

An Assessment of Linguistic Development in a Kaqchikel Immersion School

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This paper discusses two assessments designed to evaluate the progress of students in the Kaqchikel immersion program at Nimaläj Kaqchikel Amaq'. Picture-naming production and comprehension tasks were used to test for proficiency in phonology and morphology as well as lexical acquisition. The tests targeted basic contrasts which are important to Kaqchikel grammatical structure. While students are still struggling with many aspects of the language such as the phonology and positional verbs, many are able to understand and use singular vs. plural intransitive verb morphology. Results are being used to improve the program and inform future methodological and curricular decisions.

1. Introduction¹ Kaqchikel is a Mayan language spoken by about 400,000 people in Guatemala. Despite its relatively large number of speakers, for some years it has been observed that many members of the younger generations are no longer learning even the larger Mayan languages such as Kaqchikel (Garzon et al. 1998; Lewis 2001; England 2003; Hawkins 2005). The 2002 census data showed that in Kaqchikel territory (departments of Chimaltenango, Sacatepéquez, and Sololá), only 60% of the indigenous Kaqchikel population spoke Kaqchikel natively, and that the language was barely present in many of the more urban areas (Santamaría & Elkartea 2013:31).

This paper reports on production and comprehension assessments conducted with 53 students participating in a Kaqchikel language and culture revitalization program at a pre-primary and primary school in Chimaltenango, Guatemala. Although there have been several studies involving the acquisition of the morphology of different Mayan languages (cf. Pye 1992; Pye & Mateo 2006; Brown et al. 2013) and one assessing young Kaqchikel L1/Spanish L2 bilinguals (Balcazar 2009), to our knowledge there has been no assessment of children learning or acquiring a Mayan language

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outside of the usual home/community environment. We refer here more specifically to school-based or community-based indigenous language programs which have begun to gain support in the past 5 years in several of the towns in the Kaqchikel area. The studies presented here were specifically designed to test basic competency in Kaqchikel (although the assessment could be used with minor modifications for other Mayan languages), with the goal of using the results to help improve these programs which provide support for Mayan languages and for preserving Mayan cultural identity. The assessments involved both production and comprehension and they targeted lexical, phonological, and morphological phenomena which are integral in the acquisition of Kaqchikel. We present here the results of these assessments along with suggestions for alterations in the classroom and/or curriculum to better facilitate language learning.

1.1 Context for Mayan language education Over the course of the past four decades there has been a Maya cultural and political revolution, which has prominently featured goals for language policy, education and revitalization (England 2003:733). The Maya Movement brought together activists and scholars to create a number of primarily Maya-run governmental and non-governmental institutions which support Maya language, culture and identity. One of the most influential organizations is the Mayan languages academy (*Academia de Lenguas Mayas de Guatemala*, ALMG), which also has local branches for the various Mayan languages. These local branches (e.g., the Kaqchikel Cholchi') are tasked with creating Mayan language promotional and pedagogical materials. They also provide language classes on request for Maya interested in learning their heritage language. The *Dirección General de Educación Bilingüe Intercultural* (DIGEBI), a branch of the Guatemalan Ministry of Education, is likewise tasked with creating pedagogical materials in Mayan languages.

These pedagogical programs are relatively new, as official attitudes towards Mayan languages in Guatemala were entirely exclusionary until the early 2000s. Through the efforts of Maya activists, the *Ley de Idiomas Nacionales* ("Law of National Languages") passed in 2003, which gave Maya the right to use their languages in public capacities. Most relevant to the present topic was the right to education in Mayan languages:

El sistema educativo nacional, en los ámbitos público y privado, deberá aplicar en todos los procesos, modalidades y niveles, el respeto, promoción, desarrollo y utilización de los idiomas Mayas, Garífuna y Xinka, conforme a las particularidades de cada comunidad lingüística. (Article 13) [The national education system, in public and private spheres, should apply the respect, promotion, development and use of Mayan, Garifuna, and Xinkan languages in all processes, methods, and levels, according to the particular characteristics of each linguistic community.] (Our translation.)

A subsequent document was also passed in 2011 which mandated that local languages be taught in schools at the primary level in indigenous communities (acuerdo

gubernativo 320-2011). However, despite these mandates and the efforts of the ALMG and DIGEBI, the only primary schools which have Mayan language programs are those that have created them out of a desire to have them, independent of official policy or support. There is little federal support for the production of classroom materials and textbooks in Mayan languages, and there is a lack of availability for teacher training so that educators may competently teach a Mayan language. Most of the teachers who do attempt to teach Mayan languages are either Spanish monolinguals or speakers who did not have the opportunity to learn about their languages as part of their own education.

Additionally, the ‘ladino’ culture (culture of the non-indigenous population of Guatemala, Hispanic in its origins) puts tremendous pressure on young people to abandon their native identity. Maya are portrayed in curricula in such a way that children become ashamed of their culture and especially their languages. For this reason, mandatory public schooling has led to a steady decline in Maya language transmission (Hawkins 2005). There are many stories of teachers prohibiting their students from speaking Kaqchikel, and as recently as 20 years ago this was enforced with physical punishment (reminiscent of the Native American boarding schools in North America). The prevailing attitude that has made its way into the classroom is that Kaqchikel is a primitive language and that its continued use is a step backward, away from progress. Teaching steeped with these kinds of ideas and misconceptions, as well as a lack of education in Mayan history and worldview, contribute to both language loss and the identity crises that plague many young Maya.

In addition to the social power imbalance between Kaqchikel and Spanish, there is also an economic imbalance. As is common in endangered language communities, parents recognize that global languages have more economic currency than local languages, and encourage their children to learn Spanish, English, and even Japanese or German. While there are a growing number of jobs which seek Maya-speaking bilinguals, fluency in Spanish is also always a prerequisite. Schools such as the one discussed here have invested a considerable amount of energy in convincing parents of the value of Mayan languages.

Many feel that the public school system is not a worthwhile avenue for language education, both for the reasons above and because the Guatemalan educational system is the poorest-performing in Latin America, and chronically underserves its indigenous students. Only 18% of Maya children make it to high school, and less than 1% make it to the university level. This has resulted in widespread illiteracy, as over 47% of Maya cannot read or write in either Spanish or their native language(s) (UNDP 2005). It is therefore not surprising that there is a need for higher-quality Mayan language education, which the national educational system is not providing. This gap has fueled the creation of several new schools in the Kaqchikel area, including the one discussed here, to better serve the needs of the indigenous population.

2. Nimaläj Kaqchikel Amaq’ Nimaläj Kaqchikel Amaq’ (henceforth NKA) is a pre-primary and primary school in the department of Chimaltenango, Guatemala which has been in operation since 2003. It aims to provide quality, affordable education

to underprivileged children in the Chimaltenango area, and in doing so help them escape the cycle of poverty and oppression which afflicts most of the population of Guatemala, where 60% of overall the population and 90% of the Mayan population lives under the poverty line (UNDP 2005). Although many townships and rural areas within Kaqchikel territory still have strong native Kaqchikel-speaking populations, Spanish has been the language of commerce and public functions, as well of the home, in Chimaltenango for several generations. Children who have grown up in Chimaltenango have not been exposed to Kaqchikel in their immediate environment, and lack support in the language both from the parent and the grandparent generations. So while there is still a large Kaqchikel ethnic population, the linguistic situation in Chimaltenango more closely resembles that of many communities in North America and Canada where language loss has advanced to a stage where not only must revitalization programs create speakers, but they must also aim to expand the local domains in which the language can be used.

At the time that the assessments reported here were conducted, the school served 53 students, almost all of whom were fully sponsored by external grants. The students ranged in age from 3–10, and attended the equivalent of preschool through third grade (at the time of writing NKA also has a fourth grade).² The school employed four full-time teachers, two for preschool and two for elementary school. Two teachers each covered two age groups due to lack of funds. Due to discrimination in the educational system, NKA is one of the only schools in Chimaltenango that hires Maya teachers. All the teachers are bilingual Kaqchikel-Spanish speakers, and give instruction in both Spanish and Kaqchikel throughout the day (see 2.1 below for details). Because the past few generations of Kaqchikel in Chimaltenango have not been native Kaqchikel speakers, teachers had to be recruited from other Kaqchikel-speaking towns, in this case from San José Poaquil, Simaj Ulew, San Andrés Itzapa, and San Juan Comalapa. However, because each town has its own dialect/variety (all are mutually intelligible), the input the children receive is not homogenous, although the teachers endeavour to teach standard Kaqchikel as established by the Comunidad Lingüística Kaqchikel and the ALMG.

To address some of the issues associated with Mayan language education in public schools, NKA spent the past three years developing Kaqchikel language and culture curricula to teach students their language and to inform them about their heritage. The cultural portion includes lessons on Mayan hieroglyphs, cosmology, traditional activities like weaving on a backstrap loom, the vigesimal numeral system, and topics associated with the Mayan calendar. They also put on cultural events which the students perform for the community, such as a modified version of the Mayan ball game and various theatrical productions depicting events from the Popol Wuj (Popol Vuh) and other texts representing pre-colonial activities and ideology. These events are immensely popular both with the parents and with the wider community. In addition to teaching Mayan culture (as part of the social studies curriculum), the

²At the time the studies reported here were conducted, NKA graduates had to attend other, often public, institutions in the Chimaltenango area for all subsequent grades. However, with the progress that has been made in curricular development in the past two years the school now plans to be able to keep their current students through high school.

school also offers instruction in science, math, physical education, art, and computers for all grade levels.

Even though NKA is a relatively new establishment, it has already received national recognition for academic excellence. While 40% of students repeat the first grade in other Maya areas, all of the students at NKA have progressed to the next grade every year. Also, literacy (in Spanish) is 53% nationally, whereas 100% of students at NKA are literate by age 6.

While much of this success comes from the dedication of the teachers and the administration to create their own high-quality pedagogical materials and curricula, it is also the result of the support which they are able to provide their students and their families. 90% of their students are Kaqchikel ethnically, and come from severely impoverished situations. All of the students have been diagnosed externally as malnourished, and many of them work selling items in the streets after school, since their families rely on their income even from the age of about 5. The school is acutely aware that their students' primary needs must be met in order for the goals of language revitalization or even general learning to be met. In order to address these primary needs and facilitate learning, NKA provides all of their students with breakfast, school supplies, and uniforms (which are Mayan traditional dress). Also, the school offers tutoring services for students (since most of the students' parents had little schooling themselves), as well as medical help for students who have physical issues which impede their ability to learn.

2.1 The Kaqchikel program The Kaqchikel language program at NKA is relatively new. Although pilot testing of pedagogical materials and teaching methodology has been underway since 2011, the full program had only been implemented for about a year and a half before the time of testing. In 2012 the school received a grant from the Ministry of Culture to develop methods for teaching Kaqchikel to preschool children. A team of eight teachers and administrators developed a method based loosely on that used by other Kaqchikel immersion programs (cf. Maxwell 2012 on Oxlaju Aj) which guides students from passive comprehension to active production over the course of each lesson. Students are first exposed to the vocabulary and target structures for that lesson in a demonstration by the teacher. After a quick review of the material, students are asked to answer yes/no questions about the lesson. When they have mastered this, they are asked to choose the indicated object from a set of objects (much like the comprehension test in this study), or perform an action. The lesson then moves on to more production, where students are prompted to produce the names of objects or describe the actions, just as the teacher did in the initial demonstration. Finally, students must act as the instructor and ask their classmates to give any of the responses or perform the actions elicited earlier in the lesson. Individual lessons are designed to last about half an hour each. To make the format more accessible to young children, the lessons are supplemented with other activities which involve using the language, such as games, puppet presentations, songs, rhymes and theatrical presentations. This program was implemented for all ages and all grades in January of 2013.

The goals of the language program include: (1) to have students achieve fluency in Kaqchikel (and Spanish) by the time they graduate from high school, (2) to strengthen Maya identity through the Kaqchikel language, (3) to create the future producers of literature, movies, and other culturally significant works in Kaqchikel, and finally (4) to create future Kaqchikel teachers, leaders, and representatives for the Kaqchikel nation. These lofty goals will of course take many more years to be achieved, but in terms of the current assessment, we are seeking to discover if the program as it currently exists is on track to accomplish the first of these goals.

In 2013, Kaqchikel language, art and physical education were all taught in Kaqchikel. Beginning in January 2014, math was also taught in Kaqchikel. Since students attend school from 7am–12pm in Guatemala, the children receive about 2–3 contact hours in Kaqchikel, five days a week (10–13 hours/week). The Kaqchikel language curriculum currently consists of five levels which encompass about 22 different lessons. Because all students, regardless of age, started learning Kaqchikel at the school at the same time, all grade levels covered the same material. While older students progressed slightly faster and the methodology varied somewhat between grade levels (e.g., older students can read and write, which the teachers took advantage of to convey the material in a variety of formats), all levels had covered the same lessons by the time of testing. The schedule was roughly as follows: all students started learning greetings, “my name is,” “please,” and basic classroom interaction phrases. They then progressed to imperatives and colors, followed by learning the Kaqchikel alphabet and sounds. Kaqchikel-specific sounds, particularly the glottalized stops, were taught using games, songs and tongue twisters. They also began learning numbers 1–10 and counting around this point. This was followed by the basics of conjugation, where they learned singular pronouns and basic non-verbal predication (“I am a student, you are a teacher”). They then progressed to learning the names of animals and objects in the classroom. This was followed by plural pronouns and predications (“we are students”), as well as the possessive prefixes. The next two months were spent learning intransitive verbs, which were separated into two levels: the first level covered singular intransitives, and the second covered plural intransitives. After that they returned to nouns, learning words for foods, and older students learned basic phrases to use in the market (“how much does that cost?”). This was followed by learning the Maya names for local places. Most vocabulary learned in that first year or so was present on the walls of the classrooms for review, accompanied by the word and a picture of the item or action.

When the Kaqchikel immersion program was first implemented, the children had difficulty understanding the teachers, and as a result they did not like Kaqchikel class. However, within a few weeks Kaqchikel became the ‘fun’ class, and feedback from students was very positive. Based on classroom observation, it appears that after one year students can understand much of what their teachers tell them and can respond to some basic questions. While this is encouraging, it is necessary to test these students to see how much language they have actually managed to acquire in this period of time.

3. Assessment design Two separate assessments were administered to the children at NKA. The first assessment was a production task in Kaqchikel designed to test specific grammatical phenomena both basic and essential to speaking Kaqchikel. It was important to pick phenomena which not only were linguistically salient, but also which we knew the children had already been exposed to. Because most of the children were effectively second language learners, it was important to choose structures known to be frequent in the input. To balance those criteria against getting a more comprehensive view of what the students know, we chose to evaluate them in several different areas: vocabulary, phonology, intransitive verb morphology, and positional morphology. A description of how each area was evaluated is provided in §3.3. The second test assessed the students' ability to comprehend two of the morphological contrasts targeted in the production test: singular vs. plural intransitive morphology, and singular stative vs. intransitive positional morphology. This test was likewise administered in Kaqchikel, but only required the students to nonverbally indicate one of two pictures which illustrated the target contrasts.

All of the 53 students enrolled in NKA at the time of the assessment (July–August 2014) participated in both tests. They range in age from 3–10 years old and have all been taking Kaqchikel since the language program began in 2013. Several of them were also part of the program's pilot groups for the Kaqchikel program the year before. The breakdown of participants by age and grade is given in Table 1. All grades and ages received the same test, since all had been exposed to the same basic lessons in roughly the same time frame (see §2.1).

Table 1. Participants by age and grade

Grade	Age	Number
Pre-primary	3	10
	4	6
	5	10
	6	5
First	7	6
Second	8	7
Third	9–10	9
Total:	6.27(mean)	53

To make the children feel as comfortable as possible during the assessment, both tests were administered to each child individually by their teacher at the school (as opposed to by the researchers, who were not present) over the course of six weeks, with a two-week interlude between the tests. Both tests were administered on a computer at NKA during school hours. The pictures were displayed on PowerPoint slides which the teacher would click through as answers were given. Each session of the production test was audio recorded, and the comprehension tests were both audio and video recorded.

3.1 Production task The first assessment was an elicited production task similar to that used with children in Peter et al. (2008). It first involved showing each child a series of objects and asking them to name them; the objects consisted of 15 items which the children both learned in Kaqchikel class and encounter on a regular basis. This was followed by a series of 30 culturally appropriate hand-drawn pictures³ of people performing various actions, where students were asked to describe what was going on in each picture. The test took 7–20 minutes per student to complete. A breakdown of the test conditions involved in each part of the production assessment is given in the following sections.

3.1.1 Phonology Phonology and vocabulary were tested throughout the assessment, as producing an appropriate answer to each test item required the production of the correct verb root as well as proper pronunciation. However, the section of the test designed to elicit specific sounds included only the object-naming task. The nouns were chosen based on the sounds they contained, as the aim was to elicit those sounds which are present in Kaqchikel but lacking in Spanish. Charts comparing the consonantal sounds in standard Kaqchikel and those in Guatemalan Spanish are provided below (this study did not deal with differences in vowels). Prominent allophones are given in brackets adjacent to the underlying phoneme.

Table 2. Kaqchikel sound inventory (cf. García Matzar and Rodríguez Guaján 1997)

	Bilabial	Alveolar	Postalveolar	Palatal	Velar	Uvular	Glottal
Stops	p [p ^h]	t [t ^h]			k [k ^h]	q [q ^x]	ʔ [creak ⁴]
Glottalized	b [pʰ]	tʰ			kʰ	qʰ ⁵	
Nasals	m	n [ŋ]					
Fricatives		s	ʃ			χ	
Affricates		ts	tʃ				
Glottalized		tsʰ	tʃʰ				
Approximants	w [w]	l [l]		j [j]			
Rhotic		r [r, ɾ ⁶]					

³Pictures were drawn by Ryoko Hattori and the first author, and modified by that author to fit Mayan cultural norms.

⁴See Baird 2011 on K'ichee'. However, given that what was elicited here was careful speech, we expected and coded discernable glottal stops only, as that was what the native speakers who took the production test produced.

⁵There is some disagreement about whether and where /qʰ/ may be an ejective rather than an implosive, but here it is regularly transcribed as /qʰ/, a voiceless uvular implosive, in accordance with the findings of Pinkerton (1986).

⁶Although the symbol used to represent this sound varies by author, and in the Mayan literature is simply *r*, this sound is a voiceless laminal retroflex approximant or fricative, which appears in syllable-final position, and as a flap intervocalically. This sound also exists in mostly rural dialects of Central American Spanish (see Table 3), termed in the literature the 'assibilated *r*,' the presence of which has sometimes been attributed to influence from indigenous languages.

Table 3. Guatemalan Spanish sound inventory (cf. Canfield 1981)

	Labial	Dental	Alveolar	Postalveolar	Palatal	Velar
Voiceless stops	p	t				k
Voiced stops	b [β]	d [ð]				g [ɣ]
Nasals	m		n [ŋ]		ɲ	
Fricatives	f		s	ʃ		x
Affricates				tʃ		
Approximants			l		j	
Flap			r			
Trill			r [ʀ]			

All lexical items in this task were taken from the pictures and other teaching tools on display daily in the classrooms. The sounds tested fell into the following categories, with examples of each:

- (1) a. *Velars vs. uvulars*: [kəʃ]⁷ ‘fish,’ [qupibəʃ] ‘scissors’
 b. *Ejectives and implosives*: [k’oj] ‘spider monkey,’ [g’an] ‘yellow,’ [ts’ibabəʃ] ‘pen/pencil,’ [tʃ’itʃ] ‘car/bus/metal object’
 c. *Voiceless approximants*:⁸ [jaʃ] ‘blue,’ [utiw] ‘wolf’
 d. *Phonemic glottal stop*: [woʔoʔ] ‘five,’ [kaʃiʔ] ‘four’

Each sound appeared at least twice in the set of fifteen test items, although some appeared more frequently simply by necessity. Most of the fifteen items also included more than one non-Spanish sound, and each segment was coded individually for accuracy (see §3.3 on coding). Additionally, although there are other contrasts which could have been tested (e.g., non-Spanish vowels, fricative /χ/), these were less uniform across the teachers’ dialects/individual speech and were therefore not evaluated.

Although this section of the assessment was also meant to test vocabulary, if the child did not know the lexical item and therefore could not give an answer, the test administrator gave the child the answer and then asked them to repeat it. If the child repeated the lexical item without making the proper phonological distinctions, this demonstrated that they had not yet acquired those sounds reliably in Kaqchikel (similar to the rationale for elicited imitation, e.g., Bley-Vroman & Chaudron 1994; Vinther 2002; Hatfield et al. 2007; Jessop et al. 2007; Erlam 2009; Aquil 2012).

⁷The phonetic value for what is here represented as a schwa can also be /ɨ/ or /ɜ/, depending on the dialect (García Matzar & Rodríguez Guaján 1997:18-19).

⁸Although this list largely reflects phonemic contrasts, some segments such as voiceless approximants are produced by phonological processes (e.g., voiced approximants become voiceless word-finally (and preceding voiceless segments in many dialects)), and are not necessarily phonemic. Since the segments produced by these processes are essential to proper pronunciation, they were included in the assessment.

⁹In addition to those words listed (1), the object-naming task included [wəʃ] ‘tortilla,’ [sik’iwux] ‘book,’ [tʃol’q’ix] ‘calendar,’ [bats] ‘howler monkey,’ and [kaʃiʔ] ‘two’ for a total of 15 items.

3.1.2 Intransitive verb morphology Verbs are incredibly important in the grammar of all languages. While the students had been informally exposed to a variety of verb types at the time of testing, they had only received explicit instruction on a number of common intransitive verbs and some positionals (see §3.1.3). By looking at students' performance just on these verb types, we were able to evaluate them on basic absolutive verbal morphology, contrasts in word class (intransitive vs. positional roots), and also the contrast between verbal-type predicates (intransitive positionals) and aspectless stative-type predicates (stative positionals). These contrasts are based in grammatical and semantic categorization frames which are language-specific, and which must be understood to produce morphologically correct verb forms. This made them ideal for testing here.

Basic intransitive verbs in Kaqchikel are of the following form: **tense/aspect/mood marker + absolutive agreement + verb root**. The absolutive prefixes are portmanteau morphemes which encode person and number, and their phonological form varies based on whether the following sound is a vowel or a consonant. In order to test multiple forms of the absolutive prefix, pictures were shown with single actors (where the verb should receive 3rd person singular pronominal agreement) or with multiple actors (where the verb should receive 3rd person plural pronominal agreement). This yields a 2x2 design which tests for singular vs. plural morphology, as well as for the form of the absolutive before consonant-initial and vowel-initial verb roots, as shown in Table 4. Each of these four conditions included five test items, for a total of twenty test items.

Table 4. Intransitive verb conditions

	3rd person singular subject	3rd person plural subject
Consonant-initial verb:	/Ø-/ or [i-] ¹⁰	/e-/
Vowel-initial verb:	/Ø-/	/eʔ-/

All items targeted the incomplete aspect, as that was the only aspect explicitly taught at the time of testing. However, the incomplete tense/aspect marker for the 3rd person plural (and all other persons) is /j/, whereas the tense/aspect marker for the 3rd person singular is /n/. Thus, not only do the children have to know the correct form of the absolutive prefix for the target person and number, and must apply the appropriate pre-consonantal or pre-vocalic allomorph, they must also choose the correct form of the tense/aspect/mood marker in order to get the test item right.

Sample test items are given below which illustrate the four conditions in Table 4 above, along with their associated target-like responses.

¹⁰The pre-consonantal absolutive prefix is null, but the teachers at the school almost always realize it as an epenthetic [i], e.g., *n-Ø-waʔ* is *n-i-waʔ* 'he/she is eating.' The [i] shows up very frequently in the students' speech as well.

3rd SG-C:

- (2) *n-Ø-ropin*
 INCOMPL¹¹-3 SG.ABS-jump
 ‘S/he are jumping’



3rd PL-C:

- (3) *j-e-ropin*
 INCOMPL-3PL.ABS-jump
 ‘They are jumping’



3rd SG-V:

- (4) *n-Ø-ogʻ*
 INCOMPL-3SG.ABS-cry
 ‘S/he is crying’



3rd PL-V:

- (5) *j-eʔ-ogʻ*
 INCOMPL-3PL.ABS-cry
 ‘They are crying’



3.1.3 Positionals Positionals are a functional and semantic class of words which exists in Mayan languages but is lacking in Spanish,¹² making positionals an ideal candidate for testing proficiency based on defining features of the target language. They are morphologically distinct from other word classes, and mainly refer to positions of the body (García Matzar & Rodríguez Guaján 1997:74). This also makes positionals a good choice lexically, since ‘sit,’ ‘stand,’ ‘kneel,’ etc. are used very frequently in the classroom setting.

There are two constructions involving positional roots which were tested in this study. The first type, stative positionals, are unlike intransitive verbs in that they cannot take tense/aspect or bound agreement marking without additional morphology. Instead, they occur in a construction composed of an **independent pronoun + positional root + -Vl**, where V is a lax copy of the vowel in the positional root (*u* in the

¹¹Glossing conventions: INCOMPL = incompletive aspect, INTR.POSIT = intransitive marker for positional verbs, IP = independent pronoun, STAT.POSIT = stative positional suffix. All other abbreviations used can be found in the Leipzig glossing rules.

¹²Spanish does not have a positional class of roots, but rather forms positional-type intransitives and statives via participial constructions. The Spanish structures which correspond to items in the production task include *él está parado* ‘he is standing,’ vs. *él se está parando* (or *él está parandose*) ‘he is [in the process of] standing.’ No students attempted to use a reflexive-type construction in Kaqchikel to parallel the second Spanish pattern, or any other strategies which could be interpreted as stemming from either of these structures.

case of the root *-ts'uj* 'sit' below). In the 3rd person singular, the pronoun is null. The form above is used when the action is completed, and the subject is currently in the state of sitting, standing, etc.

- (6) Ø *ts'uj-u*_l
 3 SG.IP sit-STAT.POSIT
 'S/he is seated'



There is a morphological contrast in Kaqchikel between the completed, sustained action of the stative positional construction and the process of getting into that position, which is conveyed by an intransitive verb formed from a positional root plus the suffix *-e*. Although it might seem that these intransitive forms which describe the transitional action would be scarce in the input, the intransitive forms of positionals are quite frequent because they are also used in non-incompletive aspects, as well as in imperatives. These intransitive positionals take the same prefixal morphology as the root intransitive verbs described in §3.1.2, plus an additional suffix *-e*.

- (7) *n-Ø-ts'uj-e*[?]
 INCOMPL-3SG.ABS-sit-INTR.POSIT
 'S/he is [in the process of] sitting'

The inclusion of positionals tested the children's knowledge of a distinction particular to Mayan languages which they hear frequently but had not yet been explicitly taught. To accurately respond to those items involving positionals, the children not only had to recognize the distinction between positional roots and intransitive roots, but also to know the semantic associations for different forms of positionals (even if they do not fully understand the mechanics), and then to produce the appropriate morphology for each verb type.

There were only five positional verbs to which the children had been exposed, all of which were consonant-initial. To test the children on their knowledge of the morphological and semantic contrast between stative and intransitive positionals, five test items were given for each type (stative and intransitive), for a total of ten items. These items were randomly interspersed with the twenty test items in 3.1.2 above (which were also randomized), to avoid having the contrast indicated by a patterned presentation of the stimuli. While stative positional items such as (6) were presentable in the same way as the items in 3.1.3 (as shown in (6)), intransitive positionals (such as *n-Ø-ts'uj-e* 's/he is [in the process of] sitting') required a three-panel display to show the subject in motion, in between two movement endpoints. An arrow then indicated the picture in which the figure was in motion, as shown on the following page.

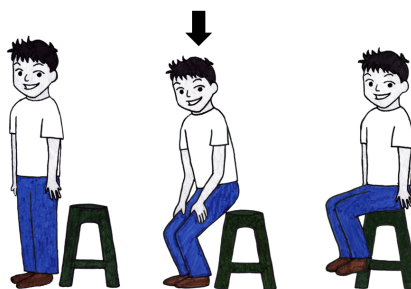


Figure 1. *nits'uje?* 's/he is [in the process of] sitting'

3.2 Comprehension task Two weeks following the production assessment outlined above, all of the students participated in a comprehension task aimed at assessing students' understanding of situations based solely on Kaqchikel verbal morphology. The comprehension task was meant to elucidate the origins of difficulties students had with verbal morphology: do they understand how person, number, aspect and class are encoded in Kaqchikel verbs, and are therefore having trouble with composition, or have they not yet learned how these categories are encoded? In the first scenario, students would score well on a comprehension task, while in the second they would not. The assessment specifically tested for the identification of singular/plural morphological distinctions as well as the morphological and semantic distinction in the positional system described above in §3.1.3. To test the students' comprehension of singular vs. plural verb forms, a picture of a single 3rd person performing an action was presented alongside a picture of two people performing the same action. The teacher administering the assessment then instructed the student in Kaqchikel to either 'Point to the [one who] is ____ing' or 'Point to the [ones who] are ____ing.' Kaqchikel is a pro-drop language, so there was no pronoun in the prompt to indicate number; the number of participants had to be read off of the absolutive verbal agreement morpheme.

The test for the difference between arriving at a position and being in a position employed the same methodology, but juxtaposed only the stative positional picture and the single in-progress action picture (the center image from the 3-panel display in the production task). This was done to simplify the visual presentation, since native Kaqchikel speakers did not appear to have trouble distinguishing the two different actions when the verb was provided.

The comprehension study consisted of 15 pairs of test items, each asked twice, with the prompt first targeting one picture, then the second time targeting the opposite picture. The items were ordered such that the choice of the picture on the right or the left was random, and items belonging to the same condition rarely appeared adjacent. The test took approximately 5–7 minutes per student to complete.

¹³The arrow to indicate movement was present in each of these 'in progress' pictures, in different orientations. This was the only picture in which the arrow could be confused with 'selection,' as in the previous task. There were no significant results which indicated that this was a stumbling point either for native speakers or for the students.

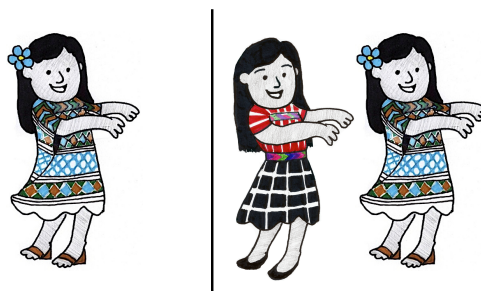


Figure 2. ‘Point to the [one who] is dancing | [ones who] are dancing’

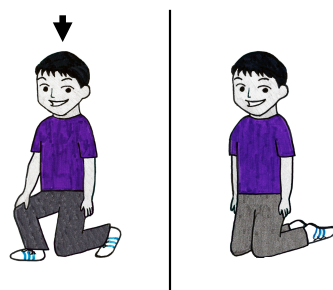


Figure 3. ‘Point to [the one who] is [in the process of] kneeling | [in the position of] kneeling’¹³

3.3 Coding and evaluation Coding for the comprehension test was binary: either the student indicated the correct picture or they did not. The production test, however, required more extensive metrics. Phonology, morphology, and lexical targets were evaluated independently for accuracy across all sections of the assessment. As mentioned in §3.1.1, correct pronunciation and the mastery of Kaqchikel phonology were evaluated based on the analysis of each individual segment. This not only applied to those segments in the phonology section, but all of the segments throughout the assessment, since many of the verb roots and affixes also contained non-Spanish sounds. Segments were divided into two categories: those specific to Kaqchikel (exemplified in (1)), and those also found in Spanish. Only segments belonging to the first category were evaluated.

Morphological errors were coded by the individual morpheme, including the null absolutive agreement markers. All of the root intransitive verbs and positionals contained two non-lexical morphemes, and the intransitive positionals contained three non-lexical morphemes, for a total of 65 morphemes across all items.

In terms of vocabulary, if the lexeme in the phonology section or the intransitive verb root/positional root in the morphology section was correct enough to be recognized by a native speaker as the target lexical item, then it was counted as correct. This measure was used so that if a child had not yet acquired the phonology of the language, they would still be able to receive credit for known lexical items, even if they could not pronounce them in a native-like way. Also, if the student substituted an equally acceptable lexical item for any target, it was likewise accepted (e.g., *-wəɬ*

‘sleep’ for *-uʃlan* ‘rest’). The test consisted of thirty unique lexical items across all sections, including the object naming task.

Generally speaking, students were only evaluated on the segments/morphemes/roots which they actually produced. It was a relatively frequent occurrence that if the student did not know the lexical item, he or she would not produce any form at all. In these cases, the student had no value for morphology (as opposed recording those morphemes as ‘non-target-like’ for that item), since it is entirely possible that they could have a knowledge of the morphology but were unwilling to express it without a lexical base to which to attach it. In some cases, students did produce the prefixes without a root, in which case they were given credit for their knowledge of morphology while only marking the lexical base as unknown.

The responses of the students were compared with the results of all four NKA teachers, as well as the results of two unaffiliated native Kaqchikel speakers in their forties. Both unaffiliated speakers had perfect scores on both the production and comprehension tests. The NKA teachers all scored 100% on the comprehension task and between 93% and 98% on the production task. To evaluate the responses for the Kaqchikel production task, a random sampling of the responses to each section of the test were evaluated independently by a panel of two native Kaqchikel speakers, one of whom was a teacher at NKA and the other of whom was an older speaker from Santa María de Jesús. The two native speakers and the researchers had a 98% inter-rater reliability rate.

4. Results

4.1 Production task The results reported below are from 37 of the 53 students at NKA, as the test for the youngest groups was not properly administered. Students ranged in age from 5–10, with a mean age of 7.

4.1.1 Overall results The average scores for each age group ranged from about 25–50% correct. Although the primary students performed slightly better than the pre-primary students, age was not a large factor in relative achievement. This is not surprising given that all students had the same amount of exposure to the language, so age has been combined in all subsequent production figures. Overall, students did better on morphology than either vocabulary or phonology, although there is not a large disparity in the range of scores.

4.1.2 Phonology Recall from §3.1.1 that students’ phonological production was evaluated using all items they successfully produced from all portions of the test, including the 15 items from the naming task. The focus was on their production of non-Spanish consonants, namely ejectives and implosives, voiceless approximants, and glottal stops. In addition to these sounds, the researchers also noticed that many students were pronouncing syllable-initial /w/ as [gw], e.g., [gwəj] for [wəj] ‘tortilla’,

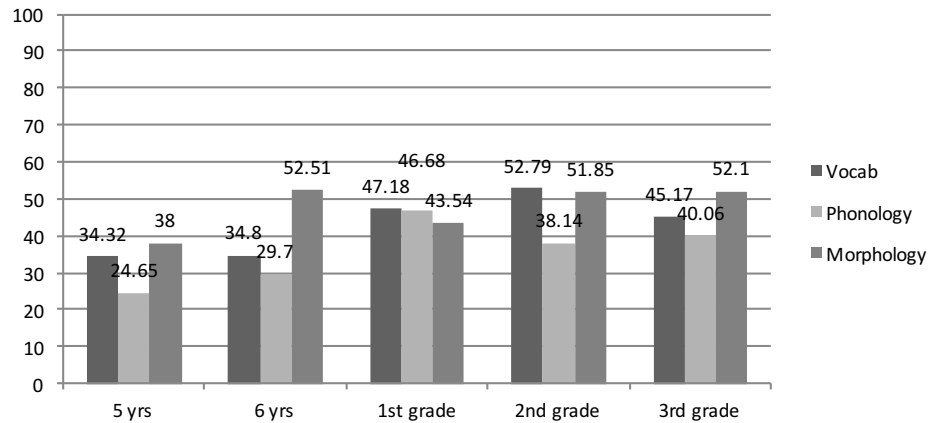


Figure 4. Mean vocabulary, morphology, and phonology scores by age group

presumably a transference from Spanish, so initial /w/ was also added to the list of sounds evaluated.

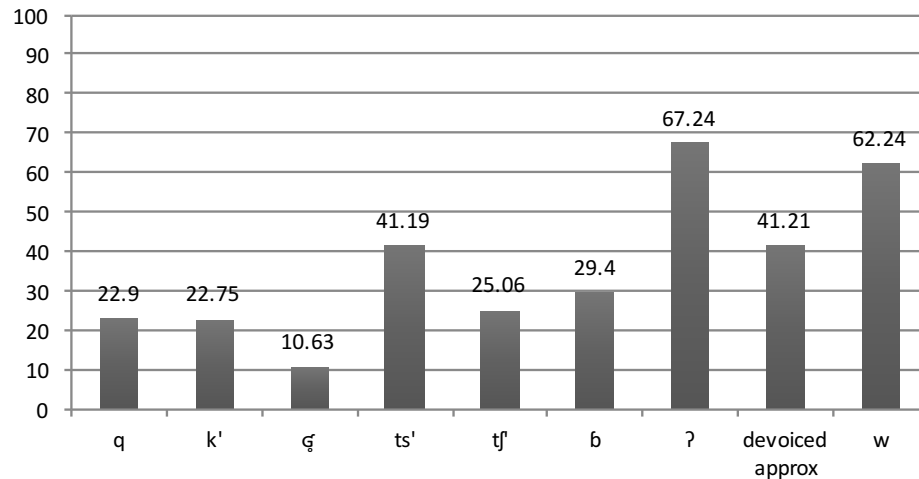


Figure 5. Percent of correctly produced target segments by type

The students were largely not successful in producing the contrast between the different types of velars and uvulars in Kaqchikel (10–22% accuracy). Whereas Kaqchikel has /k/, /q/, /k'/, and /ɕ/, students typically produced [k] for all four. /ɕ/ was sometimes also realized as glottal stop, or omitted entirely. The other ejectives /ts'/ and /tʃ'/ were often rendered identically to their non-ejective counterparts. The implosive /b/ was often pronounced as the Spanish /β/. Difficulties producing ejective and implosive sounds were expected based on typological markedness, as well as reports from L1 acquisition studies of related Mayan languages with similar inventories, where glottalized stops are mastered relatively late (cf. Pye 1992:248).

Students were particularly successful in producing glottal stops, both medially and finally, which may have been aided by the expressive use of glottal stops in Guatemalan Spanish, e.g., [siʔ] ‘yes’ and [noʔ] ‘no’. The most common error in glottal stop production was to omit it. The students were also surprisingly successful at producing all of the voiceless approximants (41.21%), even though this had not been the focus of explicit classroom instruction to the same extent as, for example, the glottal stop series. Students of all ages were also able to overcome the tendency to begin a /w/-initial syllable with a stop over 60% of the time.

These results provide us with a general idea of how the students’ phonological acquisition is progressing. At the time of testing, students were able to produce between 10% and 68% of the non-Spanish segments in Kaqchikel, which speaks to the relative difficulty of producing some sounds versus others. In terms of pedagogy, results indicate that the students are having the most difficulty with the differences between the various velar and uvular stops, which should continue to be an area of pedagogical focus. Further testing will be necessary to determine if the students are able to recognize the relevant contrasts, even if they cannot yet produce them. This is particularly true for the 16 of these children under the age of 5, who might be expected to be able to hear the relevant contrasts but not yet have the articulatory control to produce them.

4.1.3 Morphology The morphological portion of the test was designed to evaluate the children on their acquisition of three different important contrasts with respect to intransitive verbs: singular vs. plural forms, root intransitives vs. positionals, and consonant-initial vs. vowel-initial forms. The second contrast was the most complex, involving the students’ ability to distinguish and appropriately use two different verb classes, one of which, the positionals, is unique to Kaqchikel (i.e., lacking in Spanish).

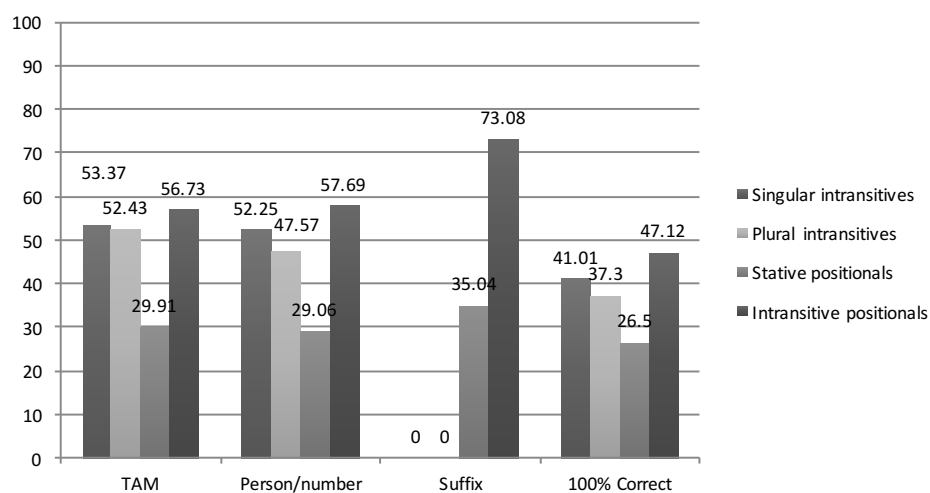


Figure 6. Percent morphological achievement by affix and condition

Results show that students only produced stative positionals in the appropriate context 26.5% of the time, and were much more comfortable producing the *-eʔ* intransitive forms (47.12%). Additionally, there is a surprisingly high rate of success in the use of the intransitive positional suffix *-eʔ* (73.08%). This could be due in part to the fact that prosodic stress falls on the final syllable in Kaqchikel, which increases that segment's perceptual salience. However, this cannot be the only factor, as the success rate for the stative positional suffix is much lower (35.04%). It is therefore more likely due to the fact that the *-eʔ* suffix is also the only morpheme shared between the imperative form and the indicative form. So while students may have not had the appropriate prefixes (substituting imperative prefixes), they still could have produced the correct suffix (see Figure 7 and the following discussion on imperatives).

Students overall performed slightly worse on standard intransitive morphology than intransitive positional morphology (41% and 37% vs. 47%), which is surprising given that intransitive positionals require more affixes (root intransitive verbs do not require suffixes). Also interesting is the similarity in the scores for singular and plural morphology. The morphological study in Peter et al. (2008:176) on Cherokee acquisition found that students had greater mastery of singular prefixes than plural prefixes, and we expected to see similar results with Kaqchikel. Although the students did perform slightly better with singular morphemes, the difference is not significant. Notice also that the rate of success in the production of the proper TAM allomorph for each condition is almost identical to the success rate for person. This indicates that the students have successfully associated the two markers as a unit, likely facilitated by the fact that together they often form a syllable. This is corroborated by a lack of errors of this type, i.e. **j-i/Ø-* 's/he is ___ing,' or **n-e-* 'they are ___ing' (see Figure 7).

From studies on 2–4 year old children acquiring K'ichee', a closely related language, we know that that prefixes are harder to acquire than suffixes, and that K'ichee'-speaking children acquire absolutive person marking later than children speaking other Mayan languages (Brown et al. 2013:293–294). Aspect marking is likewise a late acquisition, despite its frequency in adult speech (Pye 1992:256–258). While there might be a slight asymmetry in the acquisition of suffixes vs. prefixes in these data, the more noticeable difference is in construction type, where children had significantly more trouble forming stative positionals (which lack prefixal morphology) than in forming any type of inflected intransitive verb. Students therefore performed better on prefixal morphology than might have been expected based on the L1 data.

With respect to the contrast in consonant-initial vs. vowel-initial forms, the students chose the correct allomorph of the pronominal person prefix based on whether the root began with a consonant or a vowel in almost all cases. There were six instances where the consonant-initial allomorph of the pronominal prefix was used with a vowel-initial root (see Figure 7 below), e.g., **n-i-oq'* 's/he is crying,' but since these types of responses are few and the differences in the pronominal series are minimal, this contrast will not receive further attention.

The '100% correct' metric from Figure 6 demonstrates the proportion of responses that students gave which were morphologically well-formed, involved an acceptable

lexical item, and were target-like for the condition in which they were uttered. Phonological accuracy did not factor into this metric. Although the percentages may seem low (100% correct forms were not used in any condition more than 48% of the time), these scores are more impressive when compared with the results reported in Peter et al. (2008): the Cherokee kindergartners produced completely correct verb forms 5.77%–16.35% of the time, whereas the Kaqchikel children produced completely correct verb forms 26.5%–47.12% of the time. While there are many differences both in the structure of these two languages and the pedagogical contexts, the fact that both assessments specifically targeted the acquisition of singular vs. plural verb morphology and used the same ‘100% correct’ metric makes for a more reasonable comparison.

While it is useful to examine what the students produced correctly, it is perhaps even more telling to look at the types of non-target-like responses they gave. Figure 7 below provides the raw number of instances of the common non-target-like responses given over the course of the assessment.

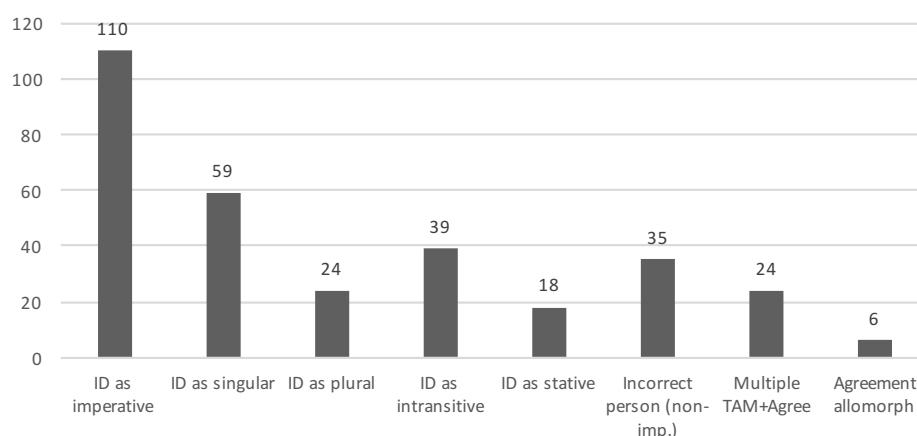


Figure 7. Number of non-target-like responses in morphological production by type

The most telling type of non-target-like response involved the use of a second person imperative verb form instead of a third person indicative, which was nearly twice as frequent as any other non-target-like response type. Although we do not currently have more than anecdotal data on the input these children are receiving, the fact that imperatives were regularly produced suggests that they are disproportionately frequent in the input. This is particularly telling since imperatives in Kaqchikel are equally complex morphologically as their indicative counterparts (Imperative/hortative TAM-person agreement-verb root). The spike in infelicitous imperative forms therefore cannot be due to the morphology of one form being simpler and easier to learn than the morphology of the other form, and is most likely due to frequency.

Also apparent in the non-target-like response data is the dichotomy initially expected with respect to singular vs. plural forms. Singular verb forms were produced when the picture was plural more than twice as often as the reverse (59 vs. 24 in-

stances), suggesting that students are indeed more comfortable with singular forms. The same result is seen with positionals, where students were more likely to produce intransitive positional (non-imperative) verb forms when the target was a stative positional than vice-versa (39 vs. 18 instances), despite the fact that the intransitive positional form, in these items, requires more overt morphology (3 affixes vs. 1).

In addition to the imperative forms, there were 35 instances of students using the non-third person agreement markers in declarative (non-imperative) contexts, which contrasts with expectations based on K'ichee' L1 children who do not exhibit confusion between different person cross-reference markers (Pye 1992:273–6). These non-target-like responses frequently involved first and second singular forms, but also involved first and second person plurals. This suggests that at least some students have not yet mapped form to function with respect to person marking.

Finally, there are a small but significant number of instances where students used two sets of TAM+agreement prefixes with a single root, for a total of 4–5 morphemes per word. Almost all of the 24 instances of this involved the student putting 3rd person indicative prefixes on a fully conjugated imperative, as exemplified below.

(8) **n-Ø-k-a-ts'uj-e?*

INCOMPL-3SG.ABS-IMP-2SG.ABS-sit-INTR.POSIT

Target: 'S/he is [in the process of] sitting'

The *n-Ø-* is the 3rd person singular indicative which was the target-like morphology, and *k-a-* is the 2nd person singular imperative. This sort of stacking suggests that these students do indeed have a grasp of the appropriate morphology, but have not always managed to go back and re-analyze rote-memorized forms, which, incidentally, are almost all imperatives.

4.2 Comprehension task At this point, we know from the production task how often students are producing the targeted contrasts. However, in this case, the frequency with which students produce these contrasts is low enough that it is not clear if conceptually they have successfully tied the singular vs. plural distinction to the verbal prefixes, or if they have figured out the difference in distribution (stative vs. in-progress) between stative positionals and intransitive positionals. The comprehension test allows us to see if the NKA students have indeed acquired the relevant contrasts, as shown by their ability to choose the picture which corresponds to a given verb form with greater than chance accuracy. All 53 NKA students took the comprehension test, including the youngest students whose results were excluded from the production test. The average score on the comprehension test was 62.95%, with scores ranging from 40%–93.33%, which indicates that some students performed much better than others (subject effects). As the goal here is to see how many students have acquired the relevant contrasts, the following figure reports the number of children in each age group who had an overall score above chance (21/30 and over).

Unlike with the production data, there is a significant relationship between age and comprehension score, where the youngest 16 students did not perform above

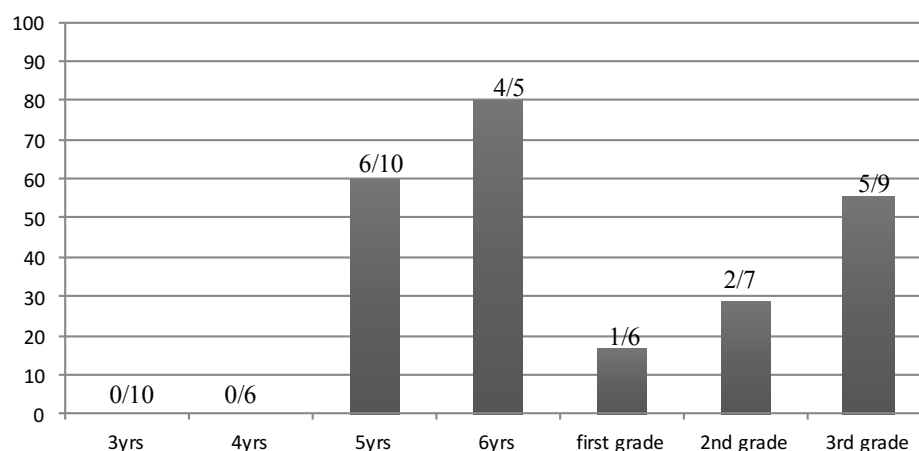


Figure 8. Number of students with an overall score above chance by age group

chance. In fact, only 18/53 students performed above chance, most of whom were 5 and 6 years old. Why the primary students, particularly the first and second graders, did not perform as well or better than the younger students is a matter of speculation.

It was entirely possible that even though a student did not perform above chance in terms of their overall score, they could have performed above chance for a particular set of forms (singulars, plurals, stative positionals, intransitive positionals). In fact, 40 of the 53 students (75%) performed above chance in at least one of the four conditions. The breakdown by condition is as follows:

- 19 (36%) correctly selected singulars above the rate of chance
- 26 (49%) correctly selected plurals above the rate of chance
- 22 (42%) correctly selected stative positionals above the rate of chance
- 5 (9%) correctly selected intransitive positionals above the rate of chance

Notice that the number of students performing above chance on plurals and stative positionals is greater than those performing above chance on singulars and intransitive positionals—the opposite result from that of the production assessment. It is likely that this is due to a well-documented bias in comprehension tests, where children have a natural tendency to select plural and completed actions over singular and incomplete actions. There was no significant difference in the comprehension of forms with consonant vs. vowel-initial roots.

However, the numbers above do not answer the primary question of how many students have mastered plurality and/or positional usage. Given the bias discussed above, we have defined ‘mastery’ as correctly selecting both singular *and* plural pictures above the rate of chance, and/or likewise correctly selecting both stative *and* intransitive positional pictures above the rate of chance. Based on this metric, 17 NKA students (32%) have mastered plurality, and 1 second grader also mastered the

distinction between the two types of positionals. This suggests that students are in the process of learning what they are being explicitly taught (the plural contrast), but do not appear to be making connections yet between form and use for those contrasts which they have not been explicitly taught. This is probably due to a variety of factors, including limited input and an overabundance of imperatives, which, at least for positional roots, obscures the relationship between form and function in general usage.

5. Applications This study involved two different assessments, one production and one comprehension, which evaluated the linguistic competence of children who had been in partial Kaqchikel immersion schooling for about a year. The aim was to discover how well the children were learning the language after using new approaches to Mayan language pedagogy and a newly developed curriculum. Lexical, phonological, and morphological aspects of language acquisition were systematically tested, targeting specific linguistic elements necessary for general competence in Kaqchikel.

Since these children get only about 10–13 Kaqchikel contact hours per week, as they do not receive input at home or elsewhere in the community, it is unrealistic to expect them to perform similarly to L1 Kaqchikel speakers of the same age. In addition to facing tremendous odds in terms of input, the program is also trying to overcome larger social and institutional barriers, such as low educational standards, poor socio-economic conditions, lack of governmental approval or support, the physical and mental disadvantages brought on by poverty and malnutrition, and the negative attitudes about the language and culture common in the broader society. Given these external factors, as well as the newness of the program, mastery of the basic contrasts which are in the daily input or results on par with those of better-established endangered language immersion programs (cf. Peter et al. 2008) would be remarkable. The assessments demonstrate that students are learning to apply basic morphological rules productively, and that 30–40% already have some command of intransitive verb morphology. Students also have a good understanding of the distribution of prefixal allomorphs, as they largely do not confuse the different incomplete TAM markers or prevocalic vs. pre-consonantal agreement allomorphs. While the students' performance on the comprehension assessment was not as high as expected, the fact that 32% have grasped number marking is very promising.

The primary goal of these assessments was to use this information about the students' linguistic strengths and weaknesses to improve the program. Several changes have been made within the school to address some of the specific issues uncovered by the test. In terms of vocabulary, teachers were surprised that children were unable to name some pictures from the walls of the classrooms which they review regularly. They have now covered the names so that the students must name the objects from memory. Teachers also had frequently been asking questions for the entire class to answer at once, or did exercises where everyone would read or count together. They suspected that this allowed some students to simply follow the lead of other students who understood the material better, which is why there were large individual differences in performance on both the production and comprehension tasks. They have

now taken steps to ensure that each child is understanding and not parroting. Lastly, to address the issues in verb conjugation and person marking, the school has created an additional series of games and activities which target verb conjugation.

In addition to letting the teachers know what particular aspects of Kaqchikel particular students have learned and where they still need improvement, the results suggest the need for some broader changes as well. For example, the children's performance on positionals suggests that although students may hear the intransitive positional more (and are therefore better able to produce it), they largely have not grasped that when used outside an imperative it has a specific meaning separate from the stative positional. Similarly, imperatives are overly prominent in the input, such that children are substituting these forms for 3rd person indicative forms in production. Both of these issues arise due to a problem common to classroom immersion instruction, namely that the types of language students are asked to respond to and produce are often not sufficient to attain high levels of proficiency (Swain 1996; Lyster 2004; Peter et al. 2008:180). There are several ways in which we have chosen to address this issue: first, these assessments have highlighted a need for increased production in a variety of formats. Finding new ways to get students using the language with the teachers and with each other should increase the variety of forms they are comfortable with, as well as reduce the time spent only on correctly executing commands. The second aspect of increased production is to expand the curriculum so that more subjects are taught in Kaqchikel. This is a long, difficult process as there are no Kaqchikel-language pedagogical materials already in existence for any core subject, but NKA has already begun working to move toward fuller immersion.

Another key result of these evaluations has simply been awareness on the part of the teachers. Guatemala does not have a testing culture, and the students had never been evaluated on their Kaqchikel language skills prior to these assessments. The teachers reported that the process of administering the tests was enlightening in itself, since they were not aware that the students were not understanding as well as the teachers thought they were. Also, a sense of accountability has since motivated the teachers to ensure that their students are progressing.

Perhaps the most challenging finding is that the youngest students do not seem to be learning as quickly as the older students, as demonstrated by results of the comprehension test. There may be many reasons for this, but going forward it will be necessary for NKA to look critically at whether their methods are working for the younger children, and to adjust them accordingly.

Finally, in an effort to extend Kaqchikel contact hours outside of the school, NKA hopes to get the parents more involved in learning and supporting the language. Support for the Kaqchikel program is not unanimous, and since all of the parents work, finding time and resources to provide adult language classes has so far been unfeasible. However, as other more successful revitalization programs have demonstrated (cf. Housman et al. 2011 on Hawaiian and King 2001 on Maori), a base of dedicated parents and adult learners is often essential to getting the language out beyond the classroom. NKA is also working to keep up with their graduates, and are adding a grade level every year. This is a burden not only in terms of curriculum, but also in

terms of procuring the funding necessary to create more classroom space. The goal is to be able to keep training their students all the way through high school.

The benefits which NKA has been able to offer its students in terms of quality education and pride in Maya identity have already had a lasting impact on its graduates, which will hopefully serve them well for the rest of their lives. In terms of the Kaqchikel program, NKA has expressed a desire to continue testing the children in Kaqchikel. They stress the importance of continually making data-based revisions to the program, as it is not always clear how a given idea will play out in the classroom, and they would like to remind those working on language revitalization pedagogy that even small changes can make a big difference.

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