LEARNING ENGLISH WORD STRESS WITH TECHNOLOGY

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When learners misplace the stress in a word, they distort the rhythm, which may render it unrecognizable to the listener. Yet, despite its significance for intelligibility, word stress is rarely taught in English as a foreign language (EFL) courses. This study investigated an alternative to classroom instruction of lexical stress: autonomous practice outside of class. Participants were six Polish EFL high-school students taking a language course at a school in Poland. To improve their prediction and production of English word stress, the students learned and practiced orthographic word-stress rules using practice worksheets and *YouGlish,* a *YouTube* dictionary, out of class for four weeks. Data were gathered from read-aloud pre- and post-tests assessing students' ability to predict and produce the stress of English polysyllabic words; a background questionnaire; the teacher's observation field notes; and pronunciation activity trackers eliciting students' behaviours, practice choices, time spent practicing, and opinions about the resources used. The results provided support for the efficacy of the materials in supporting autonomous pronunciation learning for successful and highly motivated EFL students.

INTRODUCTION

Language learners want to be effective communicators, that is, they seek to understand foreign speech and be understood by their interlocutors in intercultural conversations. Intelligible and comprehensible speech, therefore, is crucial. McNerney and Mendelsohn (1992) have stressed the important role of suprasegmentals in learners' comprehensibility and their immediate effect on its improvement. One of the prosodic aspects that is extremely important for English speech recognition is word stress. As observed by Levis (2018), correct pronunciation of English words is central to mutual intelligibility. Students must learn to identify syllables, distinguish between stressed and unstressed syllables, and recognize and realize the prominent features of stressed syllables (length, loudness and higher pitch) and their vowel quality (Derwing & Munro, 2015).

In EFL Polish classrooms, students' pronunciation needs are seldom addressed due to limited class time (Jarosz, 2022) and the fact that neither the national curriculum nor exam criteria provide pronunciation teaching or assessment guidelines. When addressed, the focus of pronunciation instruction is generally on vowel and consonant sounds, leaving it up to the students to figure out for themselves how to stress English polysyllabic words. The current study addresses the needs of six EFL Polish learners who voiced their motivation to improve their ability to stress long academic words in English. Limited by the constraints of classroom time, the teacher decided to offer them an alternative approach: to learn and practice word-stress rules using instructional worksheets and *YouGlish* (www.youglish.com) out of class for four weeks. *YouGlish* is a free *YouTube* online corpus of millions of authentic video-recorded speech samples. Once users type in a word they want to learn how to pronounce, they obtain numerous video clips of speakers of different English speech varieties pronouncing the word in context. Students can stop the recording, rewind, and listen to the same speech excerpt several times with and without captions. The current study sought to assess to what extent motivated

EFL learners could improve their ability to stress English polysyllabic words on their own with the help of instructional worksheets and *YouGlish*.

Literature Review

English word stress is a crucial factor for spoken word recognition. It serves to segment continuous speech and identify individual words that differ prosodically (Cutler, 2015). Therefore, it is important for learners to recognize and then produce correct word stress. When lexical stress is wrongly placed, it contorts the rhythm of the language, which in turn obscures the lexical meaning of the word (Benrabah, 1997; Field, 2005). Thus, stress misplacement can affect how comprehensible the speaker is perceived to be (Anderson-Hsieh et al., 1992; Hahn, 2004). Recently, Levis (2018) asserted that incorrect English word-stress placement affects not only L2 speakers' comprehensibility but also their intelligibility.

Lexical stress in English is not fixed. For Polish speakers, whose L1 stresses words on the penultimate syllable, English word stress seems unpredictable and an inherent property of the word that should be acquired together with the word. To help English language learners, Dickerson (2004, 2015) has suggested a comprehensive system that allows predicting the stress and the quality of the vowel in stressed and unstressed syllables in English polysyllabic words. Recent research investigating the efficacy of these rules has provided encouraging evidence supporting the use of this prediction system. For example, the ESL students in Sardegna's (2012) study were able to improve their pronunciation skills during instruction (four months) and maintain significant progress long-term (roughly two and a half years after instruction) after learning and practicing Dickerson's (2004) prediction rules for word and phrase stress. Later, Sardegna (2022) dispelled the myth that immersion in an English-speaking context can bring about similar changes in pronunciation improvement by comparing a control group with an experimental group. The only difference between the groups was that the latter received classroom instruction and practice under the Enhanced Covert-Rehearsal Model (Sardegna, 2022, 2023). Essentially, the teacher raised the students' pronunciation awareness, taught them pronunciation rules and learning strategies, and provided them with resources and opportunities for frequent focus-on-form practice and ongoing feedback. The instructed group improved their linking, phrase and word stress scores significantly during the course, and was able to maintain significant improvement (large effect sizes) from 18 to 38 months after the course ended. The control group did not improve. Sardegna and Dickerson (2023) extended these findings by investigating improvement by word-stress rule, showing once more the superior role of instructed vs. uninstructed settings.

There is also evidence suggesting that self-regulated computer-assisted practice enhances ESL/EFL learners' perception and production of English stress (Tanner & Landon, 2009) and that *Twitter* and *YouGlish* are useful in supporting students' learning of commonly mispronounced words (Kartal and Korucu-Kis, 2020). Recently, Sardegna and Jarosz (2022) investigated whether self-regulated practice outside of class without instruction or feedback from the teacher but with the help of instructional resources (worksheets and *YouGlish*) could bring about improvements in perceiving word stress. The study found that only highly motivated EFL students improved, which highlighted the important role of sustained intrinsic motivation in autonomous pronunciation learning.

The cumulative evidence suggests that English word-stress rules are learnable and accelerate learning, and that technology tools can facilitate the learning process. However, more investigations are needed to ascertain whether self-regulated learning (without teacher support)

brings about comparable improvement with pronouncing (not just perceiving) English word stress.

Research Question

The main goal of this study was to assess whether motivated EFL students could be successful at improving English word stress on their own. Our guiding research question was the following:

> RQ: To what extent can motivated EFL learners improve their ability to produce English word stress after working with orthographic rules and extensive listening input autonomously for four weeks?

METHODS

Participants

Six Polish secondary school students, aged 17-18 (1F, 5 M), were asked and consented to participate in this study. They were selected from a larger group of students from an EFL course at a state school because their responses to a background questionnaire indicated that they (a) had no prior knowledge of English word-stress rules, (b) needed and wanted help with pronouncing and understanding long academic English words, (c) were highly motivated to improve their ability to stress those words autonomously and outside of class; (d) agreed to study and practice the word-stress rules for four weeks on their own outside of class, (e) and were eager to use instructional technology tools for self-study. Also, their teacher identified them as highly motivated and successful self-regulated language learners, which suggested that they would do well studying English word stress on their own if given the appropriate resources for self-practice.

Self-Study Materials

The students were provided with four worksheets containing explicit information on identifying endings and applying two of the four word-stress rules proposed by Dickerson (2004) to predict the pronunciation of English di- or polysyllabic words: Key Stress Rule (KSR) and Left Stress Rule (LSR). The KSR rule applies to words with the following KSR endings: -ia(C), -io(C), -iu(C), -ienC (where C stands for Consonant). Once the KSR ending is found and separated from the stem of the word with an open parenthesis, the syllable (starting with a vowel) that precedes the ending should be stressed. We call this syllable the Key Syllable.

> **KSR Words**: fam**íl**(iar, rem**éd**(ial, f**ásh**(ion, inv**ént**(ion, g**én**(ius, ob**éd**(ient, conv**én**(ient (Open parentheses identify KSR endings; the Key Syllable is underlined, bolded and stressed).

KSR endings may be followed by other endings (e.g., -ly, -ment, -s, -e, -ed, -ing), including endings for other word-stress rules, such as -ive, -able, -ated. Thus, KSR endings come before other rule endings in determining the stress of the word.

> **KSR Words**: fam**íl**(iar[ize, d**év**(iant[ly, imm**éd**(iate[ly, f**ásh**(ion[able), exec**út**(ion[er, ob**éd**(ient[ly), conv**én**(ienc[e,

(Open parentheses identify KSR endings; open brackets identify all other endings; the Key Syllable is underlined, bolded, and stressed).

The LSR rule applies to words longer than two syllables and it pertains to:
- nouns ending in –y
- long verbs and related forms of –fy
- long words ending in –ate, -ated, -ator, -ating, -acy, -acies.

Once the LSR ending is found and separated from the stem of the word with an open parenthesis, the stress goes on the syllable (starting with a vowel) left of the Key Syllable. We call this syllable the Left Syllable.

LSR Words: ec**ól**og(y, ex**émpl**if(y, ill**úm**in(ate, d**él**eg(ated, appr**óx**im(ating, d**él**ic(acy (Open parentheses identify LSR endings; the Key Syllable is underlined; the Left Syllable is in italics, bolded, and stressed).

The system proposed by Dickerson (2004, 2015) allows predicting not only stress placement in long words but also the quality of the vowel sounds in stressed and unstressed syllables. Thus, learners are equipped with all the information they need to pronounce academic, complex words appropriately. The worksheets included explicit explanation of the stress and vowel prediction rules, and a comprehensive list of polysyllabic words for self-study practice (stress placement and decisions about the vowels) with a key provided at the end. The first worksheet was dedicated to the types of endings and to finding the Key and the Left syllables. The second and third worksheets taught and offered practice opportunities for KSR and LSR words, respectively. The fourth worksheet was a review of all the practice and it comprised mixed examples for both rules. For extensive listening and speaking practice, the learners were encouraged to use *YouGlish* (www.youglish.com), which offered the kind of high variability and self-paced listening practice the EFL Polish learners needed to support their autonomous learning of lexical stress.

Data Collection and Analysis

The students completed a prediction and a production test twice (before and after practice). The tests contained 40 polysyllabic words, which included 10 KSR and 10 LSR words (different from the ones used for practice). The other 20 words were stressed by two other rules that were not taught, thus serving as distractors. For the prediction test, each word had three/four options, and each option had a different syllable stressed. The task was to figure out how to stress the word and then select the option that had a stress mark on the correct syllable. The students could work at their own pace as no time limit was imposed. However, they were not allowed to use the worksheets or any other resources during the test. For the production test, the students were asked to read aloud the same list of 40 words. The test was administered on another day and recorded on students' mobile phones as they read the words aloud twice with a falling intonation. The students were informed that only the second time would be assessed by the raters so they could change the pronunciation of a word if they thought they had mispronounced it the first time. Pre-and post-test scores were obtained from both tests for KSR and LSR words. Two pronunciation experts independently assessed students' production of word stress. They reached high interrater reliability for all words in the pre-test (*ICC* = .95) and post-test (*ICC* = .92), and absolute interrater reliability (*ICC* = 1.000) for only the KSR and LSR words in both tests. Pre- and post-test mean scores were compared using Wilcoxon signed-rank tests. The effect size of the results (practical significance) was calculated by dividing the *z* value by the square root of the number of observations, whereas *r* > .50 = large effect (Rosenthal, 1991).

Qualitative data about the participants were collected from students' responses to a background questionnaire and pronunciation activity trackers, and the teacher's observation field notes. The background questionnaire provided information about students' age, pronunciation experience, and perceived strengths, weaknesses and expectations. The pronunciation activity trackers served to record students' opinions of the resources they used for practice, and the type, time, and duration of their practice. The teacher recorded notes about students' overall skills, class engagement, study behaviors, and general characteristics. To investigate their personal engagement, practice and progress, each student's characteristics and actions were juxtaposed with their scores and analyzed to create learner profiles.
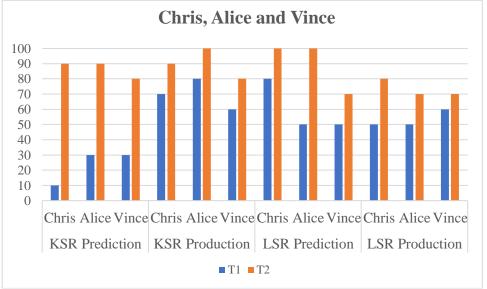
RESULTS AND DISCUSSION

Learners' Behaviors and Learning Outcomes

All the students reported having practiced using the worksheets and *YouGlish* as indicated by the teacher. In other words, they completed the worksheets, and then listened to the words in *YouGlish* and repeated them after the speaker(s). On average, they spent from 2 to 5 hours studying outside of class, and made from 4 to 6 tracker entries in their pronunciation activity trackers, showing that they practiced at least once a week during the four weeks. They also reported that they appreciated learning the rules and using *YouGlish* for extensive listening input. Some even told the teacher that they continued using *YouGlish* for self-practice after the study ended. This initially highly motivated group of students remained enthusiastic and highly motivated throughout the whole month. They also expressed thinking that they had increased their awareness of how to pronounce KSR and LSR words, and understood what they needed to do to continue to improve.

Students' test scores matched their perceptions of learning. Pairwise T1-T2 comparisons revealed significant differences regarding students' ability to stress KSR and LSR words. For KSR words, the difference between T1 ($M = 68\%$; $SD = 11.70$) and T2 ($M = 87\%$; $SD = 15.06$) scores was of both statistical and practical significance ($t = 21$; $z = 2.232$; $p < .05$) (Cohen's $d = 0.64$; large effect size). Similarly, for LSR words, the difference between T1 ($M = 58\%$; $SD = 11.69$) and T2 ($M = 72\%$; $SD = 13.29$) scores was statistically ($t = 15$; $z = 2.060$; $p < .05$) and practically significant (Cohen's $d = 0.59$; large effect size). These results provide strong evidence for the teachability and effectiveness of these rules. They also extend Sardegna and Jarosz's (2022) findings from perception to production involving groups of highly motivated and successful self-regulated students. To determine learner profiles and what contributed to their improvement, we examined students' characteristics and practice behaviors after class, and their ability to learn the rules. We present our findings next.

Chris, Alice and Vince (pseudonyms are used). At the beginning of the study, Chris, Alice and Vince could only predict the stress of 1-3 KSR words, and although they were more accurate with their predictions of LSR words, Alice and Vince only predicted half of them right. After learning the rules, these students improved considerably, reaching 70% or more accuracy in predicting and producing KSR and LSR words. In fact, Chris and Alice reached 90-100% accuracy in all their scores at T2 except in LSR production, which were in the 70-80% range (still quite high) (see Figure 1). Lesser improvement with LSR words is to be expected considering that they had less time to practice this rule as it was introduced in the third week of the study.
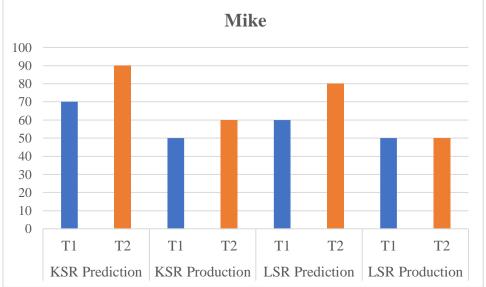
Figure 1.
T1 and T2 prediction and production scores for Chris, Alice and Vince.

According to the teacher's observation notes, Chris was the most engaged and Alice was the most introverted of all the participants. While Chris was very involved and always ready to show his extended English knowledge in class, Alice remained quiet and shy during the lessons. She never spoke until asked by the teacher. In this sense, Chris and Alice seemed polar opposites. However, they were very similar with respect to completing class work. Both were diligent and hard-working students – always prepared for class and on task. The teacher expected them to do well in self-directed learning. Overall, Chris made five tracker entries and Alice made six tracker entries, averaging a total of 3 hours and 2 hours altogether of practice, respectively. In his pronunciation activity tracker, Chris expressed his regret for not having studied more, but he declared commitment to do more practice in the future. Alice acknowledged that the production part was much easier after the month of practice, but also confessed that she thought she could have made greater progress if she had managed to learn the endings and rules by heart. Considering that she reached 90% and 100% accuracy in predicting the stress of KSR and LSR words, respectively, it is safe to say that she did learn the rules. These comments show how much Chris and Alice strived to get 100% accuracy in all their scores. They wanted to learn the rules and worked hard not only to learn them but also to pronounce the words accurately. In contrast, the teacher described Vince as linguistically talented, open-minded, knowledgeable, and willing to take risks in language learning, but not as hard-working as Alice and Chris. She perceived him to be prone to studying only what interested him. Vince reported four entries and two hours altogether of practice, which demonstrated his engagement and interest. Although he was very sparing with comments in the pronunciation activity tracker, he did indicate that he found the practice interesting and helpful, and the post-test easier. Vince's high interest in learning the material and Chris's and Alice's motivation and dedication to learning the material well seemed to have played an important role in helping them achieve higher scores at T2 for both rules and skills.
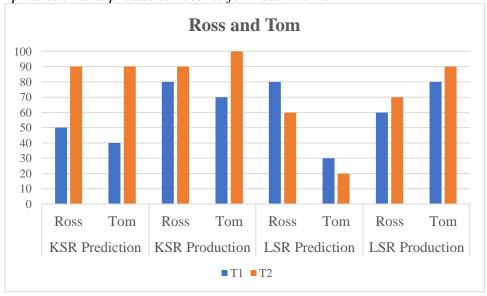
Mike. Mike started at a relatively high accuracy level in predicting KSR words (70%) and LSR words (60%) and his accuracy improved by 20% during the four weeks of study, reaching 90% and 80% accuracy, respectively. However, his production accuracy remained in the 50-60% accuracy range for both rules at T2 (see Figure 2).

Figure 2.
T1 and T2 prediction and production scores for Mike.

The teacher described Mike as a hard-working student. He was also always prepared for class and submitted his homework on time. His out-of-class practice behavior suggested the same kind of dedication he exerted in class as he reported spending 2.5 hours on the worksheets and *YouGlish*. In his pronunciation activity tracker, Mike indicated that he initially struggled a bit with understanding how to apply the rules, but once he put the hours and effort, he seemed to manage to apply them well. He also commented that systematic work on the sheets made the tasks easy and enjoyable. It is possible that he focused too much on learning the rules and doing the exercises in the worksheets, and neglected practicing saying the words aloud, which resulted in little to no improvement with his production skills. 'Systematic' seems to be the keyword describing this student's behavior, and it is reflected in his scores. He seemed more interested in applying the rules systematically and learning the prediction system well rather than in actually improving the pronunciation of the words. Of the six students, he is the only one who was not able to reach at least 70% production accuracy with either rule at T2.

Figure 3.
T1 and T2 prediction and production scores for Ross and Tom.

Ross and Tom. These students reported the highest number of out-of-class self-study and practice hours (Ross = 5 hours; Tom = 3.10 hours). The teacher described them as responsible, hard-working, and on time with homework assignments, and the best of the whole group in all school subjects. She also highlighted their analytical minds and indicated that they always asked numerous questions in class to satisfy their thirst for knowledge. A look at their scores confirms that their dedication to learning how to stress KSR words paid off as they were able to reach 90%-100% accuracy in predicting and producing these words at T2 (see Figure 3).

Ross highlighted the usefulness of the rules for improving his pronunciation and speaking in general. Yet, his prediction scores for LSR words were lower at T2 than at T1. After the test, he admitted feeling that he had not improved much in speaking because he was not practicing the words. It is possible that he got confused in the test and started to apply the rules wrongly. A lack of improvement in predicting LSR words resulted in negligible improvement in pronouncing the words accurately. Tom also decreased in prediction accuracy with LSR words. However, it is possible that he did not feel the need to study this rule as his production accuracy for LSR words was the highest of all at T1 (80%). The fact that he reached 90% at T2 with these words clearly indicates that he did not need a rule to help him figure out how to pronounce LSR words. He may have already had intuitive knowledge of how to stress these words accurately.

CONCLUSION

This study investigated an alternative approach to classroom instruction. Self-study worksheets raised students' awareness of English word stress, taught them how to determine which syllable to stress in a long word, and offered them focus-on-form practice. Teacher support and ongoing feedback, typical of classroom-based approaches (see Sardegna, 2012, 2023) was replaced by *YouGlish*, which provided reliable and constant speech models for students to listen to and imitate. The findings suggest that, with intrinsically motivated self-regulated learners, this approach can be as effective as classroom-based interventions (with teacher feedback). The students significantly improved their ability to stress polysyllabic words stressed by KSR and LSR. The results also extend Sardegna and Jarosz's (2022) findings with respect to perceiving English word stress after using the same self-study approach for a similar group of highly engaged and motivated students.

An analysis of learner profiles provided further insights. The prediction rules are useful for learners like Chris, Alice and Vince, who had a hard time figuring out by themselves which syllable to stress. The rules gave them confidence and accelerated their learning. Learners like Tom, whose production accuracy of LSR words was already high, do not need to study the rules to continue improving (also argued in Sardegna & Dickerson, 2023). Most probably, Tom had already developed intuitions on how to stress these words. Finally, it is important to highlight that the learning of prediction rules does not necessarily equate with production accuracy (see Figure 2 – Mike's progress). Students should produce accurately what they predicted, which they can only accomplish if they practice saying the words aloud. Future research might want to corroborate the findings long-term and with other word-stress rules and learners of different ages and levels of English proficiency and motivation.

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