttest	Self Digital Literacy Assessment (10 minutes)
	Post-course online interview (5 minutes)

2.3 Participants

The participants of the one-group pretest and posttest included 32 Chinese preservice teachers in their second year of Arabic language education at three teacher education universities in Yunnan, Ningxia, and Gansu provinces. These participants engaged in two-week online lessons based on the developed syllabus. Five preservice teachers were randomly selected to participate in postlesson interviews. Participation in the interviews was anonymous.

2.4 Data Collection

The instrument of the one-group pretest and posttest was the Digital Literacy Scale adapted from Ng (2012). The pretest score used 5-point Likert scale questions to assess Arabic preservice teachers' digital literacy level in cognitive, technological, attitudinal, and social-emotional domains. The posttest score had the same digital literacy items as the pretest. All digital literacy self-assessment scale items were divided into four domains (Table 2).

The instrument for follow-up individual online interviews was an interview guide. The interview guide was a set of questions asked by the researchers in an interview format (Merriam & Tisdell, 2015). The interview guide in the study consisted of evaluation questions to assess the relevance and appropriateness of the developed syllabus in digital literacy and Arabic language speaking proficiency.

Table 2. Domains of Digital Literacy

Domain	Item Numbers
Cognitive	12, 17
Technical	7, 8, 9, 10, 11, 16
Attitudes	1, 2, 3, 4, 6, 13, 14
Social-emotional	5, 15

2.5 Data Analysis

The study employed a statistical analysis to analyze the quantitative data collected from the digital literacy self-assessment scale. The mean scores were compared using descriptive statistical methods. To investigate whether there was a statistically significant difference in digital literacy scores, a paired sample *t* test was conducted.

In addition, the qualitative data from the follow-up individual online interviews were analyzed using six steps of thematic analysis (Braun & Clarke, 2006). This thematic analysis aimed to explore preservice teachers' perspectives of the developed syllabus. To enhance the validity and reliability of the qualitative findings, member checking was used in the study. The participants reviewed and verified the researchers' interpretations of the feedback from their interviews. Member checking helps minimize the risk of misinterpretation by participants and reduces researcher bias, ensuring a more accurate reflection of participants' views and experiences (Maxwell, 2005).

3. Results

This section presents findings from the one-group pretest and posttest, *t* test, and postcourse individual interviews.

3.1 Findings for Research Question 1

The study compared the means of each item in the digital literacy self-assessment scale before and after the implementation of the developed digital literacy-integrated syllabus. The results are based on the responses of 32 participants. Table 3 shows that the pretest mean for overall digital literacy in the cognitive domain was 2.375 (*SD* = .842), while the posttest mean increased to 2.875 (*SD* = .707). This shows an improvement in the cognitive domain after the syllabus implementation. Item 12 improved from 2.750 (*SD* = 1.107) in the pretest to 3.563 (*SD* = .840) in the posttest. Item 17 showed improvement, increasing from 2.000 (*SD* = .916) in the pretest to 2.188 (*SD* = .931) in the posttest, but it remained relatively low in both tests.

Table 3. Mean and Standard Deviation of the Digital Literacy Items in the Cognitive Domain

No.	Item	Mean (Pretest)	SD (Pretest)	Mean (Posttest)	SD (Posttest)
12	I am confident with my search and evaluation skills in regards to obtaining information from the Web.	2.750	1.107	3.563	.840
17	I am familiar with issues related to web-based activities e.g. cyber safety, search issues, and plagiarism.	2.000	.916	2.188	.931
	Total	2.375	.842	2.875	.707

Based on Table 4, the pretest mean for overall digital literacy in the technical domain was 2.240 (*SD* = .883), while the posttest mean increased to 2.891 (*SD* = .718). It is important to note that Item 11 had the lowest average score on the pretest has the lowest average score (*M* = 1.183, *SD* = .998), while it showed the highest increase in the posttest, rising to 3.313 (*SD* = .896). This significant increase highlights the improvement in participants' technical skills needed to use information and communication technologies (ICT) for learning and creating Arabic artifacts (e.g. presentations, videos, online posts, Word documents). Furthermore, the average score of Items 7, 8, 9, 10, and 16 increased in the technical domain on the posttest compared to the pretest. These findings further support the positive impact of the digital literacy-integrated syllabus in the technical domain.

Table 4. Mean and Standard Deviation of the Digital Literacy Items in the Technical Domain

No.	Item	Mean (Pretest)	SD (Pretest)	Mean (Posttest)	SD (Posttest)
7	I know how to solve my technical problems.	2.469	.950	2.938	.982
8	I can learn new technologies easily.	2.094	.963	2.375	1.100
9	I keep up with important new technologies.	2.031	1.204	2.313	1.091
10	I know about a lot of different technologies.	2.313	1.176	3.031	.897
11	I have the technical skills I need to use ICT for learning and to create Arabic artifacts (e.g. presentations, videos, online posts, Word documents) that demonstrate my understanding of what I have learned.	1.813	.998	3.313	.896
16	I have good ICT skills.	2.719	1.023	3.375	.793
	Total	2.240	.883	2.891	.718

According to Table 5, the overall mean score for the pretest was 3.268 (*SD* = .739), while the posttest mean increased to 4.054 (*SD* = .492). These findings revealed that there was an improvement in pre-service teachers' attitudes toward technology as a tool for enhancing their Arabic language-speaking learning efforts. This shift is particularly evident in the context of their ability to utilize ICT to support their speaking in Arabic learning.

Table 5. Mean and Standard Deviation of the Digital Literacy Items in the Attitudes Domain

No.	Item	Mean (Pretest)	SD (Pretest)	Mean (Posttest)	SD (Posttest)
1	I like using ICT for Arabic-speaking learning.	3.031	.897	3.844	.723
2	I learn Arabic speaking better with ICT.	2.969	.861	3.594	.712
3	ICT makes Arabic-speaking learning more interesting.	3.313	1.030	4.594	.560
4	I am more motivated to learn Arabic speaking with ICT.	3.125	1.070	4.188	.780
6	ICT enables me to be a self-directed and independent learner.	3.219	.975	3.344	.865
13	There is a lot of potential in the use of mobile technologies (e.g. iPads, smartphones, etc.) for Arabic-speaking learning.	3.281	.924	4.500	.568
14	Teachers/ lecturers should use more ICT in their teaching of Arabic speaking in my class.	3.938	.716	4.313	.592
	Total	3.268	.739	4.054	.492

Item 14 had the highest mean score in the pretest (*M* = 3.938, *SD* = .716), indicating strong support for increasing the use of ICT in Arabic-speaking teaching. In the posttest, the highest mean score was observed in Item 3 (*M* = 4.594), highlighting that preservice teachers found ICT-enhanced Arabic-speaking learning more interesting. Although Item 2 had a relatively low mean score on the pretest (*M* = 2.969, *SD* = .861), the posttest score increased to *M* = 3.594 (*SD* = .712), suggesting a noticeable shift in preservice teachers' perceptions of ICT as a tool for improving their Arabic speaking. Items 4, 6, and 13 in the attitudes domain all showed increases in mean scores between the pretest and posttest phases.

Table 6 presents the results of the digital literacy items in the social-emotional domain. The overall mean for the pretest was 3.281 (*SD* = .941), while the posttest mean increased to 4.188 (*SD* = .669), reflecting an improvement in preservice teachers' perceived social-emotional digital literacy skills. Item 5 showed a substantial increase from the pretest (*M* = 3.219, *SD* = 1.008) to the posttest (*M* = 4.250, *SD* = 0.718). Interestingly, compared to Item 5, Item 15's mean value increased less in comparison to the pretest.

Table 6. Digital Literacy Items in the Social-Emotional Domain

No.	Item	Mean (Pretest)	SD (Pretest)	Mean (Posttest)	SD (Posttest)
5	I frequently obtain help with my university work from my friends over the Internet e.g. through WeChat, QQ, and Xiaohongshu.	3.219	1.008	4.250	.718
15	ICT enables me to collaborate better with my peers on project work and other learning activities.	3.344	1.125	4.125	.871
	Total	3.281	.941	4.188	.669

3.2 Findings for Research Question 2

To answer the Research Question 2, the following hypotheses were formulated:

H_0: There is no statistically significant difference in the digital literacy score among Arabic preservice teachers before and after the implementation of the developed digital literacy-integrated speaking syllabus.

H_a: There is a statistically significant difference in the digital literacy score among Arabic preservice teachers before and after the implementation of the developed digital literacy-integrated speaking syllabus.

The study first conducted the normality test using SPSS. Table 7 shows the results of the normality test. According to Mooi and Sarstedt (2011), the Shapiro-Wilk test is more powerful in situations with smaller sample sizes ($N \leqslant 50$) compared to the Kolmogorov-Smirnov test. The sample size of the study was 32 participants; thus, the Shapiro-Wilk test was used to analyze the data. Table 4 indicates that the p value of the pretest ($p = .081$) was larger than .05. Similarly, the p value of the posttest ($p = .142$) was larger than .05. Therefore, because both pretest and posttest data met the assumption of normality, the study proceeded with a paired sample *t* test using SPSS.

Table 7. Results of the Normality Test

Test	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	*df*	Sig.	Statistic	*df*	Sig.
Pretest	.145	32	.086	.941	32	.081
Posttest	.140	32	.113	.950	32	.142

Note. a. Lilliefors Significance Correction

Table 8 shows the results of the *t* test. As shown in Table 8, the *t* test results indicated a significant improvement in scores between the pretest and posttest (t (31) = -9.217, $p < .001$). Thus, H_0 is rejected ($p < .05$). It indicates there is a statistically significant difference in the score of digital literacy among Arabic language preservice teachers before and after the implementation of the developed digital literacy-integrated speaking syllabus. These results suggest that the syllabus had a positive impact on the participants' digital literacy.

Table 8. Results of Paired Sample *t* Test

Test	Paired Differences					
	Mean	N	Std. Deviation	T	df	Sig. (2-Tailed)
Pretest	2.802	32	.729	-9.217	31	.000
Posttest	3.520	32	.513			

*. $p < .05$

3.3 Findings for Research Questions 3

3.3.1 The Strength of the Developed Syllabus

Increased Interest and Engagement in Arabic-speaking Learning. The participants expressed that the digital literacy-integrated speaking syllabus made Arabic learning more enjoyable and engaging. Preservice teacher #1 reported in the interview, "The Arabic lessons were interesting and useful. I have to say that I felt more motivated when the lecturer showed me these new tools, websites, and technologies to me. I focused on the course more than

before." Similarly, preservice teacher #2 said, "New technologies such as AI made me more motivated to practice speaking in Arabic. I won't feel so nervous when talking to AI because it won't make fun of me." The quantitative data confirmed that Item 3 (ICT makes Arabic-speaking learning more interesting) and Item 4 (I am more motivated to learn Arabic speaking with ICT) increased in the mean value compared to the pretest.

Usefulness and Practical Applications of Digital Tools. Several participants highlighted the practical benefits of using digital tools for both language learning and digital literacy. Preservice teacher #3 reported, "I had a very good experience with the two-week course, and I found the syllabus very practical because these technologies helped in second language acquisition, not only with my Arabic learning but also with my digital search and presentation skills, which I can also use in other classes." The interview data reveals that the Arabic language preservice teachers recognized the value of integrating technology into Arabic language learning. Preservice teacher #1 reflected on using AI-based tools like Talkpal AI, stating, "I saw the lecturer use Talkpal AI in class, and then I practiced conversations with my classmates using the AI. I even used it after class. Before this, I didn't know AI could be used for real-time interactive conversations." These findings were also supported by quantitative data. Item 11 (I have the technical skills I need to use ICT for learning and to create Arabic artifacts, e.g. presentations, videos, online posts, and Word documents) increased the most in the mean value in the posttest.

3.3.2 The Weakness of the Developed Syllabus

Increased Workloads. Although participants acknowledged the benefits of digital literacy elements integration into Arabic speaking lessons, they also pointed out that it required more time to prepare and complete the assigned tasks. Preservice teacher #2 stated, "It took me more time to search for information and prepare for the lessons compared to traditional classes. There are more digital resources to preview in addition to the content of units in the textbook, although the overall experience is not bad." Preservice teacher #1 explained, "In fact, I spent a little bit of time completing the digital tasks because I had to learn how to use tools such as PowerPoint, Tencent forums, and Talkpal AI first before presenting them in Arabic." This feedback highlights the additional cognitive load involved in mastering both Arabic language content and the digital tools required for assigned task completion, which could affect the overall Arabic learning experience with a digital literacy-integrated syllabus.

Ineffective Teamwork in Online Collaborative Tasks. Some Arabic language preservice teachers found it difficult to work with others in digital environments. Preservice teacher #1 commented, "Sometimes, the effectiveness of collaborating online is low, especially when there are some uncooperative group members. I hope that I can talk to them face to face directly." Also, preservice teacher #5 noted, "My group members were not serious. They were chatting instead of searching for resources and preparing for the presentation on Arabic and Muslim customs." The findings suggest that the Arabic collaborative experience with digital tools is not seamless. While the digital literacy-integrated syllabus integrated collaborative digital tools, it did not sufficiently address the issues of ineffective teamwork in online collaborative tasks. These findings were supported by quantitative data. Item 15 (ICT enables me to collaborate better with my peers on project work and other learning activities) increased relatively less in the mean value of the posttest compared to other items, revealing that preservice teachers faced challenges in online collaborative tasks.

4. Discussion

The findings of this study highlight the effectiveness of the developed digital literacy-integrated syllabus for Arabic-speaking courses for Chinese preservice teachers. The results demonstrate significant improvements in digital literacy across technical, cognitive, attitudinal, and socioemotional domains, along with increased interest and engagement in Arabic-speaking learning. These findings align with Ng's (2012) study, which emphasized the impact of integrating digital tools into education. The syllabus effectively combined digital literacy elements, such as technology-mediated communication and collaboration and seamless use, demonstrating self-efficacy (Janssen et al., 2013). It also included AI-interactive speaking practices, online research, and group presentations to enhance Arabic language learning and digital literacy. The inclusion of the digital willingness and attitude element (Ministry of Education of China, 2022) fostered positive attitudes toward technology-enhanced learning. This was corroborated by qualitative data, where participants expressed increased engagement and motivation in Arabic-speaking activities. Kessler (2018) found that technology-mediated social interactions could benefit the language learners. AI tools like Talkpal AI provide a nonjudgmental platform for reducing speaking anxiety and enhancing participation. These results confirm the motivational potential of digital tools in Arabic language speaking acquisition (Aliyu et al., 2024; Bahruddin & Febrıanı, 2020; Ritonga et al., 2021; Shao et al., 2022).

Another key strength of the syllabus is its practicality. Participants reported transferable skills in academic and

professional contexts, aligning with Martin and Grudziecki's (2006) emphasis on digital literacy as a life-enabling skill. Digital literacy is a crucial skill for individuals to effectively participate in the digital world (Warschauer & Matuchniak, 2010). By integrating real-world applications, the syllabus prepared preservice teachers for future challenges in education and the digital world. These findings support the broader practical value of a digital literacy-integrated syllabus for preservice teachers' future careers.

Despite these strengths, there are also challenges. Increased workloads and ineffective teamwork in online collaborative activities emerged as significant barriers. These findings are consistent with Capdeferro and Romero's (2012) observation of frustrations linked to workload distribution and teamwork dynamics. Collaborative learning activities such as group presentations promote information sharing and Arabic skills development. However, uncooperative group members can undermine their effectiveness, as previously noted in the literature (Bahruddin & Febrıanı, 2020; Mazlan et al., 2020). This highlights the additional effort required to integrate digital literacy in Arabic language learning because integrating digital literacy into instructional design is one of the difficulties of the integration of technology (Blau et al., 2020).

Addressing these issues requires structured guidance and enhanced scaffolding from lecturers to support learners as they use digital tools and collaborate. Lecturers should consider the additional time and cognitive demands for learners, especially those who are unfamiliar with these technologies. Additionally, clear expectations and structured guidelines for collaborative tasks are essential for fostering productive teamwork. Moreover, future syllabus design should consider integrating more digital tools that encourage active participation and reduce the affective barriers such as speaking anxiety commonly faced in second language learning. This is especially important in improving Arabic speaking skills, where learners often experience anxiety and hesitation (Kouihi, 2019; Lian, 2021).

5. Conclusion

The study highlights the potential of integrating digital literacy into Arabic language education for preservice teachers to enhance both digital literacy and learning engagement. The digital literacy-integrated syllabus helps equip future teachers with critical skills to teach in modern classrooms. However, addressing implementation challenges is crucial for maximizing the benefits of such an innovative syllabus. Future efforts should improve scaffolding and clearer guidelines for improving collaborative tasks, ensuring a holistic and sustainable approach to digital literacy in language pre-service teacher preparation programs. Furthermore, the study's limitations include a small sample size (32 participants) and a short duration (2 weeks). Future research should explore longer-term impacts and the integration of legal and ethical awareness, digital privacy, and security awareness into the syllabus to prepare pre-service teachers for responsible digital citizenship. As digital platforms increasingly influence both teaching and communication, understanding legal and ethical implications and safeguarding privacy and security will be vital for fostering responsible digital citizenship among preservice teachers.

References

Akhmedov, B. A. (2022). Use of Information and Communication Technologies in Higher Education: Trends in the Digital Economy. *Ijtimoiy Fanlarda Innovasiya Onlayn Ilmiy Jurnali*, 71-79. Retrieved January 4, 2024, from http://www.sciencebox.uz/index.php/jis/article/view/1365

Aliyu, R. I., Adam, I. M., & Abdurrashid, M. (2024). Effectiveness of E-learning Mode for Developing Arabic Language Skills for Non-Arab Speakers in Nigeria: An Empirical Study on FCE Katsina Students. *Journal of Innovative Research*, *2*(3), 7-14. https://doi.org/10.54536/jir.v2i3.3317

Al-Nahdi, Y. A. A., & Zhao, S. (2022). Learning Arabic Language in China: Investigation on Instrumental and Integrative Motivations of Chinese Arabic Learners. *Technium Soc. Sci. J.*, *27*, 767. Retrieved May 5, 2024 from https://heinonline.org/HOL/LandingPage?handle=hein.journals/techssj27&div=70&id=&page=

Bahruddin, U., & Febrıanı, S. R. (2020). Student's Perceptions of Arabic Online Learning During COVID-19 Emergency. *Journal for the Education of Gifted Young Scientists*, *8*(4), 1483-1492. https://doi.org/10.17478/jegys.763705

Blau, I., Shamir-Inbal, T., & Avdiel, O. (2020). How Does the Pedagogical Design of a Technology-enhanced Collaborative Academic Course Promote Digital Literacies, Self-regulation, and Perceived Learning of Students? *The Internet and Higher Education*, *45*, 100722. https://doi.org/10.1016/j.iheduc.2019.100722

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of Educational Objectives: The Classification of Educational Goals. Cognitive Domain* (pp. 20-24). New York: McKay.

Braun, V., & Clarke, V. (2006). Using Thematic Analysis in Psychology. *Qualitative Research in Psychology*, *3*(2), 77-101. https://doi.org/10.1191%2F1478088706qp063oa

Brown, H. D., & Lee, H. (2015). *Teaching by Principles: An Interactive Approach to Language Pedagogy*. Pearson.

Capdeferro, N., & Romero, M. (2012). Are online learners frustrated with collaborative learning experiences? *International Review of Research in Open and Distributed Learning*, *13*(2), 26-44. https://doi.org/10.19173/irrodl.v13i2.1127

Chiu, T. K., Moorhouse, B. L., Chai, C. S., & Ismailov, M. (2023). Teacher Support and Student Motivation to Learn with Artificial Intelligence (AI) Based Chatbot. *Interactive Learning Environments*, 1-17. https://doi.org/10.1080/10494820.2023.2172044

Dikaprio, V., & Diem, C. D. (2024). How Effective is Talkpal AI in Enhancing English Proficiency? Insights from an Experimental Study. *Language, Technology, and Social Media*, *2*(1), 48-59. https://doi.org/10.70211/ltsm.v2i1.48

Fannakhosrow, M., Nourabadi, S., Ngoc Huy, D. T., Dinh Trung, N., & Tashtoush, M. A. (2022). A Comparative Study of Information and Communication Technology (ICT)-Based and Conventional Methods of Instruction on Learners' Academic Enthusiasm for L2 Learning. *Education Research International.* https://doi.org/10.1155/2022/5478088

Gu, B., & Ismail, W. M. (2024). Speaking Skills Problems Encountered By Non-Native Arabic Learners At Universities In Northeast China. *Ijaz Arabi Journal of Arabic Learning*, *7*(3), 871-880. https://doi.org/10.18860/ijazarabi.v7i3.27308

Ilmiani, A. M., & Miolo, M. I. (2021). Digital literacy: An Exploration of Social Media-based Arabic Language Learning. *Journal of Applied Studies in Language*, *5*(2), 215-221. https://doi.org/10.31940/jasl.v5i2.215-221

Janssen, J., Stoyanov, S., Ferrari, A., Punie, Y., Pannekeet, K., & Sloep, P. (2013). Experts' Views on Digital Competence: Commonalities and Differences. *Computers & Education*, *68*, 473-481. https://doi.org/10.1016/j.compedu.2013.06.008

Kessler, G. (2018). Technology and the Future of Language Teaching. *Foreign Language Annals*, *51*(1), 205-218. https://doi.org/10.1111/flan.12318

Kirkpatrick, D. (1996). Great Ideas Revisited: Revisiting Kirkpatrick's Four-Level Model. *Training & Development*, *50*(1), 54-57.

Kouihi, S. (2019). *The Challenges of Learning Modern Standard Arabic as a Foreign Language in China*. [Master's thesis]. Ibn Zohr University.

Lian, C. (2021). Arabic Language Learning Anxiety in Chinese Social Media: A Study of Discursive Habitus and Language Symbolism. *Onomázein*, 88-104. https://doi.org/10.7764/onomazein.ne9.06

Lin, R., Yang, J., Jiang, F., & Li, J. (2023). Does Teacher's Data Literacy and Digital Teaching Competence Influence Empowering Students in the Classroom? Evidence from China. *Education and Information Technologies*, *28*(3), 2845-2867. https://doi.org/10.1007/s10639-022-11274-3

Martin, A., & Grudziecki, J. (2006). DigEuLit: Concepts and Tools for Digital Literacy Development. *Innovation in Teaching and Learning in Information and Computer Sciences*, *5*(4), 249-267. https://doi.org/10.11120/ital.2006.05040249

Maxwell, J. A. (2005). *Qualitative Research Design: An Interactive Approach* (2nd ed.). California: Sage.

Mazlan, N. H., Halili, S. H., & Leng, C. H. (2020). Evaluating Collaborative Learning in Malay Language Writing Instruction: A Case Study. *JuKu: Jurnal Kurikulum & Pengajaran Asia Pasifik*, *8*(3), 49-57. Retrieved January 3, 2024 from https://ajap.um.edu.my/index.php/JUKU/article/view/25776

Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative Research: A Guide to Design and Implementation* (4th ed.). San Francisco: John Wiley & Sons.

Ministry of Education of the People's Republic of China. (2022). *教育部关于发布《教师数字素养》教育行业标准的通知 [Report of the Ministry of Education on the Release of the Education Industry Standard "Digital Literacy of Teachers"]*. Retrieved March 12, 2024, from http://www.moe.gov.cn/srcsite/A16/s3342/202302/t20230214_1044634.html

Moghazy, M. (2021). The Influence of Technology and Innovation in Online Teaching Arabic as a Second Language in Dubai. *J. Educ. Pract*, *12*(5), 58-64. https://doi.org/10.7176/JEP/12-5-08

Mooi, E. A., & Sarstedt, M. (2011). *A Concise Guide to Market Research: The Process, Data, and Methods Using IBM SPSS Statistics* (1st ed.). Berlin, Heidelberg: Springer.

Mustapa, A. M., Saad, M. F. M., & Ghani, M. Z. A. (2021). Challenges and Expectations of Online Arabic Language Teaching In The Covid-19 Pandemic Era. *Ijaz Arabi Journal of Arabic Learning*, *4*(3), 599-609. https://doi.org/10.18860/ijazarabi.v4i3.11997

Ng, W. (2012). Can We Teach Digital Natives Digital Literacy?. *Computers & Education*, *59*(3), 1065-1078. https://doi.org/10.1016/j.compedu.2012.04.016

Nunan, D. (1995). Closing the Gap Between Learning and Instruction. *Tesol Quarterly*, *29*(1), 133-158. https://doi.org/10.2307/3587808

Pew Research Center. (2023). *Measuring Religion in China: 5. Islam*. Retrieved May 8, 2024, from https://www.pewresearch.org/religion/2023/08/30/islam/#:~:text=To%20correct%20for%20these%20issues,2%25%20of%20the%20adult%20population

Richards, J. C. (2001). *Curriculum Development in Language Teaching*. Cambridge: Cambridge University Press.

Richey, R. C., & Klein, J. D. (2007). *Design and Development Research: Methods, Strategies, and Issues* (1st ed.). New York: Routledge.

Ritonga, A. W., Zulfida, S., Ritonga, M., Ardinal, E., & Susanti, D. (2021). The Use of E-learning as an Online Based Arabic Learning Media for Students. In *Journal of Physics: Conference Series* (Vol. 1933, No. 1, p. 012127). IOP Publishing. https://doi.org/10.1088/1742-6596/1933/1/012127

Sarip, M., Ilham, A., Bahtiar, I. R., Hendrawanto, H., Laseduw, S. M. I., & Abdullah, M. (2024). Integrated 6C Skills of the 21st Century with Animation Video Media for Arabic Speaking Material Design. *Jurnal Kependidikan: Jurnal Hasil Penelitian dan Kajian Kepustakaan di Bidang Pendidikan, Pengajaran dan Pembelajaran*, *10*(1), 183-194. https://doi.org/10.33394/jk.v10i1.10549

Shao, S., Alharir, S., Hariri, S., Satam, P., Shiri, S., & Mbarki, A. (2022). Ai-based Arabic Language and Speech Tutor. In 2022 IEEE/ACS 19th *International Conference on Computer Systems and Applications* (AICCSA) (pp. 1-8). IEEE. https://doi.org/10.1109/AICCSA56895.2022.10017924

Tan, C., & Ding, K. (2014). The Role, Developments, and Challenges of Islamic Education in China. Muslim Education in the 21st Century: Asian Perspectives. In Buang, S. & Chew, P.G.-L. (Eds.), *Muslim Schools in the 21st Century: Asian Perspectives* (PP. 55-69). New York: Routledge.

Warschauer, M., & Matuchniak, T. (2010). New Technology and Digital Worlds: Analyzing Evidence of Equity in Access, Use, and Outcomes. *Review of Research in Education*, *34*(1), 179-225. https://doi.org/10.3102/0091732X09349791

YaNa, M. (2018). The Difficulties in Preparing Qualified Arabic Language Teachers in Ningxia, China. *International Journal of Education*, *3*(18), 68-86. https://doi.org/10.26417/ejser.v12i1.p177-183

Appendix A

Lesson Plan for Unit 5: Chat with Arabs

Goals:

1. Improve pre-service teachers' conversational skills in Arabic by engaging in real-life situations.

2. Increase awareness and understanding of Arab and Muslim customs when chatting with Arabs.

3. Enhance digital literacy by using AI language interactive tools and communication platforms.

Objectives:

By the end of the lesson, Arabic pre-service teachers will be able to:

1. Demonstrate conversational fluency by role-playing common Arabic dialogues.

2. Collaborate in groups to research and present key Arab and Muslim customs using digital tools and platforms.

3. Use AI-based platforms (e.g., Talkpal) to simulate Arabic conversations, improving pronunciation and conversational strategies.

Activity	Duration	Description	Tools/Resources
Warm-up	10 minutes	Watch videos of native Arabic speakers to observe body language, greetings, and cultural elements.	Bilibili videos, projector/screen
Lecture	15 minutes	Explain Arabic conversations from the textbook, focusing on vocabulary and grammar structures.	Cheng et al. (2015). *Arabic Spoken Course.* World Book Publishing Company.
Role-Play Practice	10 minutes	Pair-based conversational exercises on daily topics to improve fluency and confidence.	Classroom setup for pair activities
AI Interaction Speaking Practice	15 minutes	Use Talkpal to simulate Arabic conversations, improving pronunciation, fluency, and response speed.	AI Talkpal website
Group Research and Presentations	40 minutes	a. Greetings and Farewells b. Dining Etiquette c. Dress Code d. Respecting Religious Practices	PowerPoint, Tencent Meeting Online Platform
Evaluation and Feedback	Integrated	Assess speaking fluency, vocabulary, digital literacy, and understanding of Arab customs.	Observations, peer feedback, instructor evaluation
Extra-Class Work	After class	Recite new Arabic words, complete translation exercises in the textbook, and practice conversations with native speakers.	Textbook exercises, social media platforms (e.g., Xiaohongshu, TikTok, WeChat)

Appendix B

Lesson Plan for Unit 10

Goals:

1. Develop skills for independent Arabic language learning using digital platforms and tools.

2. Foster a positive attitude towards ICT in language learning and its role in improving Arabic speaking skills.

Objectives:

By the end of the lesson, Arabic pre-service teachers will be able to:

1. Identify and evaluate Arabic learning platforms (e.g., Madinah Arabic, Arab Academy) and apps (e.g., Gamoos, Maiani).

2. Demonstrate an understanding of how digital platforms can improve Arabic speaking skills.

Participate in online discussions evaluating the effectiveness of different Arabic learning tools.

Activity	Duration	Description	Tools/Resources
Warm-up	10 minutes	Guided reading of the Arabic conversation in Unit 10.	Cheng et al. (2015). *Arabic Spoken Course.* World Book Publishing Company.
Lecture	15 minutes	Emphasizing the new vocabulary and grammar.	Cheng et al. (2015). *Arabic Spoken Course.* World Book Publishing Company.
Digital Content	20 minutes	Viewing and discussing online videos about using technology for learning Arabic.	Online videos, projector/screen
AI Interaction Speaking Practice	25 minutes	Practice speaking Arabic with AI on the topic "studying Arabic on the Internet," improving fluency.	AI Talkpal website
Online Communication and Discussion	25 minutes	Group discussions evaluating Arabic learning tools (websites, apps, videos) for improving speaking skills.	Madinah Arabic, Arab Academy, Gamoos, Maiani, Tencent Meeting Online Platform
Evaluation and Feedback	Integrated	Assess speaking skills and digital literacy through participation and analysis of learning tools.	Observations, peer feedback, instructor evaluation
Extra-Class Work	After class	Recite vocabulary, complete textbook exercises, and write a reflection on learning experiences.	Cheng et al. (2015). *Arabic Spoken Course.* World Book Publishing Company.

Acknowledgments

We greatly appreciate every team member who took the time to participate in this study.

Authors contributions

Bingxin Gu, Saedah Binti Siraj and Zawawi Bin Ismail were responsible for study design and revising. Bingxin Gu was responsible for data collection. Bingxin Gu drafted the manuscript, Saedah Binti Siraj and Zawawi Bin Ismail revised it. All authors read and approved the final manuscript.

Funding

Not applicable.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Sciedu Press.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.