Toward Inclusive Modern Language Teaching and Learning: Integration of Cognitive Science and Pedagogy

Hiroko Yamashita
Rochester Institute of Technology

Abstract
Modern languages are typically taught in group settings, with the underlying assumption that all learners have a similar level of skills based on age-appropriately developed cognitive processes. Recently, however, more learners with diverse learning processes have been integrated into traditional classrooms, and instructors often teach such mixed groups of learners (Konyndyk 2011).

The current study highlights the multilayered challenges instructors face in teaching a language to a group with diverse learning processes and explores optimal ways to teach them. The study argues that, in addition to providing institutional support to fill the perceptual gap among learners, integration of cognitive science research, such as language perception and production, with language pedagogy plays a critical role in successful language teaching to a diverse group of learners.

Key words
inclusive language teaching, diverse learning process, cognitive science, pedagogy

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1. Introduction: Challenges on the ground

How do we teach grammar or dialogue in Chinese, Japanese, or Korean to a group when one learner is deaf or hard-of-hearing? How do we help a learner with dyslexia read and write in foreign characters?

It is increasingly common that language instructors in colleges teach learners with diverse needs (hereafter DLs) due to physical or cognitive conditions that require accommodations for their success in learning. These learners, despite their enthusiasm and effort, face significant challenges when learning languages compared to typical learners (hereafter TLs). There might be a learner who continues to write Hiragana in reverse, despite numerous corrections, or who is unable to read aloud a passage smoothly even in the second year. Or a learner might freeze when asked to speak in front of the class. Or a learner might be profoundly deaf or hard-of-hearing (hereafter D/HOH). These learners most likely benefit from adjusted learning environments and content not provided through traditional teaching materials and methods.

Instructors normally provide assistance and accommodations tailored to each DL. They may offer extra office hours to explain and give additional practice, provide supplementary handouts, or arrange for language tutors, among other modifications. Each DL’s area of weakness (or weaknesses, if more than one) varies, and so do the supplemental arrangements. Some instructors consult the disability office or incorporate methods from the literature introducing best practices for teaching learners with a learning disability. Such efforts add a significant amount of work on top of instructors’ already heavy teaching activities, yet the effectiveness of those teaching accommodations varies, and often DLs still lag behind. As the complexity of materials increases, gradually many of those learners find it hard to keep up with the class. Compared to TLs, very few DLs reach beyond the beginning level.

These cases happen to both seasoned and developing instructors, indicating that the challenge lies outside a given instructor’s teaching skills. Currently, there is a heightened sense of urgency among language instructors in responding to varying needs when teaching a mixed group of DLs and TLs (Konyndyk 2011).

The current study analyzes the factors that hinder DLs from reaching their full potential in modern language learning and proposes possible strategic approaches to effective teaching. The paper first outlines the challenges instructors at the university level face in teaching at-risk learners with a variety of learning processes, then describes the limitations of existing institutional support, and finally examines the potential benefits of applying discoveries from cognitive science to pedagogical methods in teaching those learners. This study argues that cross-disciplinary dialogues among researchers in cognitive science and in pedagogy are critical to the advancement of teaching modern languages to at-risk learners. It also shows that such dialogues in turn further advance studies in cognitive science.

1 In this study, the term learner with diverse needs (DL) refers to all learners with systematic hindrances to learning, whether caused by conditions involving memory, attention, or any aspects of cognition, or by sensorimotor abilities such as audition, vision, or speech motor control. The study by no means covers topics relevant to all cases but rather attempts to bring awareness to a variety of possible approaches that may benefit those learners as they study modern languages.
2. Complexity of condition assessment
There are multiple layers of challenges when instructors assist a DL in a school setting. The first challenge entails identifying the learner’s areas of need in teaching the language. Often instructors are notified of an academic accommodation for the learner by their disability office. That information is limited, however, because it generally describes the type of accommodations approved by the office, such as extended exam times, the use of a computer, or the services of a notetaker, among others. There is no mention of how such learners process written/spoken language or acquire the production skills of writing and speaking in modern languages and where their learning processes uniquely differ from those of TLs.

Instructors may more readily receive information from DLs about which areas to accommodate or even how best to teach them. Learners may choose to describe their learning style if they are aware of it. Some may receive guidance on how to be aware of their special needs and how to communicate to prepare for language learning in high school or college (Scott and Manglitz n.d.). Often, however, even those learners are unaware of their learning processes: what happens when they see characters and words, read sentences, or try to write or speak in the target language, all useful information when instructors consider teaching methods. Some learners may be entirely unaware of their need for accommodation.

Even skilled instructors may have only a limited knowledge regarding the types of diverse processes in learning, due to both the wide range of disabilities and limited opportunities to learn about them. It would be helpful for university-level instructors to receive training on how DLs perceive and learn in general. Yet even though such training would inform instructors of general characteristics, it still would not provide them with the best teaching strategies, because it would not directly assess each learner’s precise condition within the category.

For example, among D/HOH learners there are different optimal accommodations, defined by the learner’s degree of residual hearing, age at onset of hearing loss, ability to communicate using signed language, and preferred method of communication (oral, lip reading, or sign language only). Accordingly, effective assistance for each case varies, including the usefulness of a sign language interpreter and adjustments in evaluation methods. Consequently, even teaching students within a single category includes a wide array of effective instructional accommodations.

3. Success of traditional learning support systems and their current limitations

3.1. Traditional institutional support to fill the gap
In the United States, K–12 schools and universities provide support for learners with special needs to different degrees. In K–12 schools, there are systematic supports for special education, such as special education classes, tutorial sessions with trained tutors, American Sign Language (hereafter ASL) interpreters, and teaching resources specific to a variety of disabilities. How each subject is supported may vary.
At the college level, accommodations in modern languages are often added to traditional classroom teaching—DLs receive the same syllabus, schedule, and tests/quizzes/assignments as the TLs in class. Instructors may modify some parts of instruction, such as substituting assignments, changing exam formats, or allowing extended time for exams, among others. Notetakers or ASL interpreters may be assigned so that D/HOH learners will receive the content of the instruction as presented by the instructor.

Such institutional, systematic accommodation is important because it establishes an assistive learning environment and ensures its continuation throughout the course or over multiple courses during the learner’s studies at the institution. At the same time, such institutional support covers only the general learning environment and does not address all aspects of teaching and learning, particularly in modern languages. Schwarz (1997) notes the limited awareness of appropriate accommodations for modern language learning by disability offices as well as modern language faculty members in universities. Consequently, a lot of instructional accommodation is left to each instructor, who must decide on the best teaching methods and most effective assessments.

For example, an ASL interpreter who understands English and ASL, or an English monolingual captionist assigned to a modern language classroom with a D/HOH learner provides little assistance to either learner or instructor if all or most instruction is in the target language. A bilingual captionist, who transcribes the utterances by the instructor and other learners in both English and the target language, lacks a way to communicate back the learner’s ASL utterances to the instructor or fellow classmates. A bilingual ASL interpreter who understands both English and the target language offers a wider variety of support (cf. Darroch 2013). In such a case, the instructor must work closely with both learner and interpreter to mutually come to a clear understanding of the respective roles and responsibilities of the learner, interpreter, and instructor, including how to present foreign words to the learner and how the learner responds back to the instructor or communicates with classmates. The rate of information processing and its effectiveness in class must be carefully reexamined, even if bilingual interpreters are available, due to the rate of information conveyed in different modes. Hearing learners receive an enormous amount of information in a short period of time through spoken language. If all words in the utterances are to be conveyed to D/HOH learners as articulated, the interpreter must fingerspell most of the words in the target language, which is too onerous and lags behind the spoken language.

Partial success of systematic, institutional support in modern language teaching was observed in a study by Yamashita, Maru, and Aldersley (2011). They employed a system of notetakers converted to Interactive Communication Facilitators (ICFs) by hiring notetakers with advanced skills in the target language. The ICFs transcribed instructional phrases and key commands by the instructor in the target language and shared the online note with the D/HOH learners. The learners’ utterances in the target language, such as drill responses and conversations, were done in writing through updating the note. Such a system enabled D/HOH learners to participate in class activities in real time and raised the course completion rate and level of such learners in Japanese.²

² Additional curricular arrangements, such as highly structured instructions and a detailed schedule that listed required preparations, class activities, and homework for each day, were made and distributed to both D/HOH and hearing
4. Application of cognitive process research to pedagogy

4.1. Information for pedagogical modifications for DLs

The goals of language teaching and learning are multimodal, complex, and ambitious. In a matter of a few years, learners of modern languages in most college curricula are introduced to most of the basic elements of speaking, listening, reading, and writing and gain fluency gradually.

Schwarz (1997) notes the gap between the needs of learners with learning disabilities in modern languages and existing institutional support, which also applies to DLs. She suggests learners and parents need to be knowledgeable about the problems those learners face, and in turn provide information on their individual challenges to the school. Although it may be helpful and sometimes necessary in establishing the learning environment in such a manner, it is a daunting task for learners and their families. This is where researchers and instructors should play an active role.

For instructors who wish to find ways to assist struggling learners in a modern language, perhaps the most helpful resources would be (1) a list of best practices for teaching modern languages to DLs, tailored to each type of learner, and (2) teaching materials in different modes and approaches to correspond to each learner’s need. Ideally the best-practice list would be fine-grained, including effective ways of introducing, offering practices for, and assessing each skill; an even further detailed list might cover linguistic structures or reading/writing in foreign orthography (if applicable) in each language. Unfortunately, such pedagogical resources directly reaching language instructors are extremely limited.

Over the years, researchers have developed hypotheses and tested their effectiveness in teaching, including in modern language teaching. One example is the multisensory structured language (MSL) approach applied to modern language teaching, as summarized by Sparks and Miller (2000). This approach employs multiple sensory experiences simultaneously, as learners engage in language learning, such as visual, auditory, and tactile-kinesthetic skills, as represented by learners’ writing a word as they say it. The MSL approach also recommends a gradual buildup in complexity, such as teaching morphology to build words and arranging syntactic structures from simple to more complex. Other recommendations for curricular design for DLs include the organized and structured introduction of concepts, repeated practice and reinforcement, and direct teaching of sounds, among others (for summary, see Ganschow and Schneider 2020).

Because of the sheer number of types of atypical learning processes, even a simple table of proposed best practices for particular learning differences would be helpful to instructors. For facilitating deaf learners’ modern language learning, for example, McColl (2005) provides a concise table of points to consider in teaching D/HOH learners. It summarizes (1) the relevant characteristics of D/HOH learners that can affect learning in general, (2) characteristics that can affect learning modern languages, (3) the consequences as a result of such characteristics, (4) learning strategies the instructor and learner can incorporate, and (5) possible support strategies.

students. The tutor provided additional support to D/HOH students as necessary. Areas of future improvement included increased use of written presentation for mechanical drills, appropriate instruction for reading, and ways to engage all students in production activities.
The explanation of simple, general terms enables language instructors from all backgrounds to incorporate relevant approaches in their teaching. The International Dyslexia Association (2020) provides a fact sheet of learning styles of at-risk, dyslexic learners and suggests effective practices in modern language teaching. Mole, McColl, and Vale (2005) describe in detail the communication processes of deaf learners, how support staff may assist, and how instructors might redesign their teaching to accommodate deaf learners. Virginia Department of Education (2017) provides a comprehensive overview of teaching modern languages to DLs, which includes common difficulties in the learning processes of DLs and proposes effective teaching and assessment.  

What we see here is an integration of discoveries in multiple disciplines: cognitive science and pedagogy. Although results vary, the effectiveness of such applications is reported in academic research (see Nijakowska 2010; Nijakowska 2013, for review) as well as in anecdotal reports.  

4.2. Linguistic and cognitive processes for pedagogical modifications for DLs  
Although there is some integration between cognitive science and pedagogy regarding approaches for language learning in general, still underdeveloped is the direct connection between linguistic/psycholinguistic studies and language pedagogy.  

Each language has linguistic aspects that may pose unique challenges to all modern language learners. For example, how native speakers of SVO, rigid word-ordered languages comprehend their L1 is not identical to the way those of SOV languages with relatively flexible word order understand theirs (e.g., Yamashita, Hirose, and Packard 2011). Accordingly, how each language-speaker group comprehends the grammar of modern languages as L2s and applies that knowledge to their usage is not the same, even among TLs.  

Learning what kind of cognitive processes take place as learners with particular learning difficulties speak, listen, read, or write may help instructors both create and try new approaches to teaching. In multiple cognitive science fields, there are numerous studies on the L1 processes of DLs, such as those with dyslexia and autism spectrum disorder. Many studies report on the processes of reading English by D/HH learners, although it may not be the L1 for all such learners.  

What appears to be still scarce is the study of the cognitive processes at work as DLs learn L2s. Also very limited is the application of research on these DLs’ L1 and L2 processes to modern language pedagogy. Cognitive processes of DLs as they learn particular L2s would be informative as one considers appropriate methods and teaching activities, ranging from best practices for explaining grammar and designing speaking activities to creating homework and devising effective methods of assessment. The variability in the types of atypical cognitive areas among learners and the many choices of languages to learn in academic settings, however, pose a challenge to such studies because conducting statistical analyses for typical experimental studies requires a certain number of subjects tested under the same conditions.  

Some systematic investigations of processes in L2s by DLs or of specific teaching methods may reach the threshold of academic research. The constraints of subject availability and verification by statistical analysis, however, require considerable effort for each challenge DLs

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3 Zhong Chen, p.e.
already face. Although it is critical that such research be more widely conducted, there should be flexible approaches in connecting all these results and applying them to pedagogical goals. In exploring the best language teaching materials and methods for DLs, information reported about general tendencies in the cognitive processes in the L1 for a particular learning disorder and the instructor’s direct observation of the learner should be utilized, as well as research findings about the processes of DLs when learning L2s.

4.3. Analysis of cognitive processes in language-learning activities and DLs’ processes
One way to explore effective pedagogical approaches to DLs is to take what are widely accepted as effective methods in language learning for TLs and examine whether they are also effective for particular DLs in light of their known cognitive processes. For example, see the pattern drill for the structure ‘(I) do action X at place Y,’ presented in a similar way to those commonly used in textbooks below. The drill includes sentence patterns, questions, cues, and answers provided by audio. It is a common form of exercise, especially for beginning and intermediate levels.

(1) ～で ～をします：Following the example below, say sentences that describe where you do each activity.

ex. カフェ, コーヒー, のみます ‘café, coffee, drink’
　カフェでコーヒーをのみます。 ‘I drink coffee at a café.’

a. スーパー,りんご, かいます (answer: スーパーでりんごをかいます。 ‘I buy apples at the supermarket.’)

b. こうえん, テニス, します (answer: こうえんでテニスをします。 ‘I play tennis in the park.’)

c. …

The goal of this pattern drill is to practice the structure shown in the example by changing words: the place of the action, the noun of the theme role that fits the action, and the verb that describes the action. The drills are typically assigned as homework and/or practiced in class. The learners are instructed first to hear and/or repeat the sentence pattern while they see the drill in the textbook, then, given a cue by audio, assemble the answer by using the cue words, and check the correctness with the answer given by audio. By going through several sentences with the same syntactic structure, they practice the pattern and begin to learn the syntactic structure.

In order for learners to benefit from such drill activities, the following must successfully take place: a learner (1) reads the drill instruction and understands the instruction, (2) understands the drill pattern, (3) understands the grammatical rules the drill targets, (4) understands the meaning of cue words to plug into the syntactic structure of the drill, (5) assembles the sentence based on the grammatical patterns as learned, (6) speaks it aloud, (7) hears the answer and verifies the

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4 Which aspects of learners’ L1 processes transfer to L2 learning, if any, can be a topic for research by itself. Instructors should also make the best judgements in instructional adjustments based on their own observations.
correctness of the answer, and (8) speaks the sentences in the drill until able to say the pattern smoothly.

Let us consider the possible effectiveness of this type of drill activity for a dyslexic learner. It is widely known that dyslexic learners have difficulty reading written language and reading aloud, as often reported in their L1. If the instructor observes the same difficulty in a learner’s performance in the target language, then a question should be asked whether the drill as presented to all learners in the class is the most effective pedagogical approach for the dyslexic learner. The learner may benefit more if the instructor assigns the drill to be done audibly, with an extra number of repetition of patterns, cue words, and answers to compensate for the deficit in visual input. If the learner shows difficulty in practicing the drill only in audio, as in the case of some dyslexic learners, then an alternative approach to this type of drill should be considered.

Another case to consider for using this type of drill is its effectiveness for D/HOH learners. The cues and answers of the drill, which are provided by the audio, are not fully accessible for many of those learners. Typically those learners are provided with the written transcripts of the answers. Note the advantage TLs have in answering the sentences and immediately checking the accuracy of their answer by hearing it. In a matter of seconds for each question, TLs go through processing the cue words and assembling a syntactic structure, uttering the structure, and processing the answer sentence to verify the correctness of their response. In comparison, the process D/HOH learners go through in simply reading a list of written questions and answers lacks rigor, effective hypothesis testing, and feedback. To fill the gap, the instructor may then create digital flashcards to make the drill more effective. Note that if textbook publishers would consider presenting drills in different formats to accommodate a variety of learners, it would be much more efficient than having individual instructors invent such teaching materials—they could then simply choose the most effective format for each DL.

More fine-grained research provides opportunities to reconsider practices as common as drills. A learner with a cochlear implant (hereafter CI) may appear to understand spoken language as well as a hearing learner. Farris-Trimble, McMurray, Cigrand, and Tomblin (2014), however, report slower spoken-word recognition among learners with a CI than among those in the hearing group. Furthermore, those who lost hearing before learning their L1 were even slower in the task than those who lost hearing after L1 acquisition. These results question the effectiveness of rapidly spoken presentations of drill sentences, cue words, and answers in drills for learners with a CI in modern language classes.

Such examinations of commonly used tasks from the viewpoint of the cognitive processes of specific DLs may facilitate their learning of modern languages. Note there are many reports of findings about the cognitive processes of DLs by type of atypical cognitive area, and progress is constantly being made. Ongoing dialogue among researchers in cognitive science and pedagogy is essential for effective language teaching to DLs.

4.4. Cycle of application and research
Discoveries in the cognitive processes of DLs and pedagogical applications are not one-way but bidirectional. In fact, almost every new case of teaching a DL reveals more research questions. For
example, in a beginning Japanese class, a D/HOH learner of Japanese, who had lost hearing as a school-age child (thus acquiring her L1 as a hearing child) showed difficulty in transcribing *puma*, an English foreign word, in Katakana. She said the fact she did not know the animal in English made it difficult. This case raises crucial questions about the cognitive processes of Japanese-speakers’ conversion of foreign sounds to Katakana transcription, and about those of HOH learners performing the same task. It also brings up the issue of the cognitive processes of TLs of Japanese as they convert English (or any foreign) word to Katakana.

Another research question raised is D/HOH learners’ processing of complex syntactic structures in L1 and L2. Many D/HOH in the United States, whose L1 or most-exposed spoken language is English, complete beginning-level Japanese without a major problem, perhaps because syntactic structures in the beginning-level courses are usually simplex ones. These same learners, however, begin to struggle in assembling sentences as they learn multiclausal complex structures. There are many questions remaining about how D/HOH learners with an English-language background learn an SOV language with null pronouns and flexible word-order.

5. Toward establishing inclusive language teaching: Support, integration of findings, and dissemination

In a global society, being given opportunities to be multilingual is not a privilege but an entitlement. Yet the goals modern language learning sets are ambitious, and instructors’ and learners’ tasks to achieve them are complex. A review of effectiveness and adjustments for DLs’ language learning, starting with common modern languages, would be a step forward to support a diverse group of learners in a school setting. Needless to say, constant dialogue among researchers in cognitive science and pedagogy would facilitate the advancement of inclusive language-teaching methods and the development of optimal teaching materials. Furthermore, as useful approaches become clear, the dialogue should involve publishers, so that the same linguistic content may be presented with options in modality and manner of presentation, delegating only the task of selection to language instructors.

References


