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# Learning Chinese in the Digital Age

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## Introduction

Language education in the 21st century has reached an exciting point, where skills can be acquired and practiced in the real world, thanks to technology. Gone are the days of the Industrial Age, with rote memorization and mindless repetition of vocabulary or verb conjugations out of context. The Information Age brought hopes and challenges to our thinking about technology in education: Is it a tool, a subject, a piece of equipment, a technique, or what? The past few decades added new layers to this question, with use of the computer and expansion of language software in language education as well as online tools, web-based resources, and virtual school courses. Technology, computer use, and the online world have had a tremendous impact on language learning, perhaps most obviously in the almost instantaneous access that it affords to authentic materials and native speaker language partners, but also in more subtle but profound ways, as expectations about pedagogy, learning standards, and outcomes have shifted. We are now in the Digital Age, which continues to evolve and grow at a dizzying pace, with new tools and online resources to support language learning and teaching.

Parallel to the advancement of technological and digital tools in education, Chinese language education has also made headway in U.S. schools, especially since 2004 (Wang, 2012). Some states have seen Chinese enrollment grow from several hundred to tens of thousands of students in a very short time, a pattern that is reflected in national surveys (National Council of State Supervisors for Languages, 2016; *National K–12 Foreign Language Enrollment Survey Report*, 2017). Yet those numbers, however astounding, do not always include data from opportunities where students are learning Chinese through technology. Students learning Chinese can now hone their language skills any time throughout the week or the year, anywhere in the world, starting with a home internet connection and expanding out to an experience that requires a passport. Beyond data about numbers of learners, the real story is how technology has changed teaching and learning.

In order to teach effectively in this new age, teachers must plan carefully and use all available tools wisely, especially technological tools. Many people latch on to the latest gadget, app, or device rather than focusing on the content of and purposes for the curriculum they are teaching. For an excellent language program and classes, the goal is not to identify the best tools to use but rather to build students' language proficiency, knowing that tech tools themselves will not automatically create learner-centered classrooms. Instead, it is good planning and effective instruction on the part of teachers – bolstered by judicious and informed use of technology – that offer the best opportunities for success in creating truly engaging content and lessons. The purpose of this Brief is to describe frameworks that will guide uses of technology in the digital age, connect the frameworks with day-to-day classroom practices that foster students' 21st century skills with digital tools, and provide useful guides and resources for designing activities with the best digital tools. The Brief ends with a discussion of implications and considerations for applying digital tools in the classroom to support and, indeed, transform student learning.

## Three Frameworks for Language Learning in the Digital Age

Three conceptual frameworks can help teachers design and implement activities and assessments in their classes: Bloom's taxonomy, TPACK, and the SAMR model.

### Bloom's Taxonomy

Bloom's taxonomy is a useful way to frame second language acquisition, since it focuses on articulating the development of skills from lower-order to higher-order thinking. Bloom's taxonomy was originally developed by Benjamin Bloom and a team of educational specialists in the 1950s (Bloom et al., 1956) and has been revised and applied by scholars in relation to different contexts. The original framework articulates different cognitive domains that start with remembering discrete content, like vocabulary words and memorized expressions, showing that there is understanding of that information, the ability to apply that information in meaningful ways, and then the ability to analyze it. The two top levels, evaluating and creating, require learners to show that they have a thorough command of content and can manipulate it for their own purposes to improve it and generate novel concepts and abstract ideas. This progression aligns well with language proficiency levels, as learners move from remembering and understanding new vocabulary and memorized language chunks at novice levels, to applying and analyzing at intermediate levels as they form sentence-level discourse, and to evaluating and creating new content at advanced levels and beyond via more sophisticated modes of production. The levels, or frames, in Bloom's taxonomy come with action verbs that teachers can use to create learning objectives and are often represented in a pyramid, as in Figure 1.


Figure 1. Bloom's Taxonomy
https://wlclassroom.com/2013/03/12/blooms-taxonmy-in-the-foreign-language-classroom/

When we think in terms of learning a language, it is easy to see the progression of building discrete skills like vocabulary acquisition (Remembering) and comprehending language input (Understanding) through the lens of Bloom's taxonomy. The American Council on the Teaching of Foreign Language's (ACTFL, 2012) inverted pyramid of language proficiency, in Figure 2, represents the progression of language becoming more complex as proficiency grows. When we compare that pyramid to Bloom's taxonomy levels, we can see the progression from receptive to productive skills on the part of the learner (Applying).

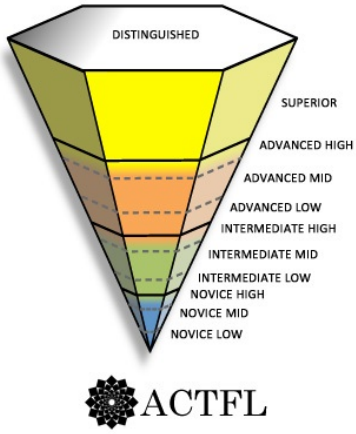


Figure 2. ACTFL Inverted Pyramid of Language Proficiency
https://www.actfl.org/publications/guidelines-and-manuals/actfl-proficiency-guidelines-2012

All of these skills need to be practiced, so that learners stretch upward toward higher levels of thinking, even at lower proficiency levels. We also know that learners need to continually reuse or recycle the vocabulary they know and expand on it with new learning. Thus, the graphic in Figure 3 recasts Bloom's taxonomy in terms of levels that are interrelated and interdependent. This version of Bloom's taxonomy makes the Creating level the key component of building language skills, continually supported by the smaller "cogs" of the rest of the taxonomy. Some potential outcomes of Creating are in smaller print to the right, and include references to 21st century technology skills like video creation and editing, podcasting, and the like. Please note that the Bloom's taxonomy level of Creating is distinct from ACTFL's Proficiency Guidelines' description of "creating with language" as a feature of intermediate-level functions (i.e., learners moving beyond parroting

memorized language to form discrete strings of sentences on their own when talking about familiar topics in daily life).


Figure 3. Bloom's Taxonomy in the 21st Century Language Classroom (image reproduced with the permission of Kathy Schrock © 2012)
http://www.schrockguide.net/bloomin-apps.html

The original Bloom's taxonomy (Bloom et al., 1956) and Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001) are solid tools for teachers and instructional designers, but they don't give examples of how thinking skills can be applied in the 21st century language classroom using technology resources. Bloom's Revised Taxonomy was created to meet some of the new challenges in the last quarter of the 20th century, and it does account for the new behaviors, actions, and learning opportunities that were starting to emerge as technology advanced and became more accessible. However, Bloom's Revised Taxonomy does not address the practices and processes that new technologies, especially digital tools, bring to teaching and learning.

To better serve the "digital natives" (Prensky, 2001), Churches (2007) revised Bloom's taxonomy again and created Bloom's Digital Taxonomy, which emphasizes communication and collaboration as key 21st century skills. For language learners in the digital age, collaboration encompasses all of the lower-order thinking skills (LOTS) and higher-order thinking skills (HOTS). When creating lessons and activities, teachers need to be cognizant that they are engaging learners in collaborative tasks, so that learners can cultivate the basic LOTS and move up into HOTS, regardless of their language proficiency level.

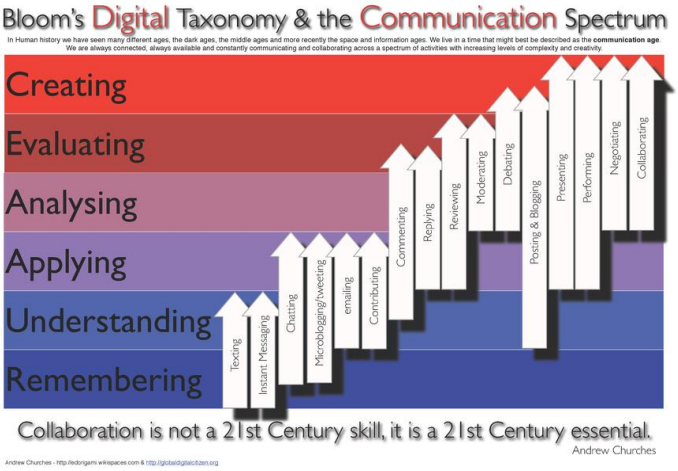


Figure 4. Bloom's Digital Taxonomy and the Communication Spectrum
http://edorigami.wikispaces.com/Bloom%27s+Digital+Taxonomy

Figure 4 emphasizes communication and collaboration along with Bloom's taxonomy. It is worth noticing that communication and collaboration can be carried out in a variety of forms, which correspond to LOTS and HOTS. Connecting back to the context of Chinese language learning, Bloom's Digital Taxonomy integrates two major 21st century skills, communication and collaboration, with the original Bloom's taxonomy, which links language learning and cognitive development in a theoretical way. With this in mind, we now move to a pedagogical perspective and introduce the TPACK framework.

### Technological Pedagogical Content Knowledge Framework (TPACK)

In addition to working with cognitive perspectives that are illuminated in the different versions of Bloom's taxonomy, teachers also need a framework to help them tie together content, pedagogical knowledge, and technological knowledge in their Chinese/World Language classroom. The Technological Pedagogical Content Knowledge framework, more commonly known as TPACK (Koehler & Mishra, 2009; Mishra & Koehler, 2006), focuses on the integration of three different types of knowledge in the learning enterprise: Content Knowledge (CK), Pedagogical Knowledge

(PK), and Technological Knowledge (TK), as shown in Figure 5. With TPACK, Chinese teachers can pull together the three knowledge bases of Chinese language and culture, standards-based teaching approaches, and an understanding of technological tools that will support learning activities.

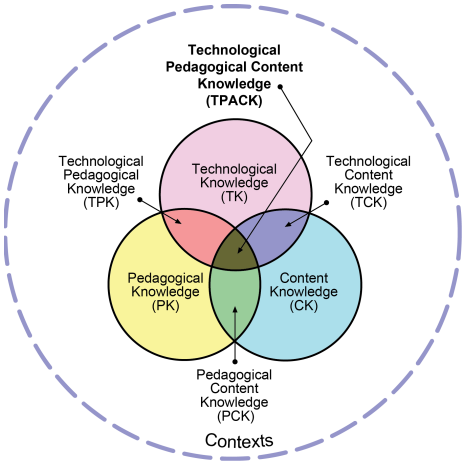


Figure 5. TPACK Framework
Reproduced by permission of the publisher, © 2012
http://tpack.org

As illustrated in Figure 5, various knowledge bases interface with one another. In the center of the diagram is technological pedagogical content knowledge (TPACK), which combines permutations of CK, TK, and PK. In order to help teachers translate this theoretical framework into practice, Table 1 has a real-world example. It shows a way that a teacher can use the TPACK framework to consider what students need to be able to do in a given task, the challenges to achieving that goal, and how those challenges can be addressed in learning Chinese (Pedagogical Knowledge - PK). It illustrates how to bring in Technological Knowledge to implement the instructional goals (TK) and how to assess the outcomes of that implementation (Technological Pedagogical Knowledge - TPK).

*Pedagogical Knowledge (PK)*
Presentational Communication is one of the three modes that learners need to practice when learning Chinese. However, shyness, stage fright, or aversion to making mistakes in front of others make presentations in class a burden for many learners, and teachers must employ strategies to lower students' affective filters.

*Technological Knowledge (TK)*
VoiceThread is an online tool in which users can create sequences of images and provide either written or verbal text to present their material to an audience. Students can practice their presentations on their own and record and re-record if needed, all without the pressure of a live audience but still demonstrating their skills in Presentational Communication for the teacher.

*Technological Pedagogical Knowledge (TPK)*
Students can create VoiceThread presentations to narrate stories, present content, or describe situations. Teachers can assess what students have created and give them feedback on what they are doing well and how they can improve.

Using TPACK as a pedagogical tool to integrate digital tools, language learning not only incorporates technology but also integrates sociocultural and communicative approaches, which view language learning as an active process where learners create their own meaning through authentic learning activities that reflect real-world contexts (Widdowson, 2003). Participation in social interactions is the primary goal and the means for authentic learning of language. These developments in language learning research indicate that technology integration must work to facilitate language learning goals.

**Substitution, Augmentation, Modification, and Redefinition (SAMR) Model**
Learning in the Digital Age focuses on empowering students to take control of their learning in learner-centered rather than teacher-centered classrooms. As a result, learners become more and more autonomous (Hung & Kapur, 2013). "Classrooms" are now expanded to be multifaceted learning environments that may include face-to-face spaces, virtual learning, and blended environments that span the continuum from formal to informal (Chan et al., 2006). Some scholars go one step further to argue that conventional classrooms are no longer sufficient for language learners in the 21st century, and that the contexts that teachers try to manufacture in such learning boxes rely on an artificial "presentation-practice-production" teaching routine that is disconnected from the real-life experience of language skills that can be practiced and used in the Digital Age (Liu, Goh, & Zhang, 2006; Wong, Chai, & Aw, in press).

Traditional language classrooms are bound by place and time, so they cannot provide enough support to cultivate autonomous learning and opportunities for authentic social interactions beyond the classroom. If teachers want to guide students in developing communication and collaboration skills, while also building all levels of thinking skills, they have to reshape their own instructional practices and incorporate technology effectively through frameworks like Bloom's Digital Taxonomy and TPACK (Lightbown & Spada, 2013). The SAMR model can assist teachers in this regard.

The SAMR model, shown in Figure 6, is a good framework to consider when thinking about the impact of technology on our lives, and it is especially useful for teachers when choosing how technology might change a task most effectively.

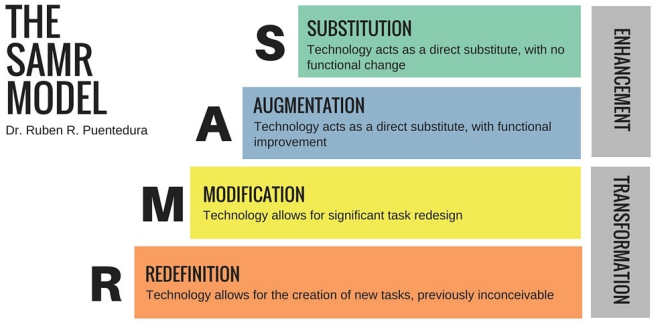


Figure 6. The SAMR Model
https://en.wikiversity.org/wiki/Instructional_design/SAMR_Model/What_is_the_SAMR_Model%3F

The SAMR model was initially designed to help educators infuse technology into teaching and learning, and it was popularized by Dr. Ruben Puentedura (Walsh, 2015). The model is helpful in supporting teachers as they design, develop, and integrate technology into teaching so that it transforms learning experiences. The four stages are on a continuum, with Substitution as the most basic and Redefinition as the most complex. Substitution and Augmentation are enhancements of learning, where Modification and Redefinition involve transformation of learning in order to create, evaluate, and analyze learning opportunities.

Substitution involves trading a traditional way of doing something for a virtual or online way. In a Chinese classroom, or any classroom, substitution could be as simple as students taking notes with word processing software or a teacher giving a quiz using an online survey tool. Paper and pencil have been substituted for an electronic form of the same task, but the learning process has not changed.

Augmentation builds beyond substitution by altering learning in a way that improves it. For example, if students take notes or share comments together in online documents or platforms, like Google docs, Padlet, or Flipgrid, they can see and respond to different perspectives about what has been heard and seen in the learning environment. Another example of augmentation could be a reading that students are working with that includes an embedded audio recording of that reading by a native speaker. Students are able to increase their learning by hearing and seeing the reading, apart from and in addition to what they could get in the class from a single teacher.

Modification is the first level of transformation, and it denotes a learning task redesign based on technology. This is where concepts like flipped classrooms fit. A teacher can take a lesson or lecture that would have been done using direct instruction and add to it video and activities for students to learn from before they come to class. Then class time can be used to apply that knowledge and practice skills, so that the focus is on communication and collaboration. Group projects can be modified with technology so that everyone can participate in, for example, a virtual presentation, with each student responsible for the content on a certain portion of a slide deck. Technology allows each individual to access the project when it is convenient for them, see what their teammates have been able to do, add their components, and provide feedback to each other before they give their presentation or turn it in.

Redefinition is where an entirely new task is available because of technology. A good example in a language-learning environment is blogging with students who are somewhere else in the world. Information and videos can be posted,s o that communication takes place synchronously or asynchronously with native language partners. This kind of exchange, which supports both interpersonal and presentational communication, was not possible before, even in situations like pen pal programs.

Learning Chinese in the Digital Age is happening more and more in non-traditional spaces beyond classrooms, and it is important to introduce the SAMR model for technology integration from a design perspective. Bloom's taxonomy focuses teachers on the cognitive aspects of learning, TPACK links that to pedagogy and some technology tools, and the SAMR model enables teachers to redesign learning tasks and incorporate technology tools in an efficient and effective way to maximize outcomes.

The past decade has been witness to much change in how learning happens in language classrooms, and support for task-based communicative learning, blended learning, flipped classrooms, and experiential learning continues to grow. Educational strategies like these have become staples of 21st century learning, particularly when they are centered on themes related to global issues, civic literacy, and world economies. The use of technology and digital tools is key to redefining instruction in Chinese or any world language learning environment. Ultimately, this means that Chinese language instruction will be more focused on developing students' communicative competence and using those skills in the real world.

## Applying the Frameworks in Fostering 21st Century Skills

Beginning in 2002, the Partnership for 21st Century Skills (P21) identified communication, collaboration, critical thinking, and creativity ("The 4 Cs") as the four key skill areas most necessary for success in the 21st century. These 4 Cs neatly complement the 5 Cs (communication, culture, connections, comparisons, and communities) in world language national standards, the World-Readiness Standards for Learning Language (ACTFL, 2015). In 2011, P21 and ACTFL brought these standards together, publishing a joint document, World Languages 21st Century Skills Map. This document, shown in Figure 7, lays out curricular strategies to help teachers move away from old-fashioned ways of teaching and learning languages and infuse their teaching with relevant topics, supported by the use of technology, to transform the learning experience.

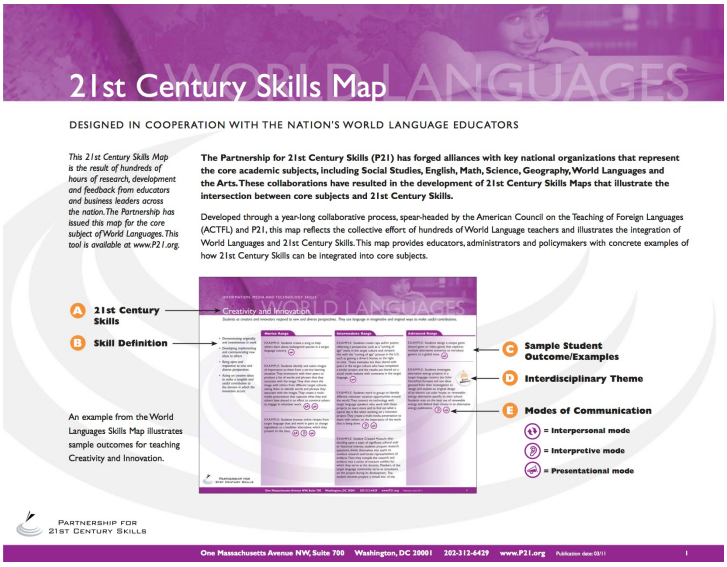


Figure 7. 21st Century Skills Map for World Languages
https://www.actfl.org/sites/default/files/pdfs/21stCenturySkillsMap/p21_worldlanguagesmap.pdf

Another important tenet in developing 21st century skills is digital literacy. Students studying Chinese in the 21st century need digital literacy skills not only to find and critically analyze information but also to create, edit, and publish their own work in Chinese. The challenge for Chinese teachers is how best to support the development of these skills in ways that also further language learning and content goals in the curriculum. Ultimately, the range of skills that 21st century learning develops will prepare students to use their Chinese language skills with a high degree of language proficiency and intercultural competence that will make them better global citizens. The real challenge for the Chinese teacher is to determine what digital and technology tools will be best to use in instruction. Strategies to choose tools are described in the next section.

## Guides and Resources: Technology Tools for the 21st Century Chinese Language Classroom

With the three frameworks described above in mind, it is helpful to outline different types of online tools and their potential applications and uses in classroom instruction and student learning. The information in Table 1 is not meant to be an exhaustive list of available tools, nor does it endorse the use of specific tools, but it outlines the range and types of tools available and briefly summarizes their potential applications.

| Technology and Digital Tools | Applications in Chinese Language Learning |
|---|---|
| Hardware<br>• Laptops, Chromebooks<br>• Tablet Devices<br>• Interactive Whiteboards | Accessing the web<br>Using language learning apps<br>Dynamic presentations |
| Online or App-Based Chinese-English Dictionaries and Glossing Tools<br>• MDBG Dictionary, Line Dictionary, etc.<br>• Pleco (mobile app)<br>• Zhongwen Chinese Popup Dictionary/Perapera Chinese Popup Dictionary (Chrome Browser Extensions) | Searching skills<br>Pronunciation practice<br>Character stroke order<br>Quick character/word glossing |
| Word Processing Tools<br>• Microsoft Office (Word, Powerpoint, etc.)<br>• G Suite (Google Docs, Forms, Presentations, etc.)<br>• Online Chinese IMEs (Input Method Editors, e.g. Chinese-Tools.com, Purple Culture, etc.) | Writing and editing skills<br>Presentations<br>Collaborative writing/presentations<br>Assessment and feedback |
| Computer-Mediated Communication (CMC)<br>• Email<br>• Chat<br>• Text-messaging with tools or apps like Voxer<br>• Face-to-Face Communication (Skype, FaceTime, Google Hangouts, etc.) | Interpersonal communication<br>Presentational communication<br>Writing/editing skills |
| Web 2.0 (Dynamic or User-Generated Content)<br>• Social networking sites<br>• Blogs, Wikis, Podcasts<br>• Video Hosting Platforms (YouTube, Vimeo)<br>• Video Clip Creation (Puppet Pals, Screencastify)<br>• Digital Portfolios (LinguaFolio® Online)<br>• Micro-Blogging Sites (Twitter/Sina Weibo) | Interpersonal communication (live spoken and asynchronous written)<br>Presentational written communication<br>Presentational spoken communication<br>Formative and self-assessment |
| Online Tools for Language Learning<br>• Quizlet/Quizlet Live, Cram (Flash cards with game-based activities)<br>• Kahoot, Nearpod, Socrative (Interactive classroom-based quizzes or audience response tools)<br>• StoryKit, Book Creator (eBook creation apps/sites)<br>• Padlet (Interactive virtual blackboard)<br>• Flipgrid (Video-based discussion platform)<br>• VoiceThread (Collaborative group conversations, slideshows, etc.)<br>• Voki (Create talking avatars)<br>• Vocaroo (Quick, online audio recording tool) | Creation of learner-centered tasks<br>Blended learning opportunities<br>Interactive and collaborative activities<br>Creation of student work |

Table 1. Technology and Digital Tools for Classroom Use

It can be daunting to choose which tools to use, given the overwhelming number of choices currently available and new choices emerging on a regular basis. Teachers need to integrate online and face-to-face teaching, choose between the use of asynchronous and synchronous tools, and consider how best to work with a flipped classroom approach. Although young learners in particular are often quite adept at using new technologies, they are not necessarily able to exploit these effectively in the context of their own language learning, and they need significant guidance from teachers to become tech savvy autonomous learners (Stickler & Hampel, 2015). Here we describe two resources that will help teachers make decisions about how to select the right tools to support learner-centered activity design. It is important to note that teachers who consider themselves more "novice" in the implementation of technology and use of various devices might want to partner with their school's technology staff or other colleagues who are proficient in the use of technology in language instruction. Using these tools effectively takes practice, experience, a willingness to experiment, and the presence of mind to be able to adjust when things do not go according to plan.

### Padagogy Wheel

The Padagogy Wheel is an interactive online PDF document that allows teachers to select Apple iOS and Android apps to support different activities, which are divided by Bloom's Taxonomy functions, as well as potential levels of enhancement and transformation, as defined by the SAMR model.

The Padagogy Wheel is designed to help teachers consider how they use mobile apps in their teaching. As mentioned above, apps are organized around the six levels in Bloom's Taxonomy. If teachers have a particular functional activity in mind, they can locate the activity within the wheel and then find a wide range of apps that could support the execution of that activity. Even if teachers are unsure of what activity might be best, lists of action verbs within the different levels can help start the brainstorming process of activity design.

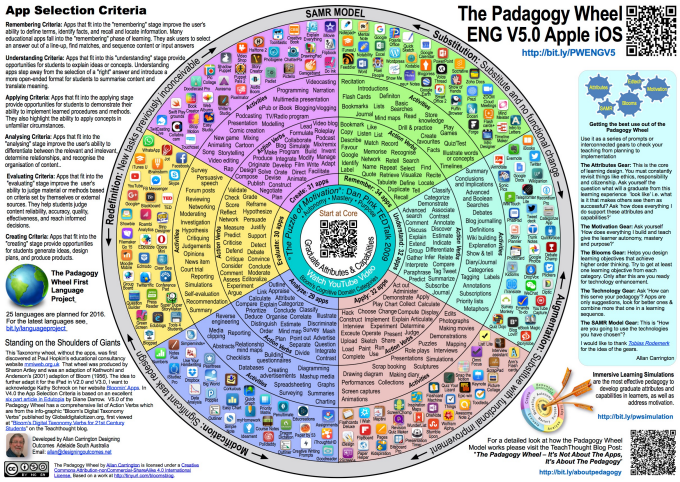


Figure 8. Padagogy Wheel (Bloom's Taxonomy and the SAMR model frame the wheel in both inner and outer circles.) https://designingoutcomes.com/assets/PadWheelV5/PW_ENG_V5.0_Apple_iOS_PRINT.pdf

There is also a Padagogy Wheel in Chinese: https://designingoutcomes.com/wp-content/uploads/Padagogy_Whl_only_CHI.600x600OPT.jpg

### Personal Learning Network (PLN) Tool Browser

The PLN (Personal Learning Network) Tool Browser was developed and is maintained by the Center for Language and Technology at the University of Hawai'i at Mānoa. It allows users – both teachers and students - to search for and narrow down choices of digital tools based on desired pedagogical or learning functions (https://clt.manoa.hawaii.edu/pln/). A PLN is not a program, but rather a set of tools that allow an individual to use social media and technology to collect, communicate, collaborate, and create for the purpose of advancing their own learning. These tools include both online resources and mobile apps. Teachers and students alike can use the PLN Tool Browser to select tools that will be most helpful – in other words to personalize their own teaching and learning. Like the Padagogy Wheel, the PLN Tool Browser can help search for tools based on type of application, format (desktop, mobile, web-based, etc.), function, and price (i.e. free or fee-based). The browser automatically narrows the range of appropriate choices based on these selections, and there is a short description of each tool -- what it is and how it might be used by a teacher or a learner. Finally, since these tools often come and go, the PLN Tool Browser is regularly updated, with new innovative applications added.


Figure 9. Two Screenshots in a Scenario Involving Purchasing Items in Microsoft's "Learn Chinese" App for iOS

**Game-Based and Virtual Reality Chinese Learning**

The use of digital online games to support Chinese language learning is just beginning to emerge. While teachers frequently use digital flash card sites like Quizlet and Cram (which include gaming platforms for content entered by the user), or make use of other general game-based platforms like Kahoot to create competitive games for their classes, there is still room for growth in use of websites and apps with Chinese language learners in mind. Startups like Duolingo, Chinese Skill, and Mondly have launched Chinese courses for English speakers in their game-based apps; however, these apps are geared more for beginning learners to gain a taste for learning Chinese. Microsoft has launched a useful "Learn Chinese" app, where learners can engage in short dialogues and spoken output is evaluated for accuracy by the app before learners can move on to the next stages in a task. Although these game-based apps can be a fun tool for learners wishing to practice Chinese on their own, they are harder for teachers to implement effectively in a formal Chinese course, given their overreliance on short, scripted dialogues; translation-based tasks; and non-contextualized vocabulary building activities.

One place for developing innovative, digital, game-based resources that can be used to support language learning is the Games2Teach project (https://games2teach.uoregon.edu), a collaboration between the Center for Applied Second Language Studies (CASLS) at the University of Oregon and the Center for Educational Resources in Culture, Language and Literacy (CERCLL) at the University of Arizona. While the majority of resources developed and reviewed by Games2Teach focuses on Western languages, there are several that support Chinese language instruction. One useful game is the Chinese version of "Ecopod: Survival," which engages learners in an adventure survival game within the ARIS iOS app. The Chinese version of the game begins with users being informed of a life-threatening influenza outbreak (based on the plot of the science fiction novel Station Eleven) and continues with users needing to make decisions about whether to stay in their dorm or evacuate, what to take with them, etc. Each time users make a new selection, the game provides new scenarios with graphics, audio recordings, sounds, and text in Chinese. New options lead the user into scenarios into the future, which might result in the death of the user, or ultimate survival in an increasingly dystopian landscape. The Games2Teach website also provides lesson plans for teachers wishing to incorporate this resource into their novice, intermediate, or advanced-level Chinese courses.


Figure 10. Two Scenes From the Chinese Version of the "Ecopod: Survival" Game in the ARIS iOS App

Though still very much in its infancy, there is a budding market for virtual reality programs to teach Chinese. Mondly VR has launched a demo app in which learners can engage in interactive lessons in 28 languages, including Chinese. Situations recreate real-life scenarios, where learners are required to input responses to prompts through both speaking (interpreted by speech recognition technology) and writing (via keyboarding in pinyin). These situations can also be accessed via Google VR technologies, which engage users who are equipped with either Google Cardboard or Google Daydream headsets for a full VR experience. However, the app from this vendor is still limited in its design, with somewhat primitive graphics and the need to improve speech recognition for Chinese sounds. Another company, ImmerseMe, has also developed a series of lessons for nine languages, including Chinese, using interactive YouTube clips, where learners practice interpersonal exchanges with videos of actual people in various situations. While the content cannot be modified, and learners are not able to "create with language" but instead are required to parrot sentence-level inputs that are fed to them, the program does allow for learners to practice interpersonal tasks for real-life situations in a low-stress virtual environment, develop spoken output skills, and repeat situations until some level of mastery is attained.


Figure 11. An Interactive Chinese "Asking for Directions" Scenario in the ImmerseMe YouTube-based Online App

What we describe here is surely the start for game-based and virtual reality approaches to Chinese language learning. We expect that these fields will develop quickly, and we recommend that readers of this Brief who are interested in learning more about these resources move forward by investigating current information about the tools described here and searching online for new products that may become available in the future.

## Implications and Considerations

A number of issues need to be considered in the context of learning Chinese in the Digital Age. Given the different learning choices in terms of use of technology, including face-to-face, blended, and online learning, we argue that learners' age and language development levels play key roles in the selection of various technology tools, and that technology is only a tool to facilitate learning, not a panacea.

### Choices in Uses of Technology: Face-to-Face, Blended, and Online Learning

Besides the traditional face-to-face environment, innovative ways and new spaces have been adopted in the teaching and learning of Chinese. The term blended learning, often used interchangeably with hybrid learning, refers to a combination of both online and face-to-face learning experiences. In a typical blended-learning context, students may attend a class taught by a teacher in a traditional classroom setting while also independently completing online components of the course outside of the classroom (Blended learning, 2013).

An online course is one in which at least 80% of the course content is delivered online, while face-to-face instruction encompasses courses in which no more than 29% of the content is delivered online, including both traditional and web-facilitated courses. In blended (or hybrid) instruction, 30%–80% of course content is delivered online, as illustrated in Figure 12:

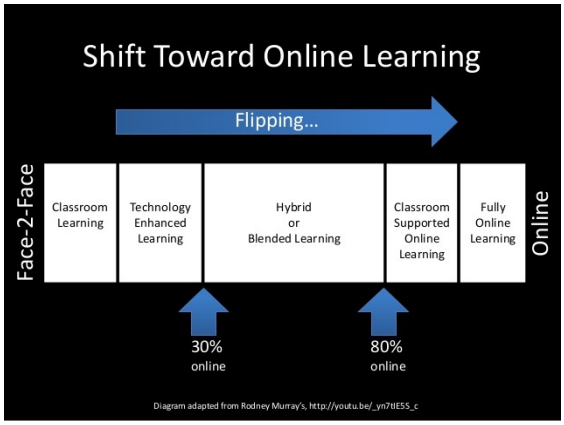


Figure 12. Shift Toward Online Learning
https://image.slidesharecdn.com/activelearningonline-140919155703-phpapp02/95/flipping-not-flopping-infusing-active-learning-in-online-and-blended-courses-21-638.jpg?cb=1411142892

This shift toward online learning has begun to address several needs related to the learning of Chinese in the K–12 education community. Though face-to-face Chinese programs have been established, particularly in urban areas or places where there are sizable Chinese heritage communities from which to draw prospective teachers, there are still many districts and schools in rural towns and smaller cities that have small groups of students who want to study Chinese. Such low student numbers cannot support the hiring of a teacher, even if one is available, which is often not the case. Online courses can fill this need. In several states, a series of high school courses have been developed and are now offered online through virtual schools, so that students from across the state have the opportunity to take Chinese.

For example, the North Carolina Virtual Public School (NCVPS), supported by several federal grants, created a series of four courses, Chinese I–IV, plus a College Board Advanced Placement Chinese Language & Culture course, which are now some of its most popular courses, with enrollment from almost every district in the state and many charter schools. NCVPS also offers its courses to non-public school students, home school students, and out-of-state students who are interested in taking Chinese, as well as other languages and subjects, as described on its website (www.ncvps.org).

Online learning has made studying Chinese a possibility for students who would not have had the opportunity to do so without it. Likewise, as many Chinese dual language and immersion programs grow from the elementary school level and continue through 8th grade, students are entering high school programs with pre-advanced or advanced proficiency in Chinese. Often, these students' needs are not supported by their high schools' course offerings in Chinese. As a result, there are several instances of secondary school immersion continuation programs that extend learning in Chinese via fully online courses.

While sharing many characteristics with online and distance courses, Massive Open Online Courses (MOOCs) are somewhat different. Oxford Dictionaries Online defines a MOOC as "a course of study made available over the internet without charge to a very large number of people." MOOCs differ from many online courses in that:

- They are designed for unlimited participation and open access via the web;
- Those participating are not registered students at a school, and they do not pay any tuition or fees;
- There is typically only a certificate given for completion of the MOOC; and
- No tuition is charged.

MOOCs are becoming more prevalent as an on-demand learning opportunity that requires very little commitment beyond an individual's interest in learning the topic offered in the MOOC. There are now a few MOOCs for Chinese language learning, especially for adults, from Coursera, edX, and elsewhere.

**Considering Student Age and Language Development Levels in Selecting Technology**

As mentioned above, more and more resources are appearing for all types of learners, with more recent publications tailoring content for students of different ages. Consider the emergence of online sites to support Chinese literacy development, which can be used as part of a formal course or by independent learners of Chinese. To name a few, there are websites that focus on building younger students' reading skills with audio supports, pinyin glossing, etc. iChinese Reader (https://ichinesereader.com) and 5Q Channel (http://www.5qchannel.com) are two such sites that offer a myriad of online storybooks for a wide range of content and student ages, from elementary to middle school learners. Similarly, middle and high school students with intermediate to advanced reading skills can access sites like Clavis Sinica's "Chinese Voices Project" (http://www.clavisinica.com/voices.html), The Chairman's Bao (https://www.thechairmansbao.com), and the Du Chinese app (https://www.duchinese.net), which provide edited texts on modern news and social issues with audio and glosses. Advanced learners can dive into all manner of texts online, with the help of character processing and glossing technology, which have revolutionized the accessibility of texts for non-native and heritage learners without the headaches of using print dictionaries. These sites and resources are just the beginning, but they point to the power of leveraging the internet for teachers to offer customized content online and for learners to expand their reading options through external sources.

Families with younger children in dual language and immersion programs might need to make personal decisions about when and how much to use supplemental digital Chinese content. Most Chinese immersion programs limit or prohibit the use of devices at early levels, as current research cautions against exposing young children to too much "screen time" on a computer or mobile device, even for educational purposes (American Academy of Pediatrics, 2017). Parents should discuss with school staff when the use of digital tools will be introduced to students and consider when and how to supplement this use at home. The American Academy of Pediatrics (2016) has conducted ongoing research on media exposure and mobile device use, creating recommendations for children's media use, and publishes this information on a helpful website where families can create media use plans for their children (http://HealthyChildren.org/MediaUsePlan). With the research on children's media continuing to evolve, many of these recommendations are fairly common sense: Avoid media exposure to children younger than age 2, have only limited exposure for children ages 2-5, and create consistent limits for children age 6 and older, while ensuring that they also have a good balance of sleep, physical exercise, and healthy social interactions.

**Understanding the Roles and Limitations of Technology**

Technology is a learning tool, not a babysitter or a replacement for a teacher or a program. One danger of the use of technology is the assumption that since it is a "cool tool," it will immediately draw users into engaging learning activities, and the teacher's work will be lessened. Though there are programs that purport to teach languages via computer-based instruction, to date no systems have been able to replace a skilled instructor, particularly in learning a language like Chinese.

Furthermore, teachers now need to go the extra mile to find appropriate materials online, survey new online tools and resources (many of which incur extra fees), and tailor their classroom instruction to use these resources in a logical manner. Similarly, teachers cannot expect that students can watch videos online or attempt online readings without teacher support. Chinese teachers need to design appropriate scaffolds, including comprehension check activities and engagement with thematic material, so that learners can work with new

material with the support of digital tools. Digital resources have expanded the boundaries of what can be accomplished by learners online and via computer-based learning activities, but their utility can be realized only with the planning and guidance of skilled teachers in designing appropriate tasks and lessons.

Another issue that is hotly debated in the Chinese language field is the role of handwriting versus typing or computer keyboarding of Chinese characters. Just as in English literacy development, handwriting is still an important writing skill in addition to computer keyboarding skills. Students need to receive explicit instruction, as well as practice, with handwriting Chinese characters and "writing" characters via Hanyu pinyin on the computer. It is interesting to consider that many Chinese assessments for students, such as the College Board's AP Chinese Language and Culture Exam, only test students on their keyboarding skills and do not have any items to check for accuracy in handwriting characters. Teachers will need to make important decisions regarding how to balance the need for handwriting practice with keyboarding.

Finally, as teachers become more proficient in integrating technology in their curriculum, the obvious next steps are to develop curriculum with more sophisticated pedagogical approaches, particularly those that allow students to process content in increasingly autonomous ways. This will involve creating opportunities for personalized learning via online tools, games, and content-based sites.

## Conclusion

This Brief describes the many considerations and decisions that need to be made by teachers, students, and parents in integrating technology in Chinese language instruction. Just as it is important that those designing and implementing Chinese language programs be conversant with learning frameworks for world languages, it is also important to know how to apply best practices of language pedagogy using digital resources. Digital tools cannot be used haphazardly: Teachers need to consider what tools to use and how to use them, students can learn to use tools to support and manage their own learning, and parents need to guide their children in wise uses of technology at home. As stakeholders become more proficient in the use of these tools, further prospects will arise for teachers to implement sophisticated pedagogical approaches. Our hope is that the tools and frameworks described in this Brief will provide a useful springboard for teachers and learners to learn more about new tools and ways to implement them to support—and transform—opportunities for Chinese language learning.

Perhaps the most exciting aspect of learning Chinese in the 21st century is the redesign of pedagogy away from a teacher-centered approach to a learner-centered paradigm that focuses on personalized learning though the use of digital tools in non-traditional "classroom" environments. Content no longer is dictated solely by prescribed, published materials taught within brick-and-mortar classrooms, but rather includes access to and implementation of resources available online to design learning experiences that develop critical thinking skills, foster collaborative learning, and provide engagement with real-world contexts. As described above, learners more and more can take their learning into their own hands via online curricula, podcasts, videos, and increasingly, virtual reality platforms. The challenges for successful technology integration in Chinese language instruction include training teachers how best to select resources and design their teaching in ways that truly redefine what happens both in and outside their classrooms. This also involves deciding when students will use technology tools to achieve learning goals, and ultimately move to even more sophisticated pedagogical approaches – flipped classroom environments, project-based learning, design thinking, service learning, and collaboration with other school programs – where students take their learning beyond what can happen in traditional classroom environments.

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