

# Learning L2 pronunciation with Google Translate

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**Abstract.** This article, based on Khademi's (2021) Master's thesis, examines the use of Google Translate (GT) and its speech capabilities, Text-to-Speech Synthesis (TTS) and Automatic Speech Recognition (ASR), in helping L2 learners acquire the pronunciation of English past -ed allomorphy (/t/, /d/, /id/) in a semi-autonomous context, considering three levels of pronunciation development: phonological awareness, perception, and production. Our pre/posttest results indicate significant improvements in the participants' awareness and perception of the English past -ed, but no improvements in production (except for /id/). These findings corroborate our hypothesis that GT's speech capabilities can be used as pedagogical tools to help learners acquire the target pronunciation feature.

**Keywords:** text-to-speech synthesis, automatic speech recognition, L2 pronunciation, Google Translate.

## 1. Introduction

The limited amount of time is one of the problems that teachers and second language (L2) students face in language classrooms (Collins & Muñoz, 2016). Such constraint deprives students of receiving sufficient linguistic input (e.g. listening to the L2) and producing output (e.g. speaking with others). One of the areas in which such time restrictions can negatively impact learning is L2 pronunciation, as it requires hours of practice (Everly, 2019) and it must address at least three stages of phonological development: phonological awareness, perception, and production (Celce-Murcia, Brinton, & Goodwin, 2010). To address this limitation and at the same time encourage students to practice, teachers often ask their students to engage

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in self-directed, out-of-classroom activities in the form of homework assignments, using technologies such as TTS and ASR. TTS and ASR can be used as effective pedagogical tools for pronunciation (Liakin, Cardoso, & Liakina, 2017), as they engage learners with a wide range of out-of-classroom activities, including the promotion of input (TTS) and output (ASR) practice. Their use also contributes to fostering learners' autonomy beyond the walls of classrooms (Van Lieshout & Cardoso, 2022).

However, TTS and ASR have only been studied separately (for an exception, see Van Lieshout & Cardoso, 2022). Therefore, little is known about the feasibility of using TTS and ASR combined (as found in GT) as pedagogical tools, nor do we understand what happens when learners are asked to use the technology on their own, outside of their classrooms (e.g. to complete homework assignments). To address this gap, this study asked the following question: using GT's TTS and ASR capabilities in a teacher-guided semi-autonomous context, can English learners acquire the pronunciation of English past -ed allomorphy (/t/, /d/, /id) in terms of awareness, perception, and production?

## 2. Method

Following a pretest-posttest research design, 20 intermediate-level English as a second language students (age: 30-40; L1: Farsi) were recruited to participate in this two-hour one-shot study. Participants took a set of pretests on awareness, perception (aural discrimination), and production of the past -ed allomorphy. Two instruments were adopted for each measure, for a total of six tests.

For awareness, participants were asked to answer four open-ended questions to determine whether they knew how past -ed is pronounced (Test 1), and then asked to match a set of past tense verbs based on how they believed their inflections are pronounced (i.e. they had to choose *used* for /d/, *added* /id/, and *asked* /t/; Test 2). For perception, two tests required participants to aurally discriminate between past and non-past constructions (Test 1) and then identify the -ed allomorph among those selected as 'past' (Test 2). Finally, for production, participants engaged in two audio-recorded tests: they read aloud a list of words containing past -ed forms (Test 1), followed by a less controlled speaking task in which they role-played an 'interview' with one of the researchers.

After completing the pretests, participants watched a video containing instructions on how the regular past tense is formed (without any information

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about pronunciation), and how to use GT’s speech features. For the treatment, which emulated the completion of a homework assignment, participants engaged in activities that encouraged them to listen (via TTS; e.g. they copied and pasted a text into GT, listened to it, and then filled-in blank spaces) and produce the target forms (via ASR; e.g. they read aloud past -ed forms into GT and then verified if the intended form was transcribed correctly). At the end of the experiment, participants completed six posttests (similar to the pretests, but containing randomized items).

### 3. Results

Using t-tests, the participants’ performance was analyzed in terms of phonological awareness, aural discrimination (perception), and production.

**Awareness:** The results from the two awareness tests indicate that the pedagogical use of GT’s speech capabilities contributed to the participants’ development of awareness of past -ed allomorphy (Table 1), particularly regarding /id/ and /t/ (but not /d/; Table 2).

Table 1. Awareness #1

	Pretest		Posttest		t-test
	M/4	SD	M/4	SD	
Total	3.30	0.80	3.80	0.41	*-3.24

\*p ≤ 0.05  
 Note. M/4=Mean (out of 4); SD=Standard Deviation.

Table 2. Awareness #2

	Pretest		Posttest		t-test
	M/7	SD	M/7	SD	
/d/	3.90	1.45	4.35	1.14	-1.53
/id/	2.85	1.04	4	1.02	*-3.81
/t/	1.55	0.99	2.3	1.03	*-2.44
Total /21	8.30	1.69	10.65	2.00	*-5.17

\*p ≤ 0.05

**Perception:** Findings from both tests indicate that the GT-based treatment helped the participants improve their perception of -ed allomorphy in general (Table 3) and across the three allomorphs (Table 4).

Table 3. Perception #1

	Pretest		Posttest		t-test
	M/15	SD	M/15	SD	
Total	10.65	1.98	12.25	0.91	*-5.14

\*p ≤ 0.05

Table 4. Perception #2

	Pretest		Posttest		t-test
	M/5	SD	M/5	SD	
/d/	1.65	0.81	2.4	0.68	*-4.26
/id/	2.4	0.68	3.4	0.59	*-7.96
/t/	0.9	0.71	1.3	0.66	*-2.18
Total /15	4.95	1.54	7.1	1.25	*-9.73

\*p ≤ 0.05

**Production:** Finally, the results for production in both tests (Table 5 and Table 6) indicate that the proposed pedagogical intervention had no effect on the improvement of -ed among the participants. When considered in isolation, only the production of the /id/ allomorph was positively affected by the treatment.

Table 5. Production #1

	Pretest		Posttest		t-test
	M/20	SD	M/20	SD	
/d/	7.15	2.30	6.90	2.38	1.31
/id/	5.05	1.96	5.65	2.18	*-2.85
/t/	3.60	1.57	3.65	1.69	-0.22
Total /60	15.80	5.54	16.20	5.54	-1.28

\*p ≤ 0.05

Table 6. Production #2

	Pretest		Posttest		t-test
	M/10	SD	M/10	SD	
/d/	3.70	1.45	3.55	1.54	0.90
/id/	2.55	1.19	2.95	1.19	*-2.63
/t/	0.90	0.85	0.95	0.82	-0.32
Total /30	7.15	3.23	7.45	2.99	-1.24

\*p ≤ 0.05

#### 4. Discussion and conclusion

This study examined the use of GT and its embedded speech features (TTS, ASR) as L2 pronunciation learning tools to find out whether English learners can acquire the pronunciation of English past -ed in terms of awareness, perception, and production in a teacher-guided semi-autonomous context (conceptualized as a homework assignment). Our findings suggest that there were significant improvements in both the participants' awareness and perception of English past -ed allomorphy, thus confirming the hypothesis that the pedagogical use of GT and its speech capabilities can help learners acquire the target pronunciation feature in these two first stages of L2 pronunciation development (Celce-Murcia et al., 2010). However, in terms of production, no significant progress was observed, except for /id/.

Considering the above mentioned findings, the present study offers some important pedagogical implications. The most important one is that it has demonstrated that learners can acquire certain aspects of L2 pronunciation (e.g. phonological awareness and perception of past -ed allomorphy) when engaged in teacher-initiated semi-autonomous activities such as those that characterize homework assignments. Via technologies such as GT and its speech capabilities, teachers can mitigate the time limitation that precludes them from focusing on pronunciation instruction, and consequently extend the reach of their classrooms to an environment that has the potential to provide input that is abundant and varied (via TTS), with ample opportunities for production practice and feedback (via ASR).

Despite these encouraging results, there are limitations that need to be addressed in further investigation. The first main limitation relates to the two-hour duration of the study, as research has shown that English learners need more than two hours of practice to acquire past -ed (Cardoso, 2018). Although we recognize this limitation, we also acknowledge that there is ecological validity in our pedagogical implementation, as it simulates a common learning situation in which students are asked to complete homework assignments on their own, with accessible technology such as GT. Another limitation is the number (n=20) and uniformity of the target population (Farsi L1 native speakers). Although our findings support the hypothesis that GT can help these learners improve their pronunciation skills, it is not clear whether these findings are generalizable to the larger population of English learners.

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