

# Contribution of Digital Approaches in the International Mandarin Education and Its Affecting Factors

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**Abstract** With the continuous innovation of information technology, social development has begun to enter the "digital intelligence" stage. In the realm of education, information technology has brought changes to various aspects such as enrollment, management, teaching, and evaluation, etc. Some countries in the world have successively released strategies or reform measures for the digitalization of education. Promoting the normalized application of digital learning resources, constructing innovative models of intelligent education, guiding learners to deep learning, and enhancing learners' core literacy have become issues of common concern around the world. In the realm of international mandarin education, the shift towards digitalization and smart education is also a consensus. The purpose of this study is to investigate the extent of contribution of digital approaches and the factors that affected the integration of digital approaches in the international mandarin education. Students and teachers that are involved in the mandarin program for UP and its partner university students participated in the research. The researchers chose the samples by using total enumeration sampling for questionnaires and stratified random sampling for the interview. The method is mixed method of quantitative and qualitative research. The results reveal that the extent of the contribution of digital approached is generally high and that of specific digital approach is different. There are five factors affecting the integration of digital approaches: Technology development and advantages of digital approaches; Curricular orientation and policies on mandarin as a foreign language in schools and institutions; Teachers' digital literacy and instruction for students; students' beliefs of use and language learning level; Social economy and hardware, software support. Five recommendations have been proposed based on the above findings: Enhancing teaching and learning resources integrated into digital approaches; Providing training programs and professional development opportunities for educators to improve digital literacy; Promoting student engagement; promoting the integration of mandarin into the school curriculum; Cultivating a supportive learning environment with the integration of a virtue community.

**Keywords** Contribution, Digital approaches, International mandarin education, Digital literacy, Curriculum orientation

## 1. Introduction

With the continuous innovation of information technology, social development has begun to enter the "digital intelligence" stage. At this stage, information technology continues to develop toward digitalization, networking, and intelligence, which has had a profound impact on all areas of society. In the field of education, information technology has brought changes to various aspects such as enrolment, management, teaching, and evaluation, etc. Some countries in the world have successively released strategies or reform measures for the digitalization of education. Promoting the normalized application of digital learning resources, constructing innovative models of intelligent education, guiding learners

to deep learning, and enhancing learners' core literacy have become issues of common concern around the world. Over the past few years, many educators have been using digital learning and teaching tools to prepare generations of learners in the learning and teaching processes to meet the skills needed by the digital life of the 21st century [1]. In the field of international Chinese education, the shift towards digitalization and smart education is also a consensus.

In December 2022, the "International Forum on the Digital Development of Chinese Language Education" and the "Inaugural Meeting of the Intelligent Education Branch of the World Association for Chinese Language Teaching and the First International Symposium on Intelligent Chinese Language Education" were held. It was mentioned in the speech for the first International Seminar on Wisdom Education for Chinese Language that digital transformation and intelligent innovative development are the direction and important issue of international mandarin education. The online learning space and traditional learning space

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Received: May 22, 2024; Accepted: Jun. 10, 2024; Published: Jun. 14, 2024

Published online at <http://journal.sapub.org/linguistics>

based on digital and intelligence technology are intertwined and integrated with each other. The use of digital tools and media has made the digital transformation of teaching methods the norm. There are more approaches to extend the learning process and apply results outside the classroom. In January 2023, JUZI Chinese App, jointly created by the Commercial Press and Beijing Language and Culture University, was officially released. Digital transformation is the preferred path for international mandarin education to cope with the dual changes in science and technology and education, and to promote high-quality development is the new mission of international mandarin education in the new era, and to enable high-quality development through digital transformation will open up a new situation in the midst of the changes [2]. The digital transformation and development of international mandarin education is becoming a new hotspot for research and a new direction for practice, and its future issues need to be explored both in theory and practice [3]. The purpose of this study is to investigate the extent of contribution of current digital approaches and the factors affecting the integration of digital approaches in the international mandarin education, and propose recommendations on improving the integration of digital approaches in the international mandarin education.

## 2. Literature Review

Scholars have discussed the significance and path of integrating modern educational technology with Chinese teaching from different aspects. Ba Dan et al. initiated a discussion on “Models and Methods of Online Teaching in Chinese Language Education”, in which researchers discussed interactive modes, intelligence, recorded classes and cloud learning in online teaching of international Chinese language [4]. Other researchers, some focused on digital resource building [5]; some explored the digital development of international mandarin language teacher education [6]; some focused on the development and application of intelligent teaching materials [7]; some analysed the forms and ways of realizing the digital revolution in international mandarin language education from a holistic perspective [8].

Cao Ge (2023) examined the development history and current status of Chinese Plus, a digital resource learning platform for mandarin, and summarized the practical experience of the Chinese Plus in promoting the digital transformation of international mandarin education from the perspectives of connection, content, and construction [9]. Liang Yu et al. (2023) studied learner’s behavioural intention to use Chinese digital learning resources and its affecting factors and found that perceived ease of use and resource quality have effects on behavioural intention [10]. Liu B (2019). mentioned that in some areas, smart classrooms have already been implemented [11]. Cheng Zijin (2023) examined the use of Vlogs in international Chinese

language education [12]. Yuan Yi et al. (2023) analysed the opportunities, risks and coping strategies brought by Chat GPT to international mandarin education, and concluded that the international mandarin education community should actively adapt to it, hold an open, exploratory and innovative attitude, and better promote the development of generative artificial intelligence in the field of international Mandarin education with the concepts of “human-centered and technology-assisted” [13]. In terms of teaching the Chinese Pinyin program, Lin S. et al. (2022) mentioned that, electronic role-play game (RPG) demonstrates how the concepts of edutainment and most importantly the phonetic and phonological knowledge of linguistics is applied [14]. The collection of papers in Digital International Chinese Language Education discussed the theoretical research, integration and application, resource construction, new technology support, and pedagogical knowledge base of digital international mandarin education from various perspectives, and fully demonstrated the latest achievements of digital international mandarin education [15]. Scholars have focused more on how to teach and how to teach well, but not enough on learner experience and acceptance and learning effectiveness.

## 3. Research Methods

The researchers used mixed methods of quantitative research and qualitative research. Quantitative research method was used to explore the extent of contribution of digital approaches in the international mandarin education. Qualitative research method was used to discover the factors affecting the integration of digital turn approaches in the international mandarin education. Stratified random sampling and thematic analysis were used.

The researcher had the teachers and students participating in the language program for UP alumnus and partner universities as the respondents, because they are the ones who have experienced the teaching and learning process in which mandarin was taught and learned as a foreign language. The questionnaire was conducted among a total of 100 students and six teachers. Stratified random sampling was used for the focused group discussion and the interview.

To get the appropriate data based on the questionnaire, the weighted mean and 4-point Likert scale scoring methods were used. The following statistical limits and verbal interpretation tables were used in interpreting the weighted means for the extent of contribution of digital approaches in the international mandarin education.

Braun and Clarke’s thematic analysis method was followed. From the transcript, the relevant answers of each participant were extracted. The use of thematic analysis in this study allowed the researcher to identify and explore patterns in the participants’ responses and develop a deeper understanding of factors affecting the integration of digital approaches in the international mandarin education.

**Table 1.** Four-Point Rating Scale (Extent of contribution of digital approaches)

value	Statistical limit	Level	Description
4	3.25-4.00	Very High Contribution (VHC)	Greatly facilitate the experience, reflection and application of new knowledge, establishing a connection between the learning environment and the learner's existing experience.
3	2.50-3.24	High Contribution (HC)	Facilitate the experience, reflection and application of new knowledge, establishing a connection between the learning environment and the learner's existing experience.
2	1.75-2.49	Low Contribution (LC)	A little effect on the experience, reflection and application of new knowledge, establishing a connection between the learning environment and the learner's existing experience.
1	1.00-1.74	Very Low Contribution (VLC)	No obvious effect on the experience, reflection and application of new knowledge, establishing a connection between the learning environment and the learner's existing experience.

**Table 2.** presents and discusses the extent of contribution of digital approaches in the international mandarin education

Indicators	Mean	Description
Translation application tools and electronic dictionaries for better understanding of new concepts	3.63	Very High Contribution
Online classes provide an alternative model when face-to face classes are difficult to conduct	3.53	Very High Contribution
Digital communication tools (chats, discussion boards, etc.) to facilitate language practice	3.09	High Contribution
Digital assessment tools (quizzes, online tests) to evaluate students' language skills	2.67	High Contribution
Online resources (websites, e-books, audio books, multimedia) for supplementary materials	2.40	Low Contribution
Click-to-interactive courseware or applications	2.17	Low Contribution
Platform for digital learning resources and MOOC	1.83	Low Contribution
Learning management system to create personalized learning experiences for the students	1.65	Very Low Contribution
Artificial Intelligence tools	1.61	Very Low Contribution
General weighted average	2.51	High Contribution

As for ethical considerations, the behavioral intention of potential interviewees was fully respected when the researchers contacted the interviewees. After the interviewees agreed to accept the interview, the time and method of the interview were further agreed upon. When analyzing the interviews, numbers were used in place of the names of the interviewees to insure the confidentiality of their personal information.

Reliability analysis was conducted using the formula of Cronbach's alpha coefficient  $\alpha = N / (N - 1) (1 - (\sum S_i^2) / S^2)$ . N is the number of items,  $S_i^2$  is the variance of each item score,  $S^2$  is the variance of the total score. The results show that the reliability coefficient is greater than 0.7, which means that the reliability of this survey result is high. Validity analysis was conducted using KMO coefficient and significance of Bartlett's test of sphericity. The results show that the KMO coefficient is 0.757 which is greater than 0.5 indicating that the sample size is sufficient and the Bartlett's value is 0.000 which is less than 0.05 indicating that this questionnaire has structural validity and can be statistically analyzed for the results of this survey.

## 4. Results and Discussion

### 4.1. The Extent of Contribution of Digital Approaches

The research result presenting in Table 2 shows that the general weighted average of extent of contribution of digital approaches in the international mandarin education is 2.51, indicating high contribution. It suggests that digital approaches play an important role in the learning and teaching of the students and teachers participating in the program. Digital technology has been widely used in the field of education. The digital transformation and development of international mandarin education is also proceeding rapidly. Digital technology and elements of international mandarin education are being deeply integrated to promote the process of digital transformation of international mandarin education. It agrees with the study of Qu Fuzhi et al. (2023), who said that with the continuous improvement of information infrastructure, the large-scale application of digital technology, and the indirect catalysis of the new coronavirus epidemic, digital technology innovation in the field of international mandarin education continues to deepen, and the ability to serve the

digitalization of education continues to improve [16].

The indicator “Translation application tools and electronic dictionaries for better understanding of new concepts” and “Online classes provide an alternative model when face-to-face classes are difficult to conduct” are the two highest with 3.63 and 3.53, which means very high contribution, suggesting that translation application tools and online classes have been widely used in international mandarin learning. It implies Translation software and online classes have played a major role in international Mandarin education. Online classes have become the norm as an alternative. In subsequent interviews, students mentioned that the school arranged Online classes because of the recent extreme high temperature weather. This reflects that online classes already have the stable conditions for conduction. This finding coincides Wu Fandi (2020)’s opinion, who indicated that the vast majority of college students have a positive and optimistic attitude towards using translation software for foreign language learning, and believe that using translation software will be helpful to their own foreign language learning [17]. Xu Anan et al. (2021) have similar findings: the mobile learning model that uses mobile networks and mobile smart terminals to achieve interactive teaching has become one of the main ways for the public to learn informally [18].

The indicators “Digital communication tools (chats, discussion boards, short video, etc.) to facilitate language practice” and “Digital assessment tools (quizzes, online tests)” are high with 3.09 and 2.67, suggesting that Digital communication tools and digital assessment tools have made significant contribution to the international mandarin education. In addition to professional online teaching platforms, teaching activities and resources carried out on video websites and social media are also one of the important forms of online Chinese learning today. The finding is similar with the study of Wang Letao (2023): There are a large number of Chinese learning contents published by foreign local teachers or Chinese learners on video websites and social media, which have become very useful learning resources for foreign learners [19]. The finding also aligns with that found by Hamadeh & Bahous (2020): not only does social media have educational properties that can be used to make language learning easier, but that students respond well to them as learning tools [20]. Online assessment can overcome the limitations of time and location, obtain a large amount of teaching data, and make timely feedback, personalized teaching, and probability prediction possible. As a form of after-class evaluation, online tests and quizzes are increasingly applied.

The indicators “Online resources (websites, e-books, audio books, multimedia) for supplementary materials”, “Click-to-interactive courseware or applications” and “Platform for digital learning resources and MOOC” are low with weighted mean of 2.40, 2.17 and 1.83, which means that the extent of contribution of them are low contribution, suggesting that participants didn’t use e-books, audio books,

multimedia and websites so much for supplementary materials; click-to-interactive applications and platform for digital learning resources and MOOC need to be further promoted among learners and educators. With the popularization of smart mobile devices such as mobile phones and pads and the advancement of network technology, mobile foreign language learning with the help of APP has become an option for language learning. In addition to multilingual learning applications, specialized mandarin learning APPs are also emerging, but their functions and usability need to be improved. Zhou Chunmei et al. (2020)’s study is consistent with the research result: The interviewees also expressed their expectations, hoping that the teaching content can be improved and optimized in terms of visualization of teaching content, diversification of media languages and grammar examples [21]. Liang Yu et al. (2023) discovered that the scale of use of Chinese digital learning resource platforms is far from satisfactory. Dynamic data such as the number of registered learners, user activity, and number of comments on many digital teaching platforms are not optimistic [22].

The indicators “Learning management system to create personalized learning experiences for the students” and “Artificial Intelligence tools”, with the weighted mean of 1.65 and 1.61, are very low. It implies that learning management system hasn’t been integrated into the international mandarin education overseas due to the characteristic of international Chinese education, that is, they are distributed in different schools and institutions overseas. As for the artificial intelligence, although with the further integration and development of the Internet and cloud computing technology, big data analysis technology and artificial intelligence technology have been widely used in teaching fields [23], the mean value in this study reflects that as the latest technological development trend, the integration of AI in the field of international mandarin education requires more time and more practical exploration. The finding is similar to the study of Yuan Xi (2023), who says that in the field of international Chinese education, the top-level design and research of artificial intelligence requires long-term investment and continuous exploration. International Chinese educators should actively explore the application practice of generative artificial intelligence products in the field of international Chinese education, and study the theories and methods of international Chinese education in the era of artificial intelligence [24]. So, it is necessary to deeply analyse the application mode of AI technology in foreign language teaching and strengthen the in-depth integration of new technologies into foreign language teaching [25].

From these findings, it is then summarized that the extent of contribution of digital turn approaches in the international mandarin education is high contribution, including translation applications, online classes, digital communication tools and digital assessment tools; however, there are still digital approaches such as Platform for digital resources and MOOC, Online resources, Click-to-interactive applications,

learning management system and Artificial Intelligence need further integration and development with lower weighted mean of the extent of contribution.

#### 4.2. Factors Affecting the Integration of Digital Approaches in the International Mandarin Education

For the other problem studied in this paper, it focuses on the factors affecting the integration of digital approaches in the international mandarin education. Quantitative research method was used. The interview and focus group discussion were conducted. The researcher analysed the results of the interviews and found the following factors affecting the integration of digital approaches.

##### 4.2.1. Technology Development and Advantages of Digital Approaches

Learners and teachers tend to use the digital approaches with better accessibility, interactivity, customization options, provision of feedback, and variety of resources available. The digital approaches break through the limitations of time and space and realizing cross-regional sharing of quality educational resources. A wide variety of digital tools can also provide a personalized and adaptive learning experience

that better meets the needs of students. Selfa-Sastre M. et. al (2022)'s study revealed that the features of digital technology unfold a range of learning opportunities in language education and can play three different roles in promoting collaborative creativity [26].

Student 2 said, "I have accessed online meeting platforms such as Zoom, Discord, and Voov. In terms of writing, I used Grammarly to check grammar." Student 3 said, "For learning Chinese language, I used several applications like Pleco, Duolingo, Papago, and Hello Chinese. I incorporate learning words via YouTube in order to enrich my vocabulary." Student 5 said, "google Translate has served as a useful tool for quick translations and clarifications during class discussions and presentations. Also, platforms like Netflix have facilitated language immersion through foreign films and series with subtitles, enhancing my listening comprehension skills."

Digital tools are created with their own usage, which affecting how and how often they are used. The rapid penetration of digital technologies such as big data, cloud computing, and artificial intelligence in the field of education, coupled with the catalytic effect of the pandemic, has led to a rapid shift from traditional education to digitalization [27].

**Table 3.** Factors affecting the integration of digital approaches in the international mandarin education

Theme	Sample Responses
Technology development and advantages of digital approaches	S2: I have accessed online meeting platforms such as Zoom, Discord, and Voov. In terms of writing, I used Grammarly to check grammar. S3: For learning Chinese language, I used several applications like Pleco, Duolingo, Papago, and Hello Chinese. I incorporate learning words via YouTube in order to enrich my vocabulary. S5: google Translate has served as a useful tool for quick translations and clarifications during class discussions and presentations. Also, platforms like Netflix have facilitated language immersion through foreign films and series with subtitles, enhancing my listening comprehension skills."
Curricular orientation and policies on Mandarin as a foreign language in schools and institutions	S1: digital tools can be used better in learning Mandarin through integrating it in our curriculum in school especially when a program requires a unit for foreign language." T2: I think mandarin as a foreign language should be included in the curriculum system so that it can be conducted in the school learning management system during the whole teaching and learning process.
Teachers' digital literacy and instruction for students	S1: As for my experience as of today in Foreign Language studies, these tools that I mentioned are useful as they are being used by our professor. I can say that I am learning prior to these tools being used. S5: On the other hand, our instructor has always given us adequate materials such as Modules and Audio aids which directly supplements each other.
students' beliefs of use and language learning level	S7: the tool that we have not been used is ChatGPT which is a type of an A.I that generates ideas and knowledge however I personally think that it could potentially harm the learning process due to the fact the it could be used as a cheating tool. S4: digital tools intend to help but the consequences may depend on how the users will make use of it. S6: I can use them better once my level of learning Chinese language raises.
Social economy and hardware, software support	T3: Some students have no computers at home. Network problems in some areas often occur. Sometimes, the students have to go to a store or coffee house to use Wi-Fi. S4: Some apps are great, but charge a membership fee, so I can only use the free trial feature for a limited time.

#### 4.2.2. Curricular Orientation and Policies on Mandarin as a Foreign Language in Schools and Institutions

Mandarin as a foreign language can be an optional or compulsory course, major subject or nonmajor subject. Curricular orientation and policies on Mandarin as a foreign language in schools and institutions will decide how teachers teach and how students learn. For compulsory mandarin course, major mandarin subject, or mandarin as a foreign language course integrated into the basic education system, schools will invest more in the construction of digital learning resources, approaches and hardware support. Increasing availability of hardware transforms teachers into mentors and coaches that enable students learn more effectively to overcome difficulty [28].

Student 1 said, “digital tools can be used better in learning Mandarin through integrating it in our curriculum in school especially when a program requires a unit for foreign language.” Teacher 2 said, “I think mandarin as a foreign language should be included in the curriculum system so that it can be conducted in the school learning management system during the whole teaching and learning process.”

The current stage is a critical period for the innovative application of education technology and the transformation and upgrading of international mandarin education. The development situation facing international mandarin language education is more complicated because the mandarin program has different curricular positioning in different schools and institutions. One of the difficulties for many teachers who encourage students' out-of-class online activities is curricular integration. Learning can be documented through learner journals or portfolios in the context of fulfilling a language requirement or as part of the curriculum for a major concentration [29]. Yin Dongmin et al. (2022) corroborated this as they hold that The field of international mandarin education is vast, multi-level, and highly differentiated. Incorporating mandarin into the national education system is an important way to carry out mandarin teaching on a large scale. It is significant for the localization and high-quality development of Chinese teaching [30].

#### 4.2.3. Teachers' Digital Literacy and Instruction for Students

Teachers design lesson plans, organize classroom activities, and guide students' learning and growth. The choice of the teacher plays a decisive role in the integration of digital tools in the teaching process and assessment.

Student 1 said, “As for my experience as of today in Foreign Language studies, these tools that I mentioned are useful as they are being used by our professor. I can say that I am learning prior to these tools being used. Student 5 said, “On the other hand, our instructor has always given us adequate materials such as Modules and Audio aids which directly supplements each other.”

Zheng Yanqun et al. (2023)'s study is consistent with this: Teachers' digital literacy and digital teaching capabilities

are key actions to achieve digital transformation of education and promote high-quality development of education. As the implementers of international mandarin education, international mandarin teachers have the responsibility to play a proactive role in educational innovation promoted by technology [31]. This also echoed with results from Alakrash H. M. (2021)'s study, the digital technology used in education depends on important assumptions that the teachers and students need to have, which are the positive point of view and necessary digital literacies [32].

#### 4.2.4. Students' Beliefs of Use and Language Learning Level

Learners' belief of usage and language learning level also affect the integration of digital tools in the international mandarin education.

Student 7 said, “the tool that we have not been used is ChatGPT which is a type of an A.I that generates ideas and knowledge however I personally think that it could potentially harm the learning process due to the fact the it could be used as a cheating tool.” Student 4 said, “digital tools intend to help but the consequences may depend on how the users will make use of it. Student 6 said, “I can use them better once my level of learning Chinese language raises.”

Students tend to use digital tools that they find satisfying, safe, useful, convenient, efficient and interactive. This finding confirms Hong Mingxue et al. (2023)'s statement that Satisfaction, perceived usefulness, knowledge anxiety, content quality, and self-efficacy have a direct impact on the intention to continue using intelligent systems [33].

#### 4.2.5. Social Economy and Hardware, Software Support

The application and promotion of digital tools has a lot to do with the local socio-economic development level. In some areas, the convenience of the Internet is insufficient and the digital products available to students are limited. Teacher 3 said, “Some students have no computers at home. Network problems in some areas often occur. Sometimes, the students have to go to a store or coffee house to use Wi-Fi. Student 4 said, “Some apps are great, but charge a membership fee, so I can only use the free trial feature for a limited time.

The finding supports Wang Chunhui (2023), who stated that for learners in some less developed countries or regions, network connections, desktop or laptop computers, terminal devices used in class, smartphones, etc. may also be new infrastructure [34].

## 5. Recommendations

From these implications of the results of extent of contribution of digital approaches and discussions of factors affecting the use of digital approaches in the international mandarin education, the following recommendations were drawn:

### 5.1. Enhancing Teaching and Learning Resources Integrated into Digital Approaches

Institutions and schools should invest in the development and acquisition of high-quality teaching and learning resources, including online platforms, electronic textbooks, learning materials, multimedia tools, and ensure equitable access to resources for all students and educators, regardless of socioeconomic status or institutional location.

### 5.2. Providing Training Programs and Professional Development Opportunities for Educators to Improve Digital Literacy

Institutions and schools should provide training programs and professional development opportunities for international mandarin teachers to improve digital literacy and pedagogical approaches. Workshops, seminars, training session with source speakers or professors invited are recommended.

### 5.3. Promoting Student Engagement

Institutions, schools and educators should implement teaching strategies that promote active student engagement and collaboration in digital literacy improvement and the use of digital learning tools.

### 5.4. Promoting the Integration of Mandarin into the School Curriculum

Institutions and schools should promote the integration of mandarin into the school curriculum and the learning management system, so that mandarin course can enter the multi-subject collaborative educational ecology.

### 5.5. Cultivating a Supportive Learning Environment with the Integration of a Virtue Community

Institutions and schools should create a positive, inclusive and supportive learning environment with the integration of a virtue community where students can collaborate and study beyond the limitations of time and space and receive constructive feedback from peers and educators.

## ACKNOWLEDGEMENTS

The researcher is highly indebted to the UP-Mandarin program teachers, students-participants. She is also fully grateful to Dr. Guo Guangwei for assistance in improving the paper. The main author wants to thank her family, friends, and most especially to her sons, Zerun and Zexi, for being the source of strength and motivation to finish this study.

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