Computer-Assisted Language Learning
for Pittsburgh’s Bhutanese Refugees:
A Proposed Authoring Tool for the Creation of Nepali/English Audio Lessons

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Introduction: The Language Needs of Refugees

For resettled refugees, learning the host country’s language is key. Buying groceries, paying bills, scheduling doctor appointments, managing finances, being involved in your children’s education, and a whole host of other daily tasks are significant hurdles for non-English-speaking refugees. Economic self-sufficiency, which is expected of refugee families within a year of resettlement, frequently depends on at least a basic grasp of conversational English. English is also necessary for refugees and immigrants who want to work toward U.S. citizenship, since the naturalization process includes tests of English reading, writing and speaking.

Despite all these pressing reasons to learn English, and despite the efforts made by resettlement agencies and organizations devoted to teaching English as a Second Language (ESL), learning English is an excruciatingly slow process for many refugees. This slow language learning has significant costs, since “limited English language proficiency … impedes access to health care services, schools, and government agencies; relegates workers to low-wage jobs with reduced likelihood of upward mobility. … It is also a key factor is what has been called acculturative stress, ‘as children and their families negotiate a new system in which their native languages may not be understood, and in which they may not know the language of the host country’ (Hernandez and Charney, 1998)” [1].

This stress can have significant personal as economic cost to non-English-speaking refugees. Several experts—including immigrant rights activist Som Subedi, a Bhutanese refugee—suggest that language difficulties and subsequent un- and underemployment, play a significant role in the very high depression [2] and suicide [3] rates of Bhutanese refugees.

Speeding up the language acquisition of refugees is therefore an important undertaking. Not only can it increase refugees’ economic prospects and thus social mobility, but it also promises to reduce many of the stresses that can lead to significant depression and distress in the refugee community.

In this paper, we outline the language difficulties faced by a particular refugee population—non-literate Bhutanese-Nepali refugees in Pittsburgh. We explore the language learning resources available to these refugees, as well as the obstacles that have prevented them from learning English as quickly as they might desire. We then propose a solution: an online authoring tool that will allow ESL teachers and Bhutanese community members to collaborate in creating audio lessons for non-literate Bhutanese language learners.

Target Community: Non-Literate Bhutanese Refugees

Pittsburgh, Pennsylvania has a long history as a city of immigrant communities, and it continues to play an important role in the resettlement of refugees arriving in the United States. Between January 2001 and March 2013, over 3,000 refugees were directly settled in Allegheny County, 44% of whom were Bhutanese Nepali—ethnic Nepalis who fled or were deported from
Bhutanese Refugees: Three Generations Raised in Three Countries

Due to the Bhutanese community’s longstanding refugee status, different generations of the population have grown up in vastly different places and in drastically different circumstances. For our purposes, we will divide the community into three figurative “generations” of Bhutanese refugees, based on where they primarily grew up: in Bhutan pre-exile, in Nepalese refugee camps, or in the United States after resettlement.

The Older Generation: Raised in Bhutan

The older generation of Bhutanese-Nepali immigrants were raised and educated in Bhutan and, like most Bhutanese, practiced subsistence farming and led lifestyles with limited access to technology. Bhutan’s lack of technology is not due not to economic constraints but also to political will to maintain a traditional lifestyle; television was illegal in Bhutan until 1999, for example, and one refugee reported that the truck that arrived to deport him to Nepal was the first truck he had ever seen [8]. Only basic education was available, and many children did not receive that; then, in 1989 the government banned Nepali education outright as part of its “One Bhutan, One People” policy [9]. Two years later, roughly 80,000 Bhutanese Nepalis—a sixth of the Bhutanese population—were stripped of citizenship. Many were deported “back” to Nepal, while others fled widespread oppression and violence.

The majority of Bhutanese refugees age 50 and older are likely not only to have low English attainment, but also to either be illiterate or only marginally literate in Nepali. One interviewed ESL teacher reports, “In my foundations and low/beginning ESL classes, most, if not all, of my students are in their 50s and 60s. Most, if not all, are also unemployed.” Culturally, to be in your 50s or 60s and Nepali is considered to be elderly [10] as life expectancies in both Bhutan and Nepal are in the mid-60s. However, life expectancies in the U.S. are much higher, requiring those in their 50s to work and contribute economically. Thus, this demographic may need more English competence than they anticipated in order to be able to participate in the U.S. workforce.
The Middle Generation: Raised in Nepal

The middle generation of Bhutanese Nepalis grew up in the refugee camps that were home to roughly 108,000 people for their peak seventeen years, 1991 to 2008. Life in the camps was far from luxurious; malnutrition and diseases like cholera claimed many lives in the first year or two, and thereafter conditions were adequate yet basic. Refugees lived in bamboo huts lacking electricity and got water from communal taps turned on only twice a day, and the community relied almost entirely on the UN and nongovernmental agencies for food, education, medical care, and other necessities [11]. In many ways, however, the Bhutanese community thrived despite these hardships. The Nepalese refugee camps were unique in being self-governing, managed by democratic leadership structures created by the refugees themselves,[11], leading them to be lauded as “model refugee camps” [12]. This strong tradition of self-organization has continued in the Bhutanese communities in the United States. In Pittsburgh, it has continued in the guise of the Bhutanese Community Association of Pittsburgh (BCAP), which organizes a wide range of community activities.

This middle generation of refugees, who spent the majority of their childhood growing up in the refugee camps and are now in their mid 20s to 30s, received basic English education. However, the only available teachers in the camp schools were also refugees, so except for the fortunate few who could attend boarding schools outside the refugee camps or receive scholarships to attend a university, most could only learn up to the level of the most educated refugee. Consequently, most possess only intermediate levels of literacy. Still, this far exceeds the education achieved by the previous generation, which may be why the literacy rate among Bhutanese Nepalis upon arrival in the United States — 65% — exceeds Bhutan's average literacy rate of 53% [13][14]. This generation’s knowledge of English is enough for them to easily hold factory and janitorial jobs, and many now often move toward middle-class pursuits such as owning a car, a flat-screen TV, and/or a house.

The Younger Generation: Raised in the United States

The youngest generation of Bhutanese Nepalis are those who have (or will) come of age since arriving in the United States. Thanks in part to ESL programs in the local schools, where Nepali is the most common native language in ESL classrooms [15], the youngest Bhutanese refugees have gained much stronger English proficiency than their predecessors.

Many of this generation are heavily invested in their community. The Bhutanese Student Group of Pittsburgh (BSGP), an informal group composed of college-aged Bhutanese youth, organizes social activities and educational opportunities for high-school and middle-school aged youth to motivate them to participate and engage in their community. Involved members of the BSGP are also highly involved in the efforts of the Bhutanese Community Association of Pittsburgh, and have helped teach informal ESL classes to adults through BCAP.

The ability and willingness of the youngest generation to translate for their elders is a great strength of the Bhutanese community. However, this is not without its cost. The reliance of older generations on their children to translate can cause significant stress to both parties, since it “can lead to unwelcome changes in family power dynamics [4]. This stress is worsened in extreme cases where
parents are fluent only in the mother tongue while children are fluent only in English, or (like many second-generation immigrants) refuse to speak to their parents in their mother tongue [16]. While language barriers cause many generational conflicts, other conflicts stem more from cultural differences between the generations—for example the younger generation challenging the traditional Nepali expectations of respecting the caste structure in dating, and of children continuing to live with their parents throughout their adult lives [10]. In these cases, too, language issues frequently worsen tensions, since children who have had to take a high degree of responsibility for their parents’ lives may be less likely to take their parents’ opinions and views seriously.

Our Target Population

All three generations of Bhutanese refugees face difficulties in acquiring English. For the older generation, non-literacy is a huge barrier to language learning. Meanwhile, younger adults face limited study time since they need to care for and support their families. The youngest generation struggles with the need for rapid acquisition of academic fluency.

While addressing any of these needs would be a worthwhile effort, we have chosen to focus our efforts on the demographic with the lowest level of English proficiency. This is, unsurprisingly, the older generation: refugees who received their formal education (if any) in Bhutan. A defining feature of these students’ learning capabilities is that the vast majority of them are non-literate in any language.

Problem Statement: Obstacles to Language Learning

Non-literate Bhutanese refugees who do not speak English have great personal motivation to learn English, and the literature suggests that they should see financial, social, and psychological benefits from doing so. In addition, an impressive array of community organizations offer them ESL classes, tutoring, and other services aimed at helping them cope with life in an English-speaking environment. Despite this, however, many Bhutanese ELLs have failed to make significant progress in their acquisition of English. In this section, we describe some of intrinsic obstacles that make language learning difficult for our population, as well as some of the limitations with existing resources to meet their needs.

Intrinsic Obstacles to Language Learning

Many factors contribute to the language learning difficulties of beginning-level Bhutanese ESL students. One is simply that Nepali is extremely different from English on every axis on which languages are commonly compared: phonology, morphology, syntax, lexicography and writing system. This makes Nepali very difficult for English speakers to learn—category III out of IV, according to the U.S. Department of State’s ranking of language difficulty [18]—and vice versa.
Second, one of the strongest indicators of academic success in a second language is proficiency in one’s native tongue [19]. When it comes to learning a new language, students with a strong command and understanding of their own language’s structure are at a significant advantage over those with more limited verbal attainment in their native tongue. More specifically, literacy in one’s first language is a significant predictor of second language acquisition; in a study of Hmong refugees taking English classes in a refugee camp in Thailand, Robson (cited in [20]) found that first-language literacy was as significant a predictor of success as previous English classes. Since a large proportion of our target population have little to no formal schooling and are non-literate, they are inherently at a significant disadvantage in their efforts to master English.

Lack of interaction with the English-speaking community is also a barrier to language learning, particularly for the older generation of refugees. While the strength and organization of the Bhutanese community provides many benefits to its members, being part of such a tight-knit group can have downsides. One of these is that, when refugees interact primarily with other refugees and immigrants—as they do even in the workplace, since many Bhutanese refugees work together—language learners have few opportunities to practice English outside of class. Of course, interacting with other members of the Bhutanese community is important for many refugees and should not be discouraged, but it does have a tendency to delay language acquisition.

**Existing ESL Resources and their Limitations**

Most existing language learning opportunities for Pittsburgh’s refugees take the form of in-person ESL classes or tutoring. In fact, in the section in which Allegheny County’s 2013 needs assessment on immigrant and refugee communities [4] documents existing literacy resources for refugees, classes and tutoring opportunities are the only resources they list. These courses play a crucial role in the existing language learning successes of the Bhutanese community, and have many important advantages for language learning: consistent exposure to fluently spoken English, a safe space to practice speaking and listening without judgment, potential mentorship from more fluent community members, and the great respect for ELLs’ existing culture and language that ESL teachers bring to the classroom. Nothing is perfect, however, and our current system of teaching ESL does have its own set of limitations.

As of 2013, 2,000 resettled refugees were enrolled in ESL classes at the Allegheny Intermediate Unit (AIU) and Greater Pittsburgh Literacy Council (GPLC). Classes were also offered by the South Hills Interfaith Ministry (SHIM) and the Downtown Family Literacy Center (DFLC), and individual tutoring by student-led volunteer groups like CMU FORGE and Pitt FORGE. Each of these organizations services a different neighborhood or demographic, or has slightly different programming goals: a focus on young mothers, for example, or working adults.

Pittsburgh’s reliance on nonprofits to teach ESL classes to refugees seems to be a standard practice in the U.S., but it is not without drawbacks. In most of the nonprofits listed above, most if not all ESL teachers are volunteers or AmeriCorps members, whose terms last one or two years, at most. This is problematic in terms of teacher training, support, and institutional memory: one of the local teachers we interviewed stated that “There are materials for me to use, but they aren’t very good
and I prefer to use my own.” Some teachers have felt particularly underprepared to meet the needs of the most beginning ELLs, who require different educational approaches than higher-level students.

Teacher turnover is, unsurprisingly, a large issue with volunteer-led efforts. According to one local ESL teacher, “As soon as a teacher leaves, there is a significant drop in student attendance” [17]. Moreover, from both our interviews and our reviewed literature, students frequently join and leave the class, which makes “students less inclined to attend class and teachers [have] greater difficulty maintaining a sense of continuity in instruction” [17].

Access to ESL classes is also a continuing issue. While cost is not a barrier, nevertheless it is clear that the classes do not reach all of the resettled refugees who need language learning, due to both logistical problems and cultural barriers. For example, refugees are required to enroll in ESL classes only until they get a job, which the U.S. refugee resettlement program pressures refugees to do immediately. Therefore, many ELLs enrolled in and attending class are unemployed [16].

Women face particular challenges in attending in ESL classes. One Bhutanese young woman told a researcher [21], “Nepali girls don’t like talking English in front of other people, they are shy. English is hard to pronounce. [Shyness is a] girl habit.” Language learning within resettled refugee families is often focused on the men, who are then able to act as breadwinners, with the understanding that women need to take care of children [22]. The irony is that, because women prioritize child-rearing over language learning, as time goes on their ability to care for their children becomes hampered by the fact that they don’t have strong language capacity and must rely on their children to act as translators [22].

In Pittsburgh, AIU and the South Hills Interfaith Ministry (SHIM) attempt to remedy this solution by providing childcare during ESL classes; however, attendance for those has been small with classes of about five [17]. Even if mothers don’t intend to learn language for purposes such as attaining employment or regularly holding conversations with native speakers, “English language acquisition would ... increase mothers’ confidence in accessing mainstream services” like support groups, teachers at their children’s schools, and so on. In one study of 87 resettled refugee mothers, “most mothers felt their families would benefit if they learnt English, as they could be independent” [22].

A final difficulty faced by local ESL programs is the lack of coordination between these programs and the Bhutanese community members who provide vital informal translation and language assistance to beginning level Bhutanese ELLs. One teacher we interviewed lamented her paralyzing difficulties deciding what to teach her beginning-level ESL course. Because the leaners in that class speak extremely minimal English, they are unable to tell her their learning goals or give feedback on whether her classes are covering useful material. “It’s hard to figure out what they want to know,” the teacher told us. “I find myself constantly assessing what they would like to know, and how to approach that.” This uncertainty was apparent as we talked to her about whether literacy was an important goal for her students, and whether she ought to be teaching them written language at all. It seems like a significant structural weakness in the existing ESL paradigm that ESL teachers feel they need to hazard guesses about what kind of language learning would be most useful to their students, with no feedback from either the ELLs themselves or the ELLs’ communities. We became
convinced that any lasting solution to the Bhutanese refugees’ language acquisition difficulties should address this disconnect between the ESL teachers and the communities they serve.

Problem Statement

While the Bhutanese Nepali refugee community in Pittsburgh has access to many language learning resources and can draw on many significant community strengths, there are nonetheless a significant number of Bhutanese refugees whose language learning has been distressingly limited and slow. Our target population of lowest-proﬁciency Bhutanese refugees are primarily older adults who received no or limited education in youth, and who are as a result non-literate in Nepali. While they want to gain conversational ﬂuency in English, their lack of ﬂuency in Nepali and their lack of familiarity with modern technology limit the ESL resources available to them. Our goal is to propose a project which we believe will help these students make faster progress in their language learning, whether or not they are able to attend ESL classes in person. In addition, we hope to address the disconnect between ESL teachers and the communities they serve by providing an avenue for the two groups to work together toward their mutual goals of improved English ﬂuency for our target population.

Related Work: Language Learning for Non-Literate Adults

We turn now to the existing body of knowledge on how non-literate adults acquire an additional language, and what tools already exist to help them learn English. Since non-literate ELLs clearly lack access to the plethora of books and other written resources on learning English, we focus our review on computer-assisted language learning (CALL) tools, which include video- and audio-based language learning systems as well as computer and smartphone software.

Research on Language Learning for Non-Literate Adults

Non-literate English Language Learners present a unique case for ESL teachers, both because they face challenges that other ELLs don’t, and because many techniques and resources that work for literate ELLs don’t help those who can’t read. One serious question that seems to remain unanswered in the literature is whether a non-literate or preliterate ELL should begin by learning written language, or whether he or she should instead focus on gaining conversational ﬂuency and delay learning written language until later (if at all).

Many psychologists used to believe that literacy brings about vast improvements in abstract reasoning and cognitive capacity. In a series of studies of the Vai people of Liberia, however, Scribner and Cole [23] convincingly challenged this claim. Usually, literacy and formal education are strongly correlated; the Vai people, however, have a written language which is transmitted informally and not taught in schools. This allowed the researchers to separate the effects of literacy from the effects of
education in general. Scribner and Cole found that, among this population, literate and non-literate people of similar education level showed no significant difference in general cognitive tasks. It was, instead, the number of years of formal schooling that was associated with improved performance.

If literacy is to be taught first, there is some indication that teaching native language literacy first may be preferable to beginning with English literacy. A very small study of illiterate Haitian Creole speakers learning English in the 1980s found that those who were given 12 weeks of Creole literacy training followed by 12 weeks of ESL performed at least as well as those given 24 weeks of ESL classes [24]. However, due to the very small size of the study (21 and 8 in the two treatment groups, respectively), the findings failed to reach statistical significance. The study is also of limited applicability to our Bhutanese population, since Haitian Creole literacy involves the Roman alphabet, while Nepali literacy does not. It is therefore unclear whether Nepali literacy would transfer to English literacy as readily as Creole literacy did for this study’s participants.

Ultimately, gaining literacy as an adult—in any language—is a herculean task. For those who have never been exposed to written language, it involves challenges that many of us have never even considered, such as “learning that two-dimensional figures can represent speech, that there is a sound/symbol correspondence, and learning to discriminate visually between small shapes and to recognize the similarities between machine print and handwritten letter shapes” [20].

Because of this, many experts [25][26] suggest bypassing literacy entirely and instead focusing on teaching non-literate ELLs oral competence. The local ESL teachers we consulted shared this view; one said she spends 80-90% of class time on listening and speaking skills, while another said that, while her students “would appreciate being able to read,” verbal skills are a much more basic need.

In terms of best practices in teaching non-literate ELLs other language skills, Shaughnessy [26] suggests that it is useful to “utilize and honor the strong oral skills of the learners through dialogue and the use of song or rhyme,” and that, for adult students, using repetition heavily can overcome irregular attendance. Gault [27] further suggests that many older students find traditional classroom structures and teaching approaches familiar and comfortable, and their use should therefore not be ruled out despite the pedagogical advantages of more modern educational techniques.

**Computer-Assisted Language Learning and its Applicability to Non-Literate ELLs**

The field of Computer-Assisted Language Learning (CALL) emerged in the 1980s as ESL teachers and Second Language Acquisition (SLA) researchers began to apply computer technologies to language learning. CALL is most simply defined as “any process in which a learner uses a computer and, as a result, improves his or her language” [28], but other researchers [29] remind us that “CALL is not shorthand for ‘the use of technology’ but designates a dynamic complex in which technology, theory, and pedagogy are inseparably interwoven.”
While CALL began as a niche topic in the field of second language acquisition, it is now ubiquitous; as the editor of one book on the subject put it, “the question is no longer whether to use computers but how.” [30] We therefore turn our attention to how technology may be able to address the language learning problems of non-literate language learners.

Commercial Language-Learning Software

Many of us are at least passingly familiar with the commercial software available for language learning. One of the most well-known language learning programs is Rosetta Stone, a series of CDs that allow users to learn a wide range of languages on their home computer. Rosetta Stone combines pictures, videos, text and audio recordings to teach vocabulary and grammar without any use of the learner’s native language. It also uses rudimentary speech recognition to offer students feedback on their pronunciation. A study conducted by Vesselinov [31] of City University of New York found this approach to be quite effective; on average, it takes about 55 hours of study for the average English-speaking Rosetta Stone user to master one college semester’s worth of Spanish.

In the last two years, Rosetta Stone has been eclipsed by Duolingo, which has the advantage of being free for users. Like Rosetta Stone, Duolingo is multimodal; it also includes translation exercises, and makes use of the learner’s native language. Duolingo is also notable for gamifying language learning; users earn points by completing language learning tasks. Vesselinov and Grego [32] found that Duolingo was even more effective than Rosetta Stone. His research estimated that the average user would learn a semester’s worth of Spanish in only 34 hours.

Rosetta Stone and Duolingo share several significant traits that research shows are helpful in language learning. First, as noted, they combine a variety of media in a relatively immersive environment, which has been shown to be more conducive to learning than experiencing audio or visual input in isolation [33]. They also both make use of spaced repetition, an important technique in language learning that involves “recycling” new material at carefully spaced intervals that increase over time, promoting both recall and retention [34]. Both of these features are shared by many other CALL initiatives.

However, while it is pedagogically sound to integrate study of the four primary language skills—listening, speaking, reading and writing—this integration makes these software tools virtually useless for non-literate language learners. As figure 1 demonstrates, an ELL needs literacy in his or her primary language in order to decipher the progression of English lessons, let alone participate in them.

![Fig. 1: A screenshot of Duolingo for Hindi speakers: useful if you can read Hindi, useless if you can't. Source: duolingo.com.](image-url)
CALL for Specific Language Skills

Of greater interest to us, therefore, are CALL applications that focus on specific language skills. In its early years, single-focus CALL was the more common than integrated approaches like Rosetta Stone’s or Duolingo’s. Writing in 1982, Garrett [29] noted that “grammar has been the focus of a fairly high proportion of the foreign language software developed so far,” partially because grammatical rules are (at least superficially) amenable to computerization, and partially because delegating grammar drilling to computers relieved ESL teachers of an unpleasant aspect of language teaching.

More recently, vocabulary learning has been a significant CALL focus. The primary benefit of using software for vocabulary learning instead of traditional flashcards is that computers can provide visual or audio cues to help learners master the vocabulary. This makes computerized flashcards like Anki an interesting avenue to pursue for non-literate ELLs. Anki allows users to connect vocabulary words to pictures, audio clips or even video clips in addition to translations or definitions. Another invaluable vocabulary resources, Tatoeba, provides ESL teachers with audio recordings as well as written translations of thousands of sample sentences in hundreds of languages.

One interesting study [35] on vocabulary-focused CALL combined computer-based and phone-based learning to develop students’ vocabulary. Students participating in a four-week online vocabulary class learned new vocabulary on the course website, presented in context and with audio recordings. The new words of the day were then sent to the learners by SMS twice a day. A comparison of pre- and post-tests found that students’ English vocabulary did improve markedly over the four weeks of the course, although unfortunately the study did not compare participants’ progress to a control group or students using an alternate form of instruction.

Listening skills are also relatively easy for language learners to practice with the aid of a computer. “The addition of sound to computers in the 1980s brought listening away from the linear tape and allowed the blending of onscreen graphics and text, leading to multimedia environments. Digitized speech and video offer greater control for the listener, and the addition of technologies for supporting meaning, such as L1 and L2 captions, glosses and explanatory notes, can improve both immediate comprehension and acquisition” [30]. Captions and explanatory notes are, of course, of limited interest to our non-literate target population.

Other Options for Developing Listening Skills

While computers are a valuable, other technological study aids such as audio CDs and MP3s continue to be an important way that language learners practice listening and speaking skills.

Perhaps the best-known form of audio lesson on the market is the Pimsleur method, developed in the 1960s by an applied linguist who was dissatisfied with the lack of theoretical and pedagogical grounding of existing language learning resources. The Pimsleur method is an entirely oral method of achieving basic conversational competence. Unlike immersive approaches to language learning, like Rosetta Stone, it makes use of the ELL’s native language.

For example, a Pimsleur audio lesson for an English speaker learning Arabic (see Fig. 2) discusses a scenario, presents a brief dialogue in Arabic (spoken by native speakers), and asks the
student to repeat key words and sentences. There is ample silence for the student to repeat the requested phrase before the correct form is played. These repetition sentences are then interspersed with recall questions, such as “How do you say ‘Excuse me’ in Arabic?”

A key feature of the Pimsleur system is that newly introduced phrases are repeated at carefully timed, increasing intervals, in keeping with Pimsleur’s research on “graduated-interval recall.” [36] The vocabulary words are also very carefully chosen to cover the most commonly used words in the earliest lessons, making great efforts not to spend the beginning student’s time on rarely used vocabulary or grammar.

The Pimsleur method has lost market share in the last few years, partially because it is expensive and partially because more multimodal language learning is now possible. However, the crucial characteristic of the Pimsleur model for our purposes is that it requires no literacy. In fact, Pimsleur materials actively discourage students from trying to read in the target language until they have mastered pronunciation, for fear that they will assume familiar letters correspond to the sounds they would make in the student’s native language [36]. This emphasis on oral skills to the exclusion of written skills makes it a very useful model for our target population.

Proposed Solution: An Authoring Tool for Creating Audio Lessons

After learning about the language needs of our target population and discussing strategies with five ESL teachers and two members of the Bhutanese community, we concluded that a viable solution design would need to have the following features. First of all, unlike the majority of language-learning books and software on the market, it must address the learning needs of non-literate language learners. Second, it must be accessible to students without computers and smartphones. Third, the cost needs to be reasonable. Fourth, it should address the language learning needs of ELLs who are unable to take ESL classes as well as those already

Fig. 2: Transcript of the first 90 seconds of Pimsleur Eastern Arabic I.

Narrator in black, male native speaker in red, female native speaker in green. Pauses indicated by ______.

Listen to this Arabic conversation:
‘Afwan. Inti tahti inglizi?
La, ya ach. Ana ma baref Inglizi.
Ana baref shwayet ’Arabi.
Inta Ameriki?
Na’am, ya anise.

In the next few minutes, you’ll learn not only to understand this conversation, but to take part in it yourself. Imagine an American man sitting next to a Syrian woman in someone’s home. He wants to begin a conversation, so he says, “Excuse me”— ‘Afwan. The Arabic speaker is going to repeat this, part by part, starting from the end. You are to repeat each part after him, trying to make your pronunciation sound exactly like his. Be sure you repeat aloud.

—wan ______ —wan ______
‘Af— _____ ‘Af— ______
‘Afwan ______ ‘Afwan ______
The sound ‘a at the beginning of ‘afwan is very common in the Arabic language. Listen and repeat after the speaker, trying to match his pronunciation. ‘Afwan ______ ‘Afwan ______ ‘Afwan ______

Source: transcribed from youtube.com/user/PimsleurApproach.
enrolled in ESL class. For these reasons, our solution design focuses on the development of audio lessons that language learners can use as a self-study resource at home.

We also believe that an ideal solution would consist not of a final language learning product that will quickly become outdated, but instead of a process of developing new teaching materials. The best practice in language learning is to equip language learners with the vocabulary and grammar they need in real life, in a “just-in-time” fashion [35]. Audio lessons that can be developed on the fly to meet particular learners’ needs are thus more likely to be useful than a basic lesson plan that doesn’t take students’ actual language needs into account.

Finally, an ideal solution should bring together the three major stakeholders in the target populations’ language learning: the language learners themselves, their ESL teachers, and the bilingual members of the Bhutanese community on whom the ELLs currently rely for language help. Although both ESL teachers and the younger, bilingual generation of Bhutanese refugees are already heavily invested in the ELLs’ language development, thus far their efforts have not been coordinated. An ideal solution would bring both groups together to address the needs of struggling Bhutanese ELLs.

We propose the creation of an online authoring tool through which ESL teachers and bilingual (English/Nepali) Bhutanese contributors can collaboratively create audio lessons for Bhutanese ELLs to use in order to practice English on their own. This resource will be intended not as a replacement for classroom instruction, but rather something that can be used as homework for students in class, and as a stand-alone resource for those unable to attend ESL classes.

Technologically, this system is twofold. The content creation system will consist of a website to which the ESL teachers and bilingual Bhutanese contributors can record or upload short audio files, consisting of a word, phrase or sentence in English or Nepali. The software will interleave these audio files into a single MP3 file per audio lesson and store these MP3s on the website. Second, the content delivery system will consist of low-cost MP3 players to which ELLs can download the audio lessons.

In conjunction with the technological aspect of our proposed solution, we plan to engage deeply with the ESL teachers and Bhutanese community members who are interested in participating in this project. Our goal is to facilitate their collaboration, and to enable them to take responsibility for the project as it goes forward. In particular, we want to train a team of Bhutanese youth to help develop and maintain the website, to act as research assistants and training liaisons for their community, and to recruit and manage translating contributors for the website. In this way we will both capitalize on the existing strengths of the Bhutanese community, and will also build further capacity for the community to address its own language needs.

Content Creation

The website will function as the portal for ESL teachers and Bhutanese contributors to build lessons together, as well as a portal for students to access audio content. To understand this website’s purpose and requirements, let’s walk through the life cycle of an audio lesson.
Sherman teaches a beginner-level ESL class at GPLC, made up entirely of Bhutanese students. Sherman comes up with a lesson plan on grocery shopping and decides to create an accompanying audio lesson for homework. He wants to record ten different sentences, each repeated three times. Sherman logs in to the website and makes the lesson outline, choosing the order of the thirty sentences. Sherman tags the sentences “grocery shopping” and decides to search the site for other lessons with that tag. He finds a few other sentences that fit his lesson and adds them to his own. He also writes an explanatory introduction for the lesson.

The ten new sentences, and the introduction, now appear in the website’s list of untranslated phrases. These are the first untranslated phrases that have been posted in a few days, so all of the translation contributors who have opted into email updates are automatically notified. Sherman then records himself saying each sentence in English, and uploads each of these to the website.

Nirmala, a bilingual Bhutanese contributor logs into the website, records herself saying a couple of Sherman’s sentences, and uploads them to the website. After a couple days, the lesson hasn’t been fully translated. Sherman posts on the forum, asking for help. A couple other bilingual contributors see his post and translate the remaining sentences as well as the lesson introduction.

The website then automatically combines the sentences into a single audio file. In class the following week, Sherman lets his students know the audio lesson is now available. Some of his students have brought their MP3 players to class, so Sherman uses his own laptop to transfer the new lesson to them. Other students download the lesson at home or at a family member’s house, with the assistance of a more technologically savvy relative. The students then listen to the lesson and practice with it at home for the next week.

This scenario illustrates the major requirements of the website. Users must be able to create accounts, create lesson plans, display phrases lacking translations, record and/or upload audio clips, converse on a discussion board, search for users or lessons, and download lessons. It must also automatically merge audio clips into a single MP3 when a lesson is complete.

We plan to develop this website in close collaboration with ESL teachers, prospective Bhutanese translators, and members of the Bhutanese community who can represent the interests of non-literate language learners. We will stay in close contact with all three groups as the solution is iteratively developed and deployed, to ensure that the process meets all of their needs and fulfills all their requirements as completely as possible.

**Content Delivery**

There are two primary requirements for MP3 players for this project. First, they should be simple to operate; second, they should be as inexpensive as possible. We found that low-cost clip-on MP3 players are available for around $2 each. Each comes with a small box, a pair of earbuds, and a mini-USB-to-USB cord for charging and moving files. For storage, these use microSD cards, which can be found at a sufficient

Fig. 3: A $2 MP3 player. Source: [dhgate.com](http://dhgate.com).
size for about $4 each. These MP3 players have just 6 buttons, making them simple to use even for ELLs who are unused to such technology.

To distribute the MP3 players to students, we recommend pursuing two avenues simultaneously. ESL teachers can sell them at cost (or give them out, depending on project funding) in class. The devices can also be stocked in Nepali grocery stores in the South Hills, which often function as informal Bhutanese community centers. This will make the units accessible to those not attending ESL classes.

### Plans for Monitoring and Evaluation

Once the project is deployed, further monitoring and evaluation is necessary to ensure that our system has the desired effects on users’ language acquisition. This is particularly vital in the case of this project, since its success will depend on the buy-in and collaboration of all three user groups of the website: ESL teachers, bilingual contributors, and the ELLs themselves. If any group fails to adopt use of the website, none of the other groups will be able to use it to its full potential. It is therefore imperative that we monitor adoption of the process very carefully at every stage of deployment.

#### Phase One: Pilot Study

Once we have developed a prototype of the website, and we have gotten local ESL organizations and BCAP on board, we will begin a two-week pilot study of the audio lessons with approximately ten Bhutanese ELLs. Participants will be recruited by their ESL teachers and also through BCAP, which has several useful means of communicating to the Bhutanese community (e.g., their YouTube channel and automatic phone system). We would prefer to enroll a mix of current ESL students and non-attenders in the study.

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**Fig. 4: Planned Interview Questions**

(to be translated into Nepali)

- How often did you use the MP3 player? For how long, on each occasion?
- How many audio lessons did you start? How many did you finish?
- What times of day did you use the audio lessons? Where were you at the time?
- Did you practice English outside of class before you got this MP3 player? How? Did using the MP3 player change this?
- Can you think of any English words or phrases you learned from the audio lessons?
- What problems did you run into using the device? the lessons?
- How do you feel about the device?
- Did you try to download other lessons? Who helped you, if anyone? Were you successful? If not, what happened? Were our instructions useful? What changes to them would you suggest?
- If you could keep using the MP3 player, would you? If you could keep using the audio lessons, would you? Why or why not?
- If you could change three things about the device, lessons, or website, what would you change?
Because none of us are Nepali-speaking, we will need to hire and train a small number of bilingual Bhutanese youth to help run the study—specifically, to teach participants to use the system at the start of the pilot study and to conduct follow-up interviews afterwards. These Bhutanese research assistants will need to be trained in IRB requirements as well as interview protocols. We will recruit these research assistants during our initial focus group stage (not described in this document for the sake of brevity) and will pay them $30 per interview conducted.

Each of the ten participants will be given an MP3 player (total cost: $100) containing one or two audio lessons, created by ESL teachers and bilingual contributors solicited during the focus groups. The ELLs will be trained on how to use the device by one of our Bhutanese research assistants. During this process, the research assistant will take notes on the ELL’s level of comfort with the MP3 player and headphones. They will also provide them with instructions on downloading 1-2 additional audio lessons from our website.

One week after participants receive the MP3 players, the research assistants will interview them about their experience. See Figure 4 for suggested interview questions.

Together with the research assistants, we will tabulate and analyze the answers to these questions, in order to find out how satisfied users were with the system, and to make a list of changes to consider for the next iteration.

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**Phase Two: Three-Month Quasi-Experimental Study**

While we hope the pilot study will give us important feedback, a study of ten users can’t show us whether a new language learning system will be effective. The second step of our rollout will thus be a three-month trial with 50-75 participants, which will provide us with the opportunity to explore both whether the audio lessons are being effectively used, and whether their use leads to increased English fluency.

The first step in our trial will be to apply for grants from Vibrant Pittsburgh, Teens 4 Change, and Mayor Peduto’s Welcoming Pittsburgh Initiative to pay for the trial. (Estimated budget: $500 for 50 MP3 players, $3000 in stipends for bilingual research assistants and web developers.)

In this trial, we will distribute approximately 50 MP3 players to ELLs who were not involved in the initial pilot study. Ideally, 25 of these will be ELLs recruited from existing ESL classes, and 25 will be ELLs who are motivated to learn English but are not currently taking ESL classes. The demographics of these users should match the demographics of our target population—skewed somewhat older and more female than the Bhutanese Nepali population as a whole. It should include language learners from a variety of neighborhoods, employment statuses, and levels of family support.

If possible, we plan to provide a control group for this study. If enough language learners are interested in participating, this could be done most easily by wait-listing all but 50. If not, we could try to get ESL students who are uninterested in the MP3 player to serve as controls. With such a small group of users, trying to match demographics between the two groups may be preferable to randomizing which participants receive the MP3 player.
During the three-month period of the study, we will work actively with ESL teachers and Bhutanese translators to produce as much audio content as possible for the website. In addition to ensuring that study participants have ample material available, this will also ensure that the website is well seeded with useful content by the time it is made public. Furthermore, while the ESL teachers and Bhutanese contributors are not the main focus of this study, their user experience is extraordinarily important to the success of the program. Working closely with them during these three months, and adjusting the workflow to meet their needs, will be important to the future success of the project.

Both before and after the three-month period, participants’ English conversation skills will be assessed by ESL teachers. The details of this assessment will be developed in conjunction with those ESL subject experts, but it is important that the tests cover material that is covered in the ESL teachers’ classes as well as in the audio lessons. If we have a control group, the scores of MP3 users can be compared to the scores of the controls. If we don’t have enough participants to use a control group, we can instead look compare the pretest score to post-test score to see if they suggest improvement. (Of course, this is not ideal since we would expect immigrants to increase in fluency over the course of three months.)

Additional assessment measures at this time will include surveys and interviews of the participants, using questions similar to those asked in the pilot study. Furthermore, since the website will (at this stage) require user authentication to download lessons, we will be able to track which students downloaded which lessons. This will provide a number of objective measures of whether the audio lessons are being used.

**Phase Three: Periodic Summative Evaluation**

Once the three-month trial study is completed, we hope to incorporate that final round of user feedback before deploying the website for public users. At this point, we will want to plan a strategy for periodic assessments of usage of the system. The website can be configured to send us regular updates about usage patterns—number of message board posts, average amount of time a new lesson is listed before it’s translated, number of downloads per lesson, and so on. If MP3 players are distributed through ESL centers, we can also keep tabs on how many MP3 players are being sold—although, of course, some users may use their own MP3 players to access content, and some ELLs may buy the MP3 players for uses other than language learning!

With the help of Google analytics, it should be simple to track usage of the system over time. This will be extremely valuable because it will allow us to intervene immediately if, for example, one user group stops using it frequently enough to maintain a steady state. However, we will also need to periodically assess the effectiveness of the system—whether those who use it are gaining language skills from the experience. We therefore suggest that studies like our three-month experiment be continued in future years, so that we can continue to study the usefulness of the project.
Conclusion: Further Work

This proposal is only the beginning of what our team hopes will be a long process of implementing a new resource for the Bhutanese refugee community. We hope that those involved in this work in the future will be able to both tackle the inevitable challenges that will arise and extend the project in productive ways.

Tackling Anticipated Challenges

Any ambitious projects faces challenges and setbacks in implementation; this proposal is no exception. As work moves forward, we suggest that those implementing this proposal prepare to meet the two major types of challenges we foresee: technological challenges and structural challenges.

In terms of technology, our solution requires the deployment of a technological device to a largely computer-illiterate target population. It will therefore be necessary to provide a great deal of training and support to the end users of the proposed system; we suggest MP3 player instruction manuals in English, Nepali, IKEA-style pictograms, as well as Nepali-language audio instructions for downloading new material to be stored on the MP3 when it is first given out. If the MP3 player itself turns out to be an unworkable solution, the project team could consider switching to a system in which audio lessons are pushed to users via automated phone call service rather than pulled by the user when he or she thinks to download an update.

Structurally, our project relies on the motivation of ESL teachers and Bhutanese volunteers to contribute to the pool of lessons available. While the lessons developed during the three month trial will provide a solid core of lessons permanently available on the website, the project’s growth and continued vitality depends on the adaptation and use of the project to meet the community’s shifting needs over time. We hope the problems inherent in recruiting volunteer contributors to an open-source project will be ameliorated by our plans to involve the Bhutanese community throughout the adoption process, as co-researchers and web developers and not simply as research subjects. We hope that, by training Bhutanese youth to be involved in the project and by turning the project over to a largely Bhutanese advisory board, we will empower the existing stakeholders in refugees’ language learning to become active participants in the solution we have designed.

Suggestions for Continued Work

Despite the undeniable fact that there are non-literate, bilingual people all across the world, very little research has been done on the second language acquisition of preliterate and non-literate language learners. This project offers researchers an opportunity to learn more about what obstacles these language learners face, and what strategies they draw upon to successfully master a new language.

In creating our solution design, we drew heavily on the knowledge of colleagues in ESL, and the knowledge of our team of mostly computer scientists regarding what solutions would be
plausible given technological constraints. However, CMU is home to many others disciplines with interest in our project area. It may be worthwhile to involve experts in cognitive tutoring, second language acquisition, and human/computer interaction—just to give a few examples—to ensure that the audio materials and website produced are in line with best practices.

Finally, our proposal focuses entirely on one small segment of Pittsburgh’s immigrant community: low-proficiency, non-literate, refugee English language learners from Bhutan. This is hardly the only population that uses the services of the community organizations with which we hope to partner. We hope that the system we have designed will be of use to Bhutanese language learners beyond the ones we have specifically targeted; it would be relatively simple to expand the website to include resources for literate ELLs, for example. Even further, if our solution proved to be of use to non-literate language learners in the Bhutanese community, it may be possible to expand it to other refugee communities, provided that bilingual volunteers could be found with whom to collaborate.

Acknowledgments

We would like to thank Douglas Perkins, for providing helpful feedback during several iterations of our solution design process. Douglas is a seasoned ESL instructor, currently at Musashino Joshi Gakuin in Tokyo, and he is an avid developer of, contributor to, and user of a wide variety of open-source/creative-commons language-learning tools.

We also extend our thanks to Zuzu Myers and Melissa Tabak, ESL instructors in Compass AmeriCorps, for sharing indispensable information about our target population, shaping our problem statement, and giving early feedback on feasible solutions.

For providing key background information and feedback along the way, we also thank Yadhu Dhital, member of the Bhutanese Student Group of Pittsburgh; Hope Rodefer, director and ESL specialist at Carnegie Mellon–Qatar’s Academic Resource Center; and Rebecca Oreto, assistant director of Carnegie Mellon’s Intercultural Communication Center.

And, of course, we thank Bernardine Dias and Ermine Teves for their support and feedback on this project.
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