

What We Know or Believe about Materially Improving the Economics, Logistics and Reliability of Language Training and Sustainment in USG

As a community, we need to radically improve the ground-truth economics, logistics and reliability of USG language training, sustainment, enhancement and assessment. We need to deliver in the real world, and prove it with data.

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Overview

Transparent Language develops and supports innovative specialized technology to make US Government (USG) foreign language training and sustainment programs much more economical, effective, flexible, reliable and reportable.

Language capability is a critical enabler of USG success, yet the U.S. is chronically less language-capable than our allies and adversaries, resulting in increased risk and decreased opportunities. In addition to traditional intelligence and military purposes, language is also a key dimension of US success in such emerging fields of international contention and cooperation as social influence and cyber.

Transparent Language's *CL-150 Platform* ("the CL-150") is a constantly-evolving, intensely language-centric technology platform. The CL-150 is a budget and effort multiplier for USG language learners, instructors, program administrators, content creators, technology developers, and researchers.

Over the last decade, Transparent Language has innovatively and energetically supported a wide variety of Intelligence (IC), Defense (DOD) and other USG language programs addressing a broad spectrum of languages, levels, domains, requirements, methodologies and use cases.

We think about technology and method in relation to

1. initial language acquisition—both schoolhouse and virtual
2. language sustainment and enhancement—both schoolhouse and virtual.

We help our customers transform six dimensions of training

1. speed (time to outcome)
2. reliability (minimum outcome)
3. relevance (highly customized to each different curriculum and purpose)
4. logistics (Conveniently train at more times and in more places. More often train on the job, rather than being re-assigned or re-located for full-time training.)
5. visibility (comprehensive, multi-level tracking and reporting)
6. economics (cost to deliver the outcome, including operational disruption from training)

Because USG is our primary customer, our systems work not only for common languages, but also for less-common and under-supported languages. Our solutions address not only general language proficiency, but also language performance for many specialized government purposes and domains.

Finding one's way using maps changed little for hundreds of years, until navigation was transformed almost overnight emerging specialized platforms, such as Google Maps. That same degree of change is now available to language learning and teaching.

As with navigation, retail, taxis and many other sectors of modern human activity, transforming the economics and logistics of language teaching and learning for serious purposes required a broad, deep, shared, highly-specialized, language-centric, new-era digital technology platform. That development has been a major effort for Transparent Language. It's now in place however, and transformational practices and outcomes are steadily becoming real and integrating into community schools, programs and practices.

Background

The IC/DOD/USG need for language capacity is rising across many languages, levels, modalities, domains and use cases. However, budgets are under increasing pressure, and language proficiency and performance have always been very time consuming and expensive to train and sustain.

The alternative to weakened US operations or unaffordable spending is finding reliable ways to train and sustain language much more quickly, flexibly and cost efficiently at scale, a concept sometimes termed “language transformation.”

Emerging Platform-level Tech Makes Serious Economic Transformation Possible

Blending human instruction and coaching with emerging platform-level technology is the key to “language transformation.” We are now at a technological turning point for education in general, language in particular, and even more specifically, the training of less-commonly taught languages and language for specialized military and intelligence purposes. Technology can now impact language acquisition, sustainment and program administration powerfully enough to achieve leadership’s call for outcomes that are “twice the result” or “in half the time.”

Technology cannot do everything, but it can, for example,

- execute some dimensions of instruction faster and more reliably than human instructors
- beneficially shift the time or place that work is done
- drive user engagement with compelling progress and game dynamics
- bring dispersed people together
- seamlessly incorporate current authentic materials almost in real time
- make under-utilized “stove piped” content archives more flexible and accessible, and
- make user time-on-task and progress significantly more visible and reportable

The technology to do that is broad, complex and expensive, because it needs to include foundational capability relative to so many languages, modalities, learning behaviors and delivery platforms. It needs to support a broad array of more effective blended learning and instruction methodologies. It needs to work for under-supported languages as well as common languages. It needs to support every different curriculum and specialized government domain, as well as general language proficiency. It needs rapid authoring capability for almost any language and level, to meet the language surge requirements that frequently accompany an unexpected humanitarian crisis or conflict. Fortunately however, open, multi-sided Platform technology only needs to be developed once to be available to every program, school, course and individual.

Empowering and Leveraging Instructors

Language proficiency is most effectively developed *in concert with competent, caring, engaged human teachers and coaches*. We agree with those who say, “Technology will not replace teachers, but teachers who use technology well will replace those who do not.”

Lessons We Have Learned

Here's what we've learned about making "Language Transformation" a reality:

1. Economic Transformation of Language programs is Not About Changing Everything. It's About Using Technology to Revolutionize a Few Key Things

If teachers are critical, how does technology have a material impact on language programs?

Consider that humans have been making clothing for millennia. Relatively recently however, technology radically transformed the breadth and scale of that human enterprise, massively improving the speed, cost and reliability of key weaving, printing, sewing and other sub-processes. This did not lead to a reduction of variety and innovation, but rather an enormous leap in both the number of clothing industry creative and manufacturing professionals and the variety and volume of produced materials.

Computers can't replace a good language instructor. "Can software do __[this]__ for my students as well as my instructors can?" is the wrong question. What we ask instead is, "What are the high-volume leverage points susceptible to re-engineering with computers and communication that can transform the economics, logistics and reliability of language acquisition and sustainment as a whole in USG?" Where is the bang for the buck with technology? What large component processes can we make one tenth the cost in order to make the overall process half the cost? What part of the work can technology make ten times as relevant and satisfying for learners and instructors, to make the whole process twice as engaging?

Here are some of the key leverage points:

- Mastering lexicon (words, phrases and other "chunks" of language)
- Automatically refreshing acquired lexicon indefinitely
- Shifting learning time
- Shifting learning place
- Tightly aligning lexicon acquisition to the exact sequence of every individual curriculum
- Making powerful new lessons based on culturally rich, hours-old authentic material
- Learning to read, type and text in another alphabet/script
- Making student and instructor effort and achievement visible
- Enabling student use of voice in high-volume computer-delivered homework
- Addressing requirements for less-common and under-supported languages as well as requirements for common languages.
- Addressing requirements for specialized language performance as well as for general proficiency.

Since 1800, technology has increased the efficiency of clothing production perhaps twenty times over. For language, simply doubling efficiency is transformational.

2. Declaratively Accelerated Blended Learning (DABL) Delivers Faster Outcomes that More Reliably Transition to Sustainment

To vastly over-simplify, language proficiency can be thought of in two parts: lexicon and language skills. Or as some academics might say, "declarative knowledge and procedural knowledge."

All language learning methods involve both (a) learning a large number of words, phrases and other “chunks” of the new language (“lexicon”), and (b) developing and automatizing the learner’s ability to select, order, modify and integrate lexical items in more complex language structures, such as sentences and discourse (“language skills.”)

Well-designed computer software is particularly good for mastering, tracking and automatically sustaining lexicon. Computers (including mobile devices) can do this quickly and for many learners at once, using a wide variety of pedagogically effective, high-volume activities and customizing the experience of each learner on the fly. Learners can do this work almost anywhere and at any time. Work can be tracked and synchronized across multiple devices, making the whole process visible and measurable.

An especially effective process is what we call ***Declaratively Accelerated Blended Learning*** (DABL.) With DABL, students learn the lexicon associated with the topic and grammar of an upcoming lesson on their computer or mobile device. This is followed by intensive communicative, task-based and cooperative class work under the eye of a skilled instructor. Class work, whether in a physical or virtual classroom, actively employs and exercises the newly-acquired lexicon as well as previously acquired lexicon and skills.

Practical breakthroughs are often simple. The potential economic and logistical impact of DABL is substantial. Students master the lexicon for a unit of instruction before the class for that unit. A skilled instructor then uses class time to aggressively drive language use. Repeat over and over. That’s pretty simple.

The only catch is that it takes a broad and deep suite of sophisticated and specialized language-centric technology to deliver DABL capability that

- is available, synchronized and reported across web, laptop and mobile devices
- equally supports less-common languages of limited commercial interest
- is not just for one course per language but can be quickly and affordably customized to every different course and curriculum, and
- seamlessly transitions from use during formal acquisition training to career-long sustainment and enhancement

As is often the case with disruptive technology, complex, sophisticated technical infrastructure is the critical enabler of simple and efficient human behavior.

“Flipped Classroom”

Readers may be aware of the phrase “flipped classroom,” describing a teaching method where the initial presentation of a concept—e.g., how to do a long division calculation—that has traditionally been delivered by a teacher at the front of the classroom during class time is instead delivered by video at home prior to class. In turn, the “homework problems” typically done by the student alone at home are instead done during class time, where teacher and peers can participate and offer encouragement, correction and explication. DABL is a “flipped classroom” for language.

To reach an advanced level, an English learner not only needs to learn the primary meaning of thousands of single words, but also secondary word meanings, as well as compounds, collocations and phrases. All

of these are stored in the memory as fixed chunks. “Get” has dozens of meanings as a single word. We also “get married,” “get into cooking,” “get out from under,” etc.

An immersed adult will acquire lexicon over time from just the “comprehensible input” of being around when language happens, but serious adult learners and professional language programs need something much faster and more reliable.

Bringing DABL to Every Curriculum

Transparent Language’s sophisticated language-centric technology makes it possible to tightly customize DABL to every different curriculum, a key to transformational course outcomes.

The pedagogical requirement for curriculum-aligned DABL is to ensure that students are lexically ready for the specific lesson about to be taught, for example an intermediate unit on weather. In class, students will describe current and past weather, listen to and give weather reports, and draw weather maps from the verbal descriptions—a variety of interesting and engaging task-based, communicative, and cooperative learning activities related to weather.

At this level, the students already know the words and phrases for rain and snow, so the DABL Courseware or Learningware is used to quickly and reliably master more advanced words and phrases such as “dew point,” “onshore wind,” and “chance of flash floods” before arriving in the classroom. This computer/phone/tablet work is assigned, tracked and fully visible to learner and instructor.

If prior to implementing a DABL approach students in this course typically acquired 15 new “vocab” per lesson, we might instead assign 30 per lesson, using the software to deliver the mastery of more material in less time by delivering a variety of engaging activities at a faster pace, and adapting in real time to what the learner finds easy or difficult.

Compliance is straightforward. Learners quickly recognize that doing the assigned computer work benefits them not only long term, but the next day. On the other hand, non-compliance is highly visible, with a variety of options for intervention. If necessary, computer work can all be scheduled during the training day when students are under full program control, relinquishing some time-shifting benefits, but retaining the full advantages of declarative acceleration.

DABL for Real-Time Curricula

DABL works equally well when curriculum is being developed in real time, day by day or week by week, for one student or a group. Software, such as the CL-150’s LessonGin, allows an instructor with no special technical knowledge to quickly create and assign compelling, and effective tech-delivered custom courseware based on current, authentic content prior to each class session.

DABL Benefits: Economics, Logistics, Reliability

A DABL approach maximizes and blends the effectiveness of both computer and instructor:

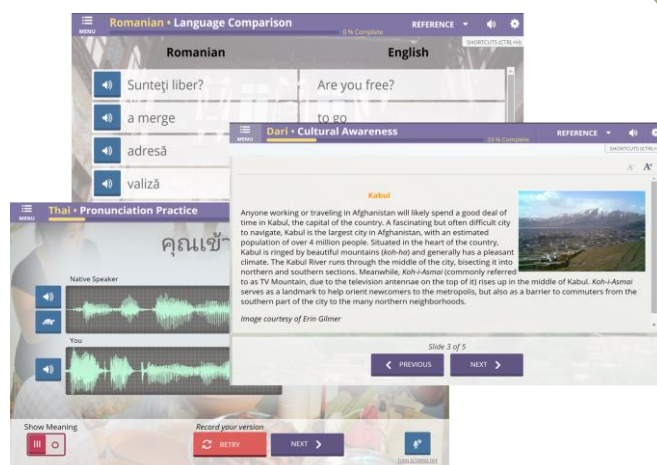
- **More proficiency in a given time.** At course completion, a significantly larger lexicon and better skills deliver higher proficiency. The total impact can be dramatic. The learner’s general lexical reservoir is more robust at each point in the course, and the learner comes to skills training with specific lexicon for that session. More time is available for skills training, and the training is more effective.

- **Greater logistical flexibility reduces costs and operational disruption.** Computer assignments can be completed almost anywhere and anytime. Face-time with the instructor can be physical or virtual.
 - In one initiative, instead of removing personnel from operations overseas for six weeks of full-time classes at a physical schoolhouse back in the US, students did just four hours of work per week for twelve weeks while staying on the job overseas. Three of each week's four hours were computer work that could be performed when convenient. Outcomes were equivalent, but learning time was reduced by over 60% and job disruption virtually eliminated.
- **Greater reliability (minimum program outcome).** The strong and unavoidable lexical acquisition regimen at the foundation of the DABL process produces a higher minimum outcome for less-diligent and less-talented students. DABL delivers impact at the low end as well as the high end.
- **Teacher time reduced or refocused.** Much instructor time becomes available for higher value engagement.
- **Greater “homework” clarity and visibility.** DABL homework effort has immediate benefits, and lack of effort is immediately and clearly visible to all.
 - In one of the earliest uses of the CL-150, military students struggling academically who said they were trying hard but just not succeeding were put on a simple lexical pre-work regimen using Transparent Language's software on a PDA. In virtually every case, academic results dramatically turned around, leading the Provost to personally champion school-wide use.

3. Technology Must be Specific to Each Curriculum

Commercial language software companies typically offer a course for each language, for example Rosetta Stone Italian, or Pearson's Golosa Russian Course, but USG's requirements go far beyond pre-canned commercial courses. In order to maximize the value derived from time and dollars, USG needs serious custom technology support of blended (and sometimes fully independent) learning of each of many different curricula and courses.

Such customization used to be economically infeasible. The time and cost of developing custom technology and authoring custom content was impractical. But learners, instructors and administrators of a DLI Basic Course, Af-Pak Hands Phase course, USSOCOM 200-hour Fam course or any of hundreds of other formal USG courses of language instruction do not need general ancillary materials. They need custom curriculum-aligned technology support that will materially improve the outcomes and economics



Tech tightly tailored to each specific course

of that specific curriculum.

The CL-150 is not a single course, but rather a large and multi-faceted meta-technology platform specifically designed to make the creating of new custom courseware for each different USG language course or curriculum logistically feasible and economically affordable.

The variety of capability available to the instructional designer for rapid integration into custom SCORM-compliant Courseware extends across many platforms and 100+ languages.

With CL-150 LessonGin, for instance, an instructor can make very sophisticated multi-activity Courseware based on current authentic content and aligned to any curriculum in about 30 minutes. LessonGin lessons integrate lexical preparation with language in context. Instructors can then easily assign, track and report on student use. A LessonGin lesson made for one class also becomes immediately available on the CL-150 for use by other USG instructors and programs.

4. The CL-150 Platform is a Multiplier for USG Language Learners, Instructors, Administrators, Content Creators, Technology Developers and Researchers.

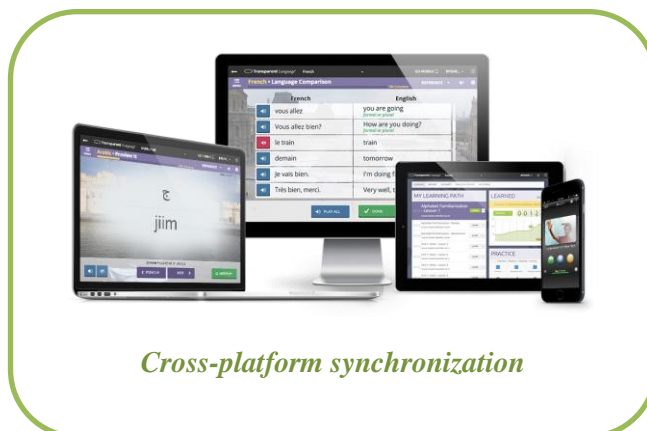
The CL-150 is a shared, intensely language-centric technology platform designed to add substantial value to every interaction of a language learner, instructor, developer, researcher, materials creator, or program administrator. The CL-150 epitomizes the economically significant transition from the point-solutions era of language training technology to the platform era.

It's only natural that in an era of point solutions each separate language software project in USG tended to recreate similar rudimentary functionalities over and over, but no single program was able to make the significant investment necessary to create breakthrough capability for the full range of languages, levels, modalities, domains, practices, platforms and content sets.

The CL-150 by contrast has over 200 developer-years invested specifically in language support and functionality of value to language learning, instruction and program management. By developing sophisticated language-centric capability once and making it *available to all*, the CL-150 changes the economic calculus for USG's large, dispersed, diverse language programs. Individual programs can invest in differentiating capability, because the CL-150 provides almost all the foundational capability for use by all in USG who choose to exploit it.

With the CL-150:

- Isolated materials archives become findable, more flexible, multi-platform, assignable, tracked and reported.
- Each content set automatically accrues a broad and constantly-expanding array of valuable language-specific and USG-specific functionality and flexibility.
- Materials become useable and synchronized across a wide variety of devices, including web, laptops, tablets and phones.



Cross-platform synchronization

- Programs become DABL-enabled, with attendant economic and logistical benefits.
- Material learned in different courses and activities over time is gathered into each user's personal lexical reservoir, where it is automatically refreshed indefinitely.
- User activity is comprehensively tracked and reported to learners, instructors and all appropriate administrators at multiple levels.
- Materials created by or for one USG organization become easily available for re-use by instructors and learners at other organizations, leveraging invested time.

Synergy with Other Providers

Providers of language content and services to USG often use the CL-150 to create materials to declaratively accelerate or otherwise advantage their courses and sustainment programs. Many bring content from various USG sources into the CL-150 to add functionality, increase flexibility, enable integration with Learned Items, enable multi-device delivery and synchronization, or integrate into comprehensive reporting of student time and achievement.

USG programs and users have access to a rapidly increasing volume of high-quality, extremely current, pedagogically effective LessonGin content produced at no extra charge to USG by instructors who do the work simply because it takes less time and produces better results than the way they were creating such lessons previously.

The CL-150 does not displace pre-existing or parallel USG content providers, but rather complements and strengthens them, if they wish. Producers of highly-curated, top-quality USG content such as course developers, GLOSS, InstaClass, Headstart, Rapport, ALL, etc. have access to the CL-150 platform with all its extra functionality, deliverability, tracking and reporting, if they choose to take advantage of it.

Research Platform

The CL-150 is also a practical vehicle for many types of research observations, tasking and information collection. Well-designed and executed research would be very valuable to the community at this inflection point. Definitive research on real-world net outcomes for programs and organizations is particularly valuable.

As language needs increase and budgets tighten, language programs will likely be initiated, expanded, reduced or cancelled based on perceptions of outcomes vs. cost. Disinterested research is needed to inform those decisions.

5. Programs Need Comprehensive Reporting to Be Effective

As instructors form classes and assign work, they need to track and report time and progress. Language Program managers need visibility into formal training, and whether sustainers are dedicating the required number of hours between training programs. Program administrators need visibility into student and instructor actions and time spent.

The CL-150 offers a comprehensive array of reports, and the number and type of reports for instructors, CLPMs and program administrators is increasing each year. With permission, any instructor or administrator can create custom reporting groups that include any set of users, and reports can be shared with peers or management.

Accurate and comprehensive reporting is also the indispensable foundation of mandated sustainment programs for large groups of personnel with varying levels of intrinsic and extrinsic motivation.

6. Any USG Language Transformation Technology Infrastructure Needs to Fully Encompass Less-Common and Under-Supported Languages

A technology platform addressing USG language requirements needs to aggressively encompass commercially under-supported languages, such as Baluchi, Cebuano or Wolof.

The developer skills needed to make leading-edge technology for under-supported languages is difficult to hire. Under-supported languages are under-supported specifically because the commercial world sees little value in dealing with them, so there is little commercial investment and few experienced developers.

Transparent Language works to maintain such personnel over the long term despite the vagaries of USG contracts and contract periods. Transparent Language has now engaged a diverse enough mix of USG customers to enable consistent long-term focus on obscure development spaces of special relevance to the USG language mission.

Enabling target-language text entry on devices with US-English operating systems can be extremely difficult for less-commonly taught languages with under-supported or complex writing systems. As a result, most language software companies catering to English speakers simply do not allow for typing in the target language. That's not acceptable for USG purposes.

The CL-150 currently includes content in the following languages for English speakers. ***Languages also available in transliterated.**

Afrikaans	Chinese, Cantonese	Javanese	Russian*
Albanian	Chinese, Mandarin *	Kalmyk	Scottish Gaelic
Altai *	Cornish	Kazakh *	Serbian *
Amharic *	Croatian	Kituba	Sicilian
Arabic, Modern Standard *	Czech	Kongo	Sinhala
Arabic, Egyptian	Danish	Korean *	Slovak
Arabic, Iraqi *	Dari *	Koyukon	Slovenian
Arabic, Levantine *	Dutch	Kurdish, Bendini	Somali
Arabic, Sudanese	English	Kurdish, Kurmanji	Spanish, Castilian
Arabic, Syrian	Estonian	Kurdish, Sorani *	Spanish, Colombian
Arabic, Yemeni – Transliterated	Farsi *	Lao	Spanish, Latin American
Armenian *	Finnish	Latin	Swahili
Asturian	French	Latvian	Swedish
Aymara	French, Canadian	Lithuanian	Tagalog
Azerbaijani	French, Congolese	Luxembourgish	Tajiki *
Balinese – Transliterated	French, Moroccan	Macedonian *	Tamil
Baluchi	Georgian *	Malagasy	Tausug
Bambara	German	Malay	Thai *
Bashkir *	Greek *	Mirandese	Tigrinya
Basque	Haitian Creole	Mongolian *	Turkish
Belorussian *	Hausa	Nepali	Turkmen
Bengali *	Hawaiian	Nogai	Tuvan *
Bosnian	Hebrew *	Norwegian	Ukrainian *
Breton	Hindi *	Ojibwe	Urdu *
Bulgarian *	Hungarian	Pashto *	Uzbek, Cyrillic
Buriat *	Icelandic	Polish	Uzbek, Latin
Burmese *	Ilocano	Portuguese, Brazilian	Vietnamese
Cambodian (Khmer) *	Indonesian	Portuguese, European	Welsh
Catalan	Irish	Punjabi, Shahmukhi*	Wolof
Cebuano	Italian	Quechua, Ecuadorian	Yoruba
Chechen	Japanese	Romanian	Zulu

The CL-150 also includes content in English for the following language pairs:

English for Arabic Speakers
 English for Bengali Speakers
 English for Bosnian Speakers
 English for Burmese Speakers
 English for Chinese Speakers
 English for Czech Speakers
 English for Danish Speakers
 English for Dari Speakers
 English for Farsi Speakers
 English for French Speakers
 English for Georgian Speakers
 English for German Speakers
 English for Greek Speakers
 English for Haitian Creole Speakers
 English for Hindi Speakers
 English for Indonesian Speakers
 English for Italian Speakers
 English for Japanese Speakers
 English for Korean Speakers

English for Latvian Speakers
 English for Lithuanian Speakers
 English for Malay Speakers
 English for Norwegian Speakers
 English for Pashto Speakers
 English for Polish Speakers
 English for Portuguese Speakers
 English for Romanian Speakers
 English for Russian Speakers
 English for Somali Speakers
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 English for Urdu Speakers
 English for Uzbek Speakers
 English for Vietnamese Speakers

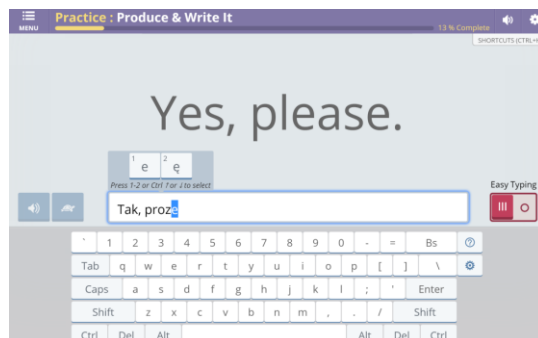
Text Entry for Less-Common Languages

Of the four modalities—reading, listening speaking and writing—writing is traditionally the least emphasized in USG language training programs. However in today’s world of text messaging, Twitter, email, blogs, etc., text entry and keyboarding take on greater significance and should not be ignored. The CL-150 offers multiple options for mastering keyboards and inputting target language using native script. The underlying technology is complicated, but the result is simpler and more effective functionality for materials creators and learners. CL-150 input options include:

- **Keyboard input via virtual keyboard.** A fully interactive keyboard is displayed with no need for plugins or software installation, allowing use on IT-restricted government computers.
- **Accent-Cycle input for Latin-style alphabets.** This option uses the American standard keyboard layout rather than the target-language standard layout. Letter variants are input by entering the base letter and cycling through variations with arrow keys or by clicking on them on the screen.

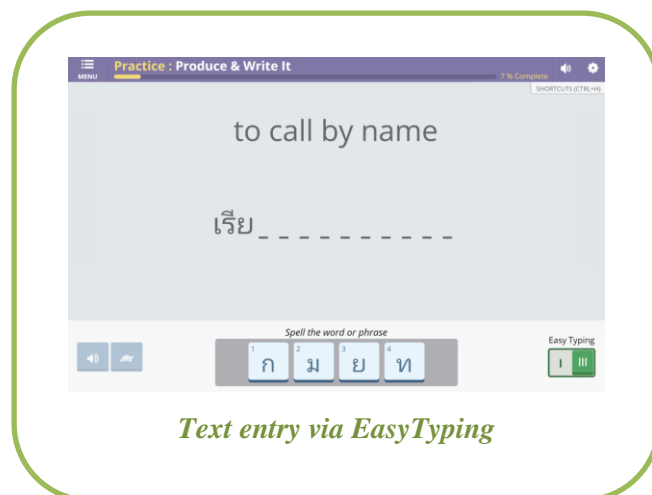


Text entry via virtual keyboard



Text entry via accent cycling

- **EasyTyping input system.** For each letter to be entered, a set of 4 or so options is displayed. The user selects one of the options by clicking or entering the number. Four different choices are shown for the next letter to be entered. The user needs to know the alphabet, but does not need to know the keyboard layout.



We Should Strive to Provide Introductory Materials for All Languages

Another interesting example of Transparent Language’s all-language focus is our **7000 Languages Project**. Transparent Language primarily makes “meta-technology.” We don’t mainly make language courses; we make the technology that quickly and efficiently makes new custom language courses with the right functionality to support any customer curriculum or domain, for any language.

Our language-specialized meta-technology also happens to be perfect for developing learning materials for endangered, less-common and under-supported languages of limited or no commercial interest—what we refer to as “earth’s other 7,000 languages.” We take great pleasure in making our unique technology available at no charge to experts and advocates of such languages. (More information at www.7000.org).

We created the 7000 Languages Project to be helpful to the world’s communities and cultures, but it happens to have ancillary value to USG. High-quality language-learning resources for rarely-taught languages can improve USG preparedness for unexpected language surges. We do not charge 7000 Partnerships or language teams for our technology or support, but we do ask that we be allowed to include 7000-developed materials in the CL-150 and our offerings for public libraries and academe.

7. The Best Language Lab is the One You Have with You

Years ago, in response to criticism that cameras on phones were not as good as the best digital cameras, someone responded, “the best camera is the one you have with you.” In the same vein, the best language lab is the one you have with you when you have time to learn. Fortunately, in today’s world, everyone can carry their language lab with them: smartphones, tablets, and laptops can all be access points for courseware and activities, as well as face-to-face or voice-to-voice real-time connection with instructors and peers.

Any effective language program infrastructure needs to connect learners, instructors and administrators with their content, their work and each other. It needs to support different people doing the same things on different platforms, and synchronize a user’s activity across all of that user’s devices, because “the device

you have with you” may be different throughout the course of a day. This is a continuing focus of the CL-150 Platform.

8. Voice Input During High-Quantity Computer Activities is a Major Opportunity

The CL-150’s *EveryVoice* technology opens up a significant new opportunity for students to use their voice—instead of the mouse—to provide answers during high-volume computer-delivered activities, instead of using their fingers or a mouse.

Fast-paced, high-volume computer-delivered lexical activities such as lexical recognition, lexical production, matching exercises, cloze (fill in the blank), sentence unscrambling and others are excellent candidates for voice input capability, and *EveryVoice* is taking them on one after another. In one of these exercises, a learner might complete 300 challenges every 30 minutes, so converting the input mechanism from mouse to speech is significant for increasing a learner’s comfort with speaking and for automaticity.

Until now though, the technical capability did not exist to implement this functionality for most languages. It is a very difficult technical challenge, and solving it has little market value. Automated Speech Recognition is only available for the most common languages, and in any case ASR is not well suited for language learning, since it focuses primarily on transcription rather utterance analysis.

Despite the value to language programs, no individual USG school or program would want to make the substantial investment necessary. Over the last few years, however, Transparent Language has developed *EveryVoice*™ as an included capability of its shared CL-150 technology platform. *EveryVoice* is a significant new fundamental capability that analyzes and compares learner utterances to native speaker utterances with surprising accuracy in almost any language, including less-commonly-taught languages.



Pronunciation Practice in Kurdish with EveryVoice



Using voice input for multiple choice exercises in Georgian with EveryVoice

9. Alphabet, Spelling, and Typing are a Major Time and Cost Opportunity

Some dismiss alphabet learning as a one-time cost, but on-demand, content-integrated alphabet learning, alphabet reference, spelling tutor and typing tutor for native scripts can deliver surprisingly substantial economic and logistical benefits to USG language programs.

In the real world, USG linguists and language-enabled personnel often learn the basics of multiple languages over the course of a career. Often the need is urgent and learners are mid-career senior professionals whose time is extremely valuable. Saving a week or so of training each time is economically and operationally valuable. This is another example of the Platform advantage. Over time a sector-specific Platform is able to focus on, add and perfect every capability of value to the target sector, no matter how large or how small.

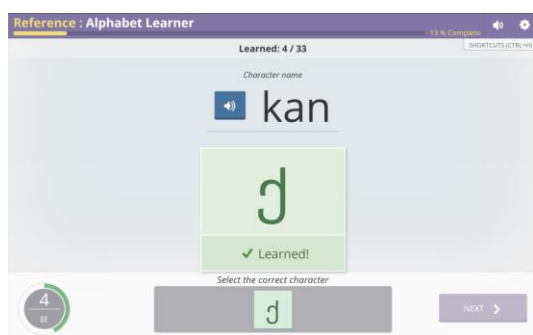
CL-150 script capability can be thought of in two portions: content-independent and content-integrated.

Content-independent script resources include *Alphabet Explorer* and *Alphabet Learner*.

Alphabet Explorer is a reference tool. Learners can click a letter on the letter panel or on the keyboard to hear the letter name and letter sounds, and see the main glyph and other forms of the letter, its keyboard location and a description of the letter's attributes from the point of view of a learner. If a letter ligates (joins) differently to various other letters, the learner can also look at how various combinations of letters ligate.



Alphabet Explorer – reference tool



Alphabet Learner – letter recognition quick learning game

Alphabet Learner is a quick game-like activity for learning to recognize the main forms of the letters of a given alphabet. A learner hears the name of a letter and then selects that letter from a number of choices. Alphabet Learner tracks what the learner is getting right and wrong, and adjusts the play until the player has learned to recognize all the letters of the target script.

After 45 minutes or so, a player might be able to sight-recognize three-quarters of the letters of the Cyrillic alphabet, for example. The player could then improve by playing again, or move on to content-integrated activities such as Alphabet

Zoom, to perfect script knowledge while learning the vocabulary and phrases in the early lessons of a target vocabulary list or course of instruction.

Content-integrated script activities include *Alphabet Zoom*, *Spelling Tutor* and *Typing Tutor*. With content-integrated activities, script learning is not a separate pre-course activity, but rather takes place while the student is in the course work, using the native text that's part of the course.

Alphabet Zoom parses and explicates the script of encountered target-language words and phrases. Students can transition from alphabet learning to language learning as soon as the alphabet basics are mastered, taking advantage of early enthusiasm rather than frustrating it.

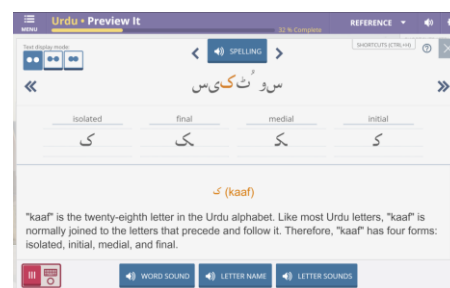
For any selected letter in a word or phrase, users see keyboard position, hear the letter name, hear the common sounds made by that letter, etc. In Arabic-script languages, as an example, Alphabet Zoom displays the presented word or phrase three different ways: 1) in fully connected form, 2) using the positional forms, but separated by breaks, and 3) in stand-alone letters (similar to block capital letters in English).



Alphabet Zoom displaying an Urdu word connected



Alphabet Zoom displaying an Urdu word connected with breaks



Alphabet Zoom displaying an Urdu word with letters in stand-alone form

Another script-related capability that works on whatever material one is learning at the moment is Spelling Inspector. Spelling Inspector helps one learn to recognize, pronounce and produce the sequence of letters in a word or phrase.



Spelling Inspector

Finally, **Typing Tutor** helps one learn to type the word or phrase encountered in the learning sequence. A guided mode lets one follow along. Independent mode lets the learner explicitly prove out and practice typing the word or phrase.



Typing Tutor: Guide Mode



Typing Tutor: Independent Mode

10. Automated Lexical Collection and Career-Long Refresh Improves Acquisition Outcomes, Reduces Post-Training Drop Off and Underpins Long-term Sustainment

It is critical that the lexical items (words, phrases, and “chunks”) learned during and in between formal training events be automatically collected in each learner’s personal lexical reservoir. That constantly growing personal lexical reservoir should move with the learner from post to post, organization to organization over the entire span of a career. Such lexical items are not only useful in themselves, but incorporate grammar and patterns important to general language skills.

The contents of a learner’s lexical reservoir should then constantly be automatically refreshed as needed during spare moments on mobile or web. In the CL-150, we call someone’s personal lexical reservoir ***Learned Vocab***.

The CL-150’s Learned Vocab system uses sophisticated spaced-interval repetition algorithms to keep Learned Vocab stable in memory indefinitely. The target-language word or phrase is both displayed and pronounced during each refresh event.

Since the reservoir is cloud based, activity on any platform is synched across platforms and comprehensively tracked and reported.

During initial acquisition, instructors can see that students are keeping up with refreshing Learned Vocab from earlier curriculum units. During career-long sustainment, mentors or CLPMs can ensure that sustainers are keeping up with their Learned Vocab and investing at least the mandated minimum hours sustaining the language.

When a refresh event is successful, that lexical item is marked as “fresh” and a date for the next refresh is set for some time in the future, as determined by the system’s spaced-interval algorithms. If the event is not successful, the user is presented with a quick re-learning sequence, and a refresh is set for the next day. Successfully sustained items are shown less and less frequently over time, eventually being shown less than once per year. Problem items are shown as frequently as necessary to keep them fresh or re-learn. The goal is maximum recall reliability with the least burden on learner time. Some learners have Learned Vocab reservoirs of 5,000 or more items.

During an Initial Acquisition course, the goal is for the student to graduate with all lexical material from all phases of the course fresh in mind. Refresh then continues the day after graduation and each day after that. Lexical refresh can be done on one’s laptop or mobile device during spare minutes. This significantly reduces proficiency fall-off, particularly when students follow language training with intensive non-language training elsewhere.

CL-150 Learned Vocab automated lexical refresh

11. Continuous Contact For Linguists Over an Entire Career Has Become Inexpensive, and Delivers Major Economic and Operational Benefits

Persistence toward a long-term goal is difficult, whether keeping fit or keeping a language. The odds of success get much, much better when connection to a good coach or mentor is maintained over time. Today’s emerging technology and practice are making such connections convenient and inexpensive.

Busy and distracted personnel have more incentive to get work done on time when someone significant to them will be pleased, and less likely to procrastinate when someone will be disappointed. Also, work is better targeted and more efficient when guided by a knowledgeable coach.

Human connection is not a problem during formal training, but proficiency falloff between training events has often been a chronic problem in USG language programs. Now however, there are a growing number of effective and cost-efficient antidotes.

Remote Enhancement Programs

Instructor-led **Remote Enhancement (“RemE”) Programs** are available from Transparent Language via the **CL-150 Connect** program, but RemE programs can also be delivered by directly by USG instructors or by other providers.

RemE programs can be structured in different combinations of asynchronous and synchronous work depending on the circumstances. They can be offered to multi-student groups, but many are one-to-one. Because a significant portion of student effort in RemE Programs is custom-designed independent computer work without the instructor present, one-to-one programs are cost efficient, and flexibility and relevance are maximized.

A well regarded RemE model is three hours of asynchronous (computer-based) work, plus one hour of synchronous virtual “face time” with an instructor per week, while the learner remains at post and continues to do a full-time job. The four weekly hours can be either during or outside work hours. This model has been shown able to not only sustain, but markedly improve, language proficiency. In one program, 6 weeks of full time instruction at a USG schoolhouse was replaced by 12 weeks of the learner doing 4 hours of work per week (3 computer, 1 face time), while remaining employed at post, with equivalent results.

RemE programs can be as intensive as needed, up to full-time for the learner.

Cohort Coaching

The least intense and least expensive, but still highly valuable, method of constant connection is **Cohort Coaching**. A sustainer signs up for an appropriate Cohort, such as Modern Standard Arabic ILR 2+ Cohort No. 103. The Coach of that Cohort publishes a steady stream of **LessonGin** lessons based on **current, authentic materials relevant to a USG professional’s needs**. Each lesson is typically up to two hours of work. A Cohort Member can do as many or as few lessons, or parts of lessons, as desired. It’s all a one-way publishing of materials and commentary to the whole cohort—no individual instruction.

Any words, phrases or other “chunks” of language highlighted in a lesson completed by the Cohort Member is automatically added to that Cohort Member’s personal *Learned Items* lexical reservoir, where those lexical items are automatically refreshed indefinitely.

Time spent and lessons completed are tracked and reported to any administrator that the Cohort Member permits to receive such reports.

A Cohort Coach does not establish as intense a personal relationship with a Cohort Member as a good instructor would. A good Cohort Coach is more like a blogger that one follows intently. Still, such relationships can have a substantial impact on sustainer behavior, especially when the sustainer’s work is tracked and reported to management/command, and importantly, Cohort Coaching is not limited in reach or scale

The fact that Cohort learning materials are based on authentic materials that are very current, often just a few days—or even hours—old, increases their attractiveness and strengthens the sense of a real person behind the flow of materials.

There's no longer any reason that every IC/DOD sustainer can't at all times have a beneficial relationship with a mentor, coach or instructor, with concomitant decrease in proficiency drop off between training events, and more successful career-long sustainment/enhancement.

12. Visible Pre-Work Can Be Used to Jump-Start Courses and For Self-Selection from a Larger Group

Providing the opportunity for independent pre-work before a course starts can allow some learners to arrive with some early objectives already achieved, even when the course managers do not have control of learner time outside of the course's period of performance.

In other instances, where only a portion of a cohort will be given language training, pre-work opportunities can be used as an indicator of likely higher motivation and a selection criterion.

Pre-work can be easily offered, executed and tracked via the CL-150, and such independent work can be performed almost anywhere on a mobile device or computer.

13. Instructors and Administrators Need Individual Training, Certification, Orientation and Support

Transparent Language has a long history of extensive remote and on-site orientations and support for USG and contract instructors and administrators. The reason we take on this task is our observation that knowledge of new capabilities and methods organically diffuses too slowly throughout dispersed communities. Direct communication and hands-on familiarization with affected personnel produces more timely results.

Training support provided by Transparent Language includes CL-150 Certification Courses for instructors. USSOCOM requires by contract that any language instructor must be CL-150 certified before training USSOCOM personnel. Transparent Language has developed a half-day certification program for that purpose. The certification program is delivered regularly by Transparent Language personnel through webinars and at locations across the US and occasionally OCONUS.

All USG instructors and contract instructors supporting the USG are welcome, if the hosting venue is able to provide outside access.

14. Authoring Should be Available to All

As the CL-150 evolves, more and more sophisticated authoring is made available directly to instructors and users. Authoring of lexical lists, for instance, has always been widely available to learners and students, and that capability has increased in sophistication year after year.

Extending the State of the Art for Instructor Authoring: LessonGin

The latest and most sophisticated CL-150 open authoring initiative is **LessonGin**, which allows instructors, Cohort Coaches and others to quickly create current, relevant, engaging, pedagogically-sound, technology-enabled Courseware lessons that are ILR level-appropriate assignable and trackable.

LessonGin lessons are used in all types of programs, from initial acquisition classes to asynchronous directed independent study. Its flexibility makes it a key tool for individualized Programs of Instruction.

Learners Want Lessons Based On Source Material That is Hours, Not Years, Old

Every day, instructors across the USG community are creating LessonGin lessons based on authentic source content less than a day old. The enthusiastic embrace of LessonGin by instructors is a direct result of the eagerness of learners for current, relevant and effective custom materials.

The design standard for LessonGin was that an instructor without any special technical knowledge should be able to create a new lesson in less than 45 minutes. In practice, most lessons are created in less than 30 minutes. Most instructors make their lessons available to other USG instructors and learners via the CL-150, and thousands of such lessons are already available.

15. More and “Lighter” Assessments Improve Engagement and Visibility

The CL-150 Team has also developed dozens of secure highest-standard, language proficiency and diagnostic tests for USG. All are computer-adaptive multi-stage tests that reduce administration time, ensure that all or almost all the test items are at or near the examinee’s level, and since its enactment are compliant with ASTM F2889-11 Standard Practice for Assessing Language Proficiency.

Test types include ILR 0+ to 3 reading proficiency, ILR 3 to 5 reading proficiency, ILR 0 to 2 reading proficiency, ILR 0 to 2 listening proficiency, and IDA-3 three-strand diagnostic. Administration time is usually about one hour.

Secure tests are not accessible outside the commissioning organization, but “CL-150 Open” versions of many of these assessments, with equivalent construction but different passages and questions, are available for use in the CL-150 without cost or prior appointment.

16. USG Critically Needs to Build and Maintain Human Language Proficiency at Scale Much More Economically, Flexibly Reliably, Visibly

Language capability is one of the few major support systems for defense, intelligence and security in which the US is often substantially outmatched by its friends and adversaries. In the eyes of many of our USG customers, this chronic deficiency unacceptably increases US risk and reduces US opportunity in critical international arenas. Language is also a major dimension of perilous emerging domains of international contention, such as cyber and social influence in the digital realm.

As the need increases, it is also true that federal budgets are under increasing pressure, and language proficiency and performance are regrettably very time consuming and expensive to train. To get more

language capability with current spending, USG has no choice but to find ways to train and sustain language proficiency and performance at scale much more economically, and flexibly.

Not long ago, many USG experts would have reasonably considered the necessary substantial improvements in the economics and logistics of large language training programs to be a fantasy. ***But emerging technology properly combined with high-quality human instruction, either in person or virtually, has demonstrably changed what's possible.*** The need now is to continue to develop and effectively integrate improved methods and practices into programs and operations across the community.

17. Loss of Faith in “Language Transformation” is a Serious Risk to USG

Transparent Language and all committed providers of language-learning products and content to USG, whether government, academe or industry, together comprise a single team working against the ideas that the expense and disruption of language training is too burdensome relative to the benefit, and that culture training, machine translation and contract interpreters/translators can adequately fill the gap.

Readers of this paper are aware that none of those substitutes for personal proficiency come near what is needed for the leading world power in military, diplomacy, intelligence, security, commercial and cultural spheres to achieve its goals in today's complex global environment. Nevertheless, the risk to America's language programs is very real.

In response, we as a team must do more than repeat that America's success in the world is not optional, and that USG language capability is a critical enabler for that success. We need to radically improve the ground-truth economics, logistics and reliability of USG language training, sustainment, enhancement and assessment. We need to deliver in the real world, and prove it with data. It's on us.