Journal of Educational Technology & Online Learning
Volume 5 | Issue 2 | 2022
http://dergipark.org.tr/jetol

Language teachers' perceptions of using Google keyboard in L2 writing

Mohammadreza Valizadeh [a] *

[a] Cappadocia University, Cappadocia, Turkey

Suggested citation: Valizadeh, M. (2022). Language teachers' perceptions of using Google keyboard in L2 writing. *Journal of Educational Technology & Online Learning*, *5*(2), 411-421.

Article Info

Keywords:

Mobile assisted language learning
Lexical errors
EFL writing
Educational technology
Google keyboard (Gboard)
Teacher perceptions

Research Article

Abstract

Despite the growth of research on mobile technologies in educational contexts, research on language teachers' perceptions of mobile technologies – particularly in the English as a Foreign Language (EFL) – remains sparse. Hence, the present study explored EFL teachers' perceptions of using Google keyboard (Gboard) for L2 writing instruction. The participants were two teachers who taught 47 intermediate Turkish EFL learners. Data were collected from the teachers. They were asked to keep a teaching journal and report their perceptions of Gboard implementation as well as the most distinctive lexical errors they deemed to emerge in the learners' writing. Data analyses indicated that the teachers perceived the integration of Gboard into instruction as an effective intervention that assisted with enhancing the spelling accuracy of the learners. The implications of the study have been discussed.

1. Introduction

These days, students are engaged in multiple technology-induced literacy activities such as texting, sending emails, and chatting through social networking websites (Zheng & Warschauer, 2017). In this shifting and dynamic context of writing, all the educational stakeholders at different levels are required to take the changing nature of writing into account (Z. Li et al., 2017). These technological developments have also initiated an interest into mobile-assisted language learning (MALL) opportunities for practicing various skills and sub-skills. Nevertheless, despite the expanding body of knowledge with respect to the application of new technologies and their affordances for fostering language skills, second language (L2) writing instruction and pedagogy has received inadequate attention in MALL literature. In this regard, a recent systematic review revealed that teaching writing has been largely overlooked in MALL implementation studies (Duman et al., 2015).

Furthermore, the scope of the existing research on second language writing teachers' perceptions in technology-oriented contexts remained largely limited. As Nazari and Xodabande (2020) argued, there is a need for more studies on teachers' perceptions in contexts where mobile phones are used. One such context that has received little attention is writing teachers' perceptions. It is, thus, important to explore how teachers perceive technological advancements in the context of writing. One such technological development is Google keyboard (Gboard), which is a widely used app developed for mobile devices and operating on Android and iOS systems. Thus, this study investigates L2 teachers' perceptions about the use of Gboard in their writing instruction.

* Corresponding author. Department of Translation and Interpretation (English), Faculty of Humanities, Cappadocia University, Cappadocia, Turkey.
e-mail address: mrvalizadeh2015@gmail.com

Doi: http://doi.org/10.31681/jetol.1060950
Received 20 Jan 2022; Revised 26 Feb 2022; Accepted 26 Feb 2022
ISSN: 2618-6586 .

2. Literature

2.1. MALL and L2 Writing

Writing is a language skill that plays a fundamental role in interpersonal communications and language development. Due to the significant growth of various digital technologies, writing has received increasing attention in language education (M. Li, 2018). A considerable number of previous studies have examined the role of technology in L2 writing classrooms, e.g., the application of Google Docs (Alharbi, 2020; Ebadi & Rahimi, 2017), Google Drive (Marandi & Seyyedrezaie, 2017), and web-blogs (Arslan & Şahin-Kızıl, 2010; Kashani et al., 2013). These studies collectively show that digital technologies positively contribute to the learners' writing. However, there is a call for experimenting with different technologies that are likely to affect the learners' writing (Duman et al., 2015).

Mobile-related technologies have also been largely explored with regard to enhancing the quality of L2 writing. School-level language learners (Al-Hamad et al., 2019; Y. Chen et al., 2017; Hwang et al., 2014; Lee, 2020; Yamaç et al., 2020) and university-level students (Andujar, 2016) are among the major groups researched in this line of inquiry. For example, Yamaç et al. (2020) explored the impact of second language writing using tablets among 96 primary-school students in Turkey. The results of the study indicated that the stories written using tablets had a higher quality when compared to the stories written using paper and pencil. Additionally, Hwang et al. (2014) also examined 59 students' use of mobile devices in writing in pre- and post-tests. The results revealed that those in the experimental group significantly outperformed the participants in the control group.

2.2. Lexical Errors

Broadly speaking, a lexical error refers to orthographic or phonological deviations in form or meaning of a target-language word (Llach, 2011). Studying lexical errors is important due to several reasons. Research on second language acquisition has dominantly explored grammatical errors, and lexical errors have been underrepresented in the literature (Llach, 2007). Additionally, despite the fact that lexical errors outweigh grammatical errors (Llach, 2007), they have been little studied and their important role in communication exchanges has been overlooked. In the same vein, Llach (2007) argues that lexical errors are often seen as a measure of communication breakdown/success, being "considered to be the most destructive and are judged most severely by native speakers, non-native judges, and L2 learners" (p. 2). Lexical errors exert a substantial impact on interpersonal connectivity and code (mis)interpretation, on the way individuals come to contribute to mutual understanding, and on the way meaning is conveyed among individuals (Hemchua & Schmitt, 2006). Moreover, lexical errors have been associated with academic success (e.g., Hawkey & Barker 2004; Llach, 2011) because "they turn out to be useful as quality indicators of learners written work and as predictors of lexical progress, of the lexical proficiency of the learners, and of their general academic achievement" (Llach, 2007, p. 2).

There are various typologies of lexical errors, which have classified the errors based on their orthographic, phonological, and syntactico-semantic types (e.g., Hemchua & Schmitt, 2006; Keshavarz, 2011). In a pedagogically-oriented classification (as shown also later), Hemchua and Schmitt (2006) inclusively classified lexical errors into 24 categories and divided them into (a) formal errors including misselection (suffix type, prefix type, vowel-based type, consonant-based type, and false friends), misformation (borrowing, coinage, and calque), and distortion (omission, overinclusion, misselection, misordering, and blending), and (b) semantic errors encompassing confusion of sense relations (general term for specific one, overly specific term, inappropriate co-hyponyms, and near synonyms), collocation errors (semantic word selection, statistically weighted preferences, arbitrary combinations, and preposition partners), connotation errors, and stylistic errors (verbosity and underspecification).

Lexical errors also have a direct relationship with the accuracy ratio of the writing (Llach, 2011; Nation, 2001). Accuracy ratio is calculated by dividing the word count by the number of errors and it provides a better picture of quality of written answers (Llach, 2011). It is apparent that as a function of decrease in lexical errors, the accuracy ratio of the text increases and vice versa. This is a point that makes it more significant to explore how intervention in the means of text composition mediates the connection between lexical error reduction and accuracy ratio. Moreover, the connection between lexical errors and text length is not always mutual. For example, 20 errors in a 150-word response with the same number of errors in a 200-word response would not be the same and text length influences the frequency of error occurrence. It thus seems to be difficult to consider lexical errors and text differences without accuracy ratio.

What is noticeably lacking in the body of knowledge on lexical errors is how mobile technologies could be employed to deal with and reduce such errors. Considering the widespread use of mobile technologies in today's educational contexts and the vast amount of communication among L2 learners in online media, it follows that learners need to pay particular attention to the accuracy of the texts they compose to avoid errors that hinder successful communication. Lexical errors need to be addressed and mobile technologies can provide affordances to increase the accuracy of the texts learners compose. Nevertheless, there is little concerted effort to increase such accuracy and reduce the lexical errors via interventions of any kind in the literature.

2.3. Teachers' Perceptions of MALL

Research on MALL has also grown exponentially considering the way teachers perceive various mobile-related affordances. Teachers are considered as significant factors for successful employment of mobile technologies to improve students' learning outcomes (Dean et al., 2015), and leverage mobiles to both enhance their reflectivity and create a learning-conducive classroom climate for their learners (Norris & Kukulska-Hulme, 2017). Research has also addressed how teachers perceive mobile technologies and employ them. This line of inquiry has addressed pre-service and in-service language teachers' perceptions of MALL (Cremades et al., 2019; Liu et al., 2017; Morgana & Shrestha, 2018; Nazari & Xodabande, 2020) across various contexts and exploitation of mobile technologies of various kinds. This body of knowledge has yielded mixed findings, with most of the studies attesting to the beneficial nature of mobile technologies in the eyes of the teachers, yet specific instances of mobile applications have also been considered as non-beneficial.

For example, Morgana and Shrestha (2018) investigated two Italian EFL teachers' perceptions of iPad, utilizing recorded meetings, semi-structured interviews, an online survey, and classroom observations in the context of action research. The study also explored the learners' perceptions of using iPad. The findings of the study indicated that the participating teachers perceived improvement in their students' work and were "enthusiastic about students' increased engagement with assignments" (p. 45). In another study, Cremades et al., (2019) explored 321 Spanish teachers' perceptions of WhatsApp via a researcher-designed questionnaire. The results of this study indicated that the teachers perceive "the use of MIM by school children as detrimental to their linguistic performance" (p. 6). Furthermore, Liu et al., (2017) expanded the well-established Technology Acceptance Model (TAM) by adding a new dimension, namely the pedagogical beliefs of teachers. The researchers collected the data via a survey distributed among 202 Chinese EFL teachers. Findings of the study indicated that "the modified version of the TAM it proposed could be effective in explaining teachers' technology integration in broader and more diverse contexts" (p. 15).

2.4. The Present Study

A technological development that can improve writing is Gboard. Gboard application is a context-dependent typing technology with a next word predictive feature that suggests the next word or phrase based on the context of the sentence. This affordance makes Goard specifically helpful in writing texts that

are both lexically and discursively accurate (i.e. spelling and writing error-free texts). These features also render the application to be facilitative in the process of writing and text composition. However, not only is the scope of research on the use of Gboard in learning limited, but little is known about teachers' perceptions of such technologies, here Gboard. The present study sought to examine teachers' perceptions of using Gboard in L2 writing. To this end, the following research questions were formulated:

1- What recurrent errors did the teachers report in the learners' writing?

2- How did the teachers perceive the implementation of Gboard in reducing lexical errors?

3. Methodology

3.1. Research Model/Design

This qualitative study is part of a larger project that explored the effect of Gboard on EFL learners' writing. In line with the two research questions, we used a qualitative design as it could help understand how individuals perceive the situated context (Creswell, 2014). For the purposes of this study, this design meant capturing the type of errors the participant teachers encounter in the learners' writing (four groups, as mentioned below). Moreover, it involved digging deep into the teachers' perceptions by exploring how they view the implementation of Gboard in the process of teaching and reducing the learners' errors.

3.2. Data Collecting Tools

Data collecting tools were learners' smart phones, Google keyboard (Gboard), teachers' reflective journals, and Telegram application. Specifically, in this study, we report the data from the teachers' reflective journals, which were fed by the experimental-groups learners' smartphones, were run via the Telegram messaging application, and involved the use of Gboard to deal with the learners' emerging errors. This perspective provides a comprehensive picture of the teachers' perceptions about MALL and especially Gboard (in line with the second research question) and the type of errors they encounter usually in the learners' writing and specifically during the intervention via Gboard (in line with the second research question).

3.3. Sampling or Study Group

The participants of the study were two English language teachers and their 47 Turkish L1 students who were selected from four classes in two different private institutions. The participants were all male and their age ranged from 15 to 18. According to the records of institutions, the language learners were in intermediate proficiency level. Furthermore, the participants had received a minimum of four years of language education in state-run schools. During the period of the present study, the students were taking a course in general English and their teachers had an M.A. in the field of Applied Linguistics. The teachers were also male, their ages were 27 and 30, and they had six and five years of experience in teaching English respectively. The two teachers were invited to participate in the study and they were reassured regarding the confidentiality of the collected data. The four groups of students participating in the study were: a control group that used only paper and pencil; an experimental group that used paper and pencil in the first two weeks and Gboard in the third and fourth weeks; another experimental group that used Gboard in the first two weeks and paper and pencil in the third and fourth weeks; and another experimental group that just used Gboard for writing.

3.4. Data Analysis

After the course, the frequency of the reported errors was counted and categorized by coding the errors. In this regard, the researcher read the transcripts separately to assign the errors to accurate categories by coding the errors based on the framework of Hemchua and Schmitt (2006) which is represented in table 1.

Table 1: coding framework for errors

A-Formal	B-Semantic
A1- misselection (suffix type, prefix type, vowel-based type, consonant-based type, and false friends)	B1- confusion of sense relations (general term for specific one, overly specific term, inappropriate co-hyponyms, and near synonyms)
A2- misformation (borrowing, coinage, and calque)	B2- collocation errors (semantic word selection, statistically weighted preferences, arbitrary combinations, and preposition partners)
A3- distortion (omission, overinclusion, misselection, misordering, and blending)	B3- connotation errors, and stylistic errors (verbosity and underspecification)

3.5. Validity and Reliability

After coding the data, the researcher asked another coder to code the data and there was a .90 degree of agreement between the coders. The researcher also member-checked the responses (Ary et al., 2014) by asking the teachers to comment on the categorizations to ensure the credibility of the codes. As with the teachers' perceptions reflected in journal entries before and after the course, a constant comparison technique (Merriam, 1998) was employed to compare the entries before and after the course. The analysis was informed by content analysis wherein the data were read several times and then the related inductive understanding of the data was developed (Cohen et al., 2007).

3.6. Research Procedures

The study was conducted over five weeks of Gboard intervention and data were collected before, during, and after the course from the teachers. Data were collected from the teachers in order to explore the most distinctive lexical errors they report in their learners' writing during the course and how they perceive the implementation of the course. In this regard, we asked the teachers to keep reflective journals (Richards & Farrell, 2005) in which they could document the most distinctive lexical errors they could delineate in the learners' written responses (12 journals by the two teachers in total during the course). Two journals (one per teacher) were also written before the course in which the teachers were asked to write about their learners' problems in writing. Two journals (one per teacher) were written after the course in which the teachers responded to queries about the enactment of the Gboard course as well as its benefits and challenges. The journals were written in Persian (the teachers' L1, later translated into English) and were delivered to the researcher by Telegram.

4. Findings

4.1. Teachers' Reported Errors

The first research question addressed the type of errors the teachers report. In this regard, the teachers were asked to write reflective journals to document the learners' most distinctive errors and explain the problems in their learners' writing. The results obtained from analyzing journal entries revealed that the teachers were concerned with learners' both formal and semantic errors. However, they considered distortion and collocation errors as the most common and serious types. In this regard, in the learners' written responses to the four tasks assigned as the pre-test, the teachers recorded 122 distortion errors including omission (e.g. intresting* for interesting) and misordering (e.g. twon* for town). The teachers also reported 51 collocation errors for the obtained responses on the pre-test. The majority of collocation errors reported by

the teachers were related to wrong use of preposition partners (e.g. "full with" instead of "full of"). The teachers also recorded 20 calque errors as a subcategory of formal misformation (translation from L1, e.g. "the reason of" instead of "the reason for"). For the eight topics assigned for the post-test, the errors recorded by the teachers differed based on the different writing conditions. They reported the same patterns of errors for the pencil and paper writing group, but noted the reduction of distortion and collocation errors in the Gboard groups, particularly in the only-Gboard group. Although there were more writing topics for the post-test, the teachers recorded around 270 distortion errors, 150 collocation errors, and 35 calque errors. A sample of the teachers' reports can be found in the Appendix.

4.2. Teachers' Perceptions

The second research question addressed the teachers' perceptions of using Gboard in reducing the learners' lexical errors. Reflective journal entries featured benefits of Gboard in helping the students write with correct spelling of English words and more accurate use of collocations. For example, in the following extract before the course, T1 considers spelling errors as the major problem in the learners' writing. The main concern of the teacher is the prospective opportunities of the students in pursuing their future goals, which makes the teacher invest a lot in emphasizing spelling errors and reducing them. In this extract, T1 mentions spelling as significant in the learners' writing and refers to the "IELTS exam" as a factor that should sensitize the learners to correct spelling:

> *The major issue with students' writings is spelling English words. As I have seen in my previous and current classes, many students have difficulty in spelling, which leads to further problems in their language learning. Since most of them are going to take the IELTS exam, I always emphasize the correct spelling of words to make them sensitive to this important factor. There is also some wrong use of propositions in their oral and written responses, but the spelling errors are more common and annoying*.

T2 considers errors in writing and speaking comparatively and underscores the greater importance of errors in writing. He also considers spelling to be a major concern along with other semantic and stylistic errors, but he does not see much improvement in the students' writing despite his efforts to scaffold the learners. Referring the different nature of writing and speaking through "medium", T2 emphasizes the role of spelling and interference from L1 (Persian) in effective communication:

> *I personally consider writing to be the most difficult language skill. When students write, they make a lot of mistakes and errors of different kinds. The point is that in writing, the errors are more serious than in speaking, as the medium of writing is different. More specifically, in speaking we don't have such errors as spelling errors. Sometimes students use English words without knowing their correct spelling, but in writing it is different. I try really hard to help my students, but learning spelling remained a major challenge among them. There are also many instances of direct translations from Persian to English in both writing and speaking. In speaking I provide instant feedback, but I see that students make the same errors in writing too.*

After the course, the teachers pointed out that the Gboard course had assisted in dealing with the learners' errors, yet they mentioned challenges in employing Gboard for instructional purposes. For example, in the extract below, T1 considers the closer mutuality between real-life and classroom functioning as a potential of Gboard and its benefits in enhancing the learners' spelling accuracy. He also voices misgivings about the possible predictive utility of Gboard and the way it could be employed for assessment purposes:

> *Experimenting with Gboard in writing was an exciting opportunity to bring the real life experience to the classroom. As we expected, students like it very much. I personally saw that it really helps students in writing, as it helped them a lot with spelling. The only problem I saw was that with Gboard there were some instances of wrong word choice, maybe caused by predictive ability. I am*

> *also thinking about how this might influence the way we assess students' performances! Am I giving scores to my students' writing?*

T2 emphasized the time-saving nature of using Gboard, greater spelling accuracy and collocation use, and generally producing texts with fewer errors. The teacher also holds that there may be problems with the employment of Gboard in practice, but it is generally effective.

> *Gboard has great potentials in writing, and it helps students with spelling a lot. In writing with Gboard sessions, students completed their responses faster than writing on the paper, which is great as it saves valuable classroom time. There were of course less spelling errors and to my own surprise better use of collocations in their writing. In some cases, students use some words which they don't know the meaning of (I checked this several times). I believe the integration of Gboard into writing is not without problems; however, it really helps students in producing responses with fewer errors*.

The common point in the teachers' reflective journals after the course, as also reflected in the above extracts, was that Gboard has been effective in enhancing the students' spelling in writing, increasing learner interest in using MALL-related technologies, faster process of writing, and reducing lexical errors.

5. Discussion

This study aimed to investigate L2 teachers' perceptions of using Gboard in writing. As to lexical errors, distortions and collocation errors were reported by the teachers to be the most salient errors. This finding could be well interpreted within the dichotomy between code-based and meaning-based approaches to writing. While the former focuses on sound relationships in order to compose well-organized texts, the latter emphasizes developing the writing literacy by being immersed in texts and broadening the knowledge base of conveying coherent texts (Ehri et al., 2001). It thus follows that Turkish L2 teachers are more disposed toward heeding linguistic/formal aspects of writing, as also attested to by previous research (Golpour et al., 2019). However, it appears that the reason for such tendency lies in the lack of systematic and due attention to writing in the Turkish language schools, which makes the teachers pay most of their attention to developing the preliminary requirements of effective writing (i.e. formal aspects) and less heed to the higher-order meaning-focused aspects of writing.

The teachers' journal entries also indicated that they considered the Gboard intervention as a positive experience. This finding is in line with studies exploring teachers' perceptions of other mobile technologies such as Morgana and Shrestha (2018). Particularly, the utility of Gboard in enhancing the spelling accuracy of the learners' writing indicates that the teachers have gradually developed an awareness of the exploitability and mobility (Norris & Kukulska-Hulme, 2017) features of Gboard in dealing with a prevalent problem among their learners. Moreover, the benefit of Gboard in approximating the classroom climate to the real-life context, as the teachers mentioned, indicates that the teachers have concerns about how this gap can be filled (Cremades et al., 2019), and it seems that Gboard provides affordances for filling part of this gap, at least in writing. The teachers also raised questions about using Gboard for assessment and time management purposes. These are aspects that merit further empirical attention to demonstrate whether or how Gboard could be used for such purposes.

The teachers' journal entries also indicated that they considered the Gboard intervention as a positive experience. This finding is in line with studies exploring teachers' perceptions of other mobile technologies such as Morgana and Shrestha (2018). Particularly, the utility of Gboard in enhancing the spelling accuracy of the learners' writing indicates that the teachers have gradually developed awareness of exploitability and mobility (Norris & Kukulska-Hulme, 2017) features of Gboard in dealing with a prevalent problem among their learners. Moreover, the benefit of Gboard in approximating the classroom climate to the real-life context, as the teachers mentioned, indicates that the teachers have concerns about how this gap could be

filled (Cremades et al., 2019), and it seems that Gboard provides affordances for filling part of this gap, at least in writing. The teachers also raised questions about using Gboard for assessment and time management purposes. We believe that these are aspects that merit further empirical attention to demonstrate whether/how Gboard could be used for such purposes.

6. Conclusion and Suggestions

The findings of the present study show that google keyboard has considerable affordances for being integrated in L2 writing instruction. This mobile application which is widely used for text typing in mobile devices might be especially effective in addressing the writing difficulties of L2 learners. Consequently, teachers who are teaching students in lower proficiency levels might consider using this application in addition to traditional textbook material to resolve their students' spelling problems. In this regard, the affordance of Gboard in predicting the next word has potential to enhance the confidence of the students in writing English words. This is particularly beneficial in lowering the negative feelings felt by students while writing in English, as it is likely to influence some of the mental factors underlying second language writing anxiety. Moreover, teachers of students in higher proficiency levels might consider using text written by Gboard alongside the texts written by hand to raise the students' consciousness with respect to lexical errors and the way such errors negatively impact communication. Relatedly, the text correction and next word prediction features of Gboard have considerable potential in developing fluency in writing with implications on writing speed. In this regard, while conducting fluency related tasks in L2 writing, the abovementioned features of Gboard facilitates focusing on meaning and make it easy for language teachers to digress their pre-occupation with form. Finally, it seems that the use of Gboard in L2 writing is associated with improvements in time management both among teachers and learners. This feature also benefits L2 instruction in general and writing instruction in particular. The present study had a number of limitations. First, there were only two participating teachers in this study. Although the low number of teachers was a result of the intact application of the course, further research with a higher number of teachers would better demonstrate the teachers' perceptions. Second, longitudinal examination of the teachers' use of Gboard would help with developmentally documenting how teachers use Gboard, and future research should address this gap. Future research can investigate how teachers perceive the use of other keyboard applications in regard to aspects such as the writing process. This could also be coupled with observing the teachers' practices and carrying out professional development courses to better help the teachers use Gboard and for a wider range of educational purposes.

References

Abrams, Z. (2016). Exploring *collaboratively* written L2 texts among first-year learners of German in Google Docs. *Computer Assisted Language Learning*, *29*(8), 1259–1270. https://doi.org/10.1080/09588221.2016.1270968.

Ahmadpour, L., & Yousefi, M. H. (2016). The Role of Mobile-assisted Language Learning on EFL Learners' Development of Writing Accuracy, Fluency, and Complexity. *Journal of Modern Research in English Language Studies*, *3*(4), 105–118. https://doi.org/10.30479/elt.2016.1581.

Al-Hamad, R., Al-Jamal, D., & Bataineh, R. (2019). The Effect of Mall Instruction on Teens' Writing Performance. *Digital Education Review*, *35*, 289–298. https://doi.org/10.1344/der.2019.35.289-298.

Alharbi, M. A. (2020). Exploring the potential *of* Google Doc in facilitating innovative teaching and learning practices in an EFL writing course. *Innovation in Language Learning and Teaching*, *14*(3), 227–242. https://doi.org/10.1080/17501229.2019.1572157.

Andujar, A. (2016). Benefits of mobile instant messaging to develop ESL writing. *System*, *62*, 63–76. https://doi.org/10.1016/j.system.2016.07.004.

Arslan, R. Ş., & Şahin-Kızıl, A. (2010). How can the use of blog software facilitate the writing process of English language learners? *Computer Assisted Language Learning*, *23*(3), 183–197. https://doi.org/10.1080/09588221.2010.486575.

Chen, Y., Carger, C. L., & Smith, T. J. (2017). Mobile-assisted narrative writing practice for young English language learners from a funds of knowledge approach. *Language Learning & Technology*, *21*(1), 28–41. https://doi.org/10125/44594.

Cohen, L., Manion, L., & Morrison, K. (2007). Research *Methods in Education*. Routledge.

Cremades, R., Onieva-López, J. L., Maqueda-Cuenca, E., & Ramírez-Leiton, J. J. (2019). The influence of mobile instant messaging in language education: perceptions of current and future teachers. *Interactive Learning Environments*, 1–10. https://doi.org/10.1080/10494820.2019.1612451.

Dean, B., Zanko, M., & Turbill, J. (2015). Mobilizing PD: Professional Development for Sessional Teachers Through Mobile Technologies. In Y. (Aimee) Zhang & D. Cristol (Eds.), *Handbook of Mobile Teaching and Learning* (pp. 1–14). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-41981-2_55-1.

Duman, G., Orhon, G., & Gedik, N. (2015). Research trends in mobile assisted language learning from 2000 to 2012. *ReCALL*, *27*(2), 197–216. https://doi.org/10.1017/S0958344014000287.

Ebadi, S., & Rahimi, M. (2017). Exploring the impact of online peer-editing using Google Docs on EFL learners' academic writing skills: a mixed methods study. *Computer Assisted Language Learning*, *30*(8), 787–815. https://doi.org/10.1080/09588221.2017.1363056.

Ehri, L. C., Nunes, S. R., Stahl, S. A., & Willows, D. M. (2001). Systematic Phonics Instruction Helps Students Learn to Read: Evidence from the National Reading Panel's Meta-Analysis. *Review of Educational Research*, *71*(3), 393–447. https://doi.org/10.3102/00346543071003393.

Estarki, N. K., & Bazyar, M. (2016). The Effect of MALL on Pre-intermediate EFL Learners' Writing Performance. *European Online Journal of Natural and Social Sciences*, *5*(2), 406–420. http://european-science.com/eojnss/article/view/4621.

Golpour, F., Ahour, T., & Ahangari, S. (2019). Iranian EFL teachers' beliefs and practices regarding writing activities and class organization. *Cogent Education*, *6*(1), 1651812. https://doi.org/10.1080/2331186X.2019.1651812

Hawkey, R., & Barker, F. (2004). Developing a common scale for the assessment of writing. *Assessing Writing*, *9*(2), 122–159. doi:10.1016/j.asw.2004.06.001

Hemchua, S., & Schmitt, N. (2006). An analysis of lexical errors in the English compositions of Thai learners. *Prospect*, *21*(3), 3-25.

Hwang, W.-Y., Chen, H. S. L., Shadiev, R., Huang, R. Y.-M., & Chen, C.-Y. (2014). Improving English as a foreign language writing in elementary schools using mobile devices in familiar situational contexts. *Computer Assisted Language Learning*, *27*(5), 359–378. https://doi.org/10.1080/09588221.2012.733711.

Kashani, H., Mahmud, R. B., & Kalajahi, S. A. R. (2013). Comparing the Effect of Blogging as well as Pen-and-Paper on the Essay Writing Performance of Iranian Graduate Students. *English Language Teaching*, *6*(10), 202–218. https://doi.org/10.5539/elt.v6n10p202.

Keshavarz, M. H. (2012). *Contrastive analysis and error analysis*. Tehran: Rahnama Press.

Lai, C., Yeung, Y., & Hu, J. (2016). University student and teacher perceptions of teacher roles in promoting autonomous language learning with technology outside the classroom. *Computer Assisted Language Learning*, *29*(4), 703–723. https://doi.org/10.1080/09588221.2015.1016441.

Lee, B. J. (2020). Smartphone tapping vs. handwriting: A comparison of writing medium. *EuroCALL Review*, *28*(1), 15–21. https://doi.org/10.4995/eurocall.2020.12036.

Li, M. (2018). Computer-mediated collaborative writing in L2 contexts: an analysis of empirical research. *Computer Assisted Language Learning*, *31*(8), 882–904. https://doi.org/10.1080/09588221.2018.1465981.

Li, Z., Dursun, A., & Hegelheimer, V. (2017). Technology and L2 Writing. In C. A. Chapelle & S. Sauro (Eds.), *The Handbook of Technology and Second Language Teaching and Learning* (pp. 77–92). https://doi.org/doi:10.1002/9781118914069.ch6.

Li, Z., & Hegelheimer, V. (2013). Mobile-assisted grammar exercises: Effects on self-editing in L2 writing. *Language Learning & Technology*, *17*(3), 135–156. https://doi.org/10125/44343.

Liu, H., Tao, W., & Cain, W. (2017). Investigating Mobile Assisted English Foreign Language Learning and Teaching in China: Issues, Attitudes and Perceptions. In I. R. M. A. (IRMA) (Ed.), *Blended Learning: Concepts, Methodologies, Tools, and Applications (4 Volumes)* (pp. 1097–1115). IGI Global. https://doi.org/10.4018/978-1-5225-0783-3.ch054.

Llach, M. P. (2007). Lexical errors as writing quality predictors. *Studia Linguistica*, *61*(1), 1-19. doi:10.1111/j.1467-9582.2007.00127.x

Llach, M. P. (2011). *Lexical errors and accuracy in foreign language writing.* Bristol: Multilingual Matters.

Malekzadeh, R., & Najmi, K. (2015). The Effect of Mobile-Assisted Language Learning (MALL) on Guided Writing Skill of Iranian Upper-Intermediate EFL Learners. *Journal of Applied Linguistics and Language Research (JALLR)*, *2*(4), 42–52. https://www.jallr.com/index.php/JALLR/article/view/61.

Marandi, S. S., & Seyyedrezaie, M. S. (2017). The multi-course comparison of the effectiveness of two EFL writing environments: Google drive versus face-to-face on iranian EFL learners' writing performance and writing apprehension. *CALL-EJ, 18*(1), 9–21. http://callej.org/journal/18-1/Marandi_Seyyedrezaie2017.pdf.

Morgana, V., & Shrestha, P. N. (2018). Investigating Students' and Teachers' Perceptions of Using the iPad in an Italian English as a Foreign Language Classroom. *International Journal of Computer-Assisted Language Learning and Teaching (IJCALLT)*, *8*(3), 29–49. https://doi.org/10.4018/IJCALLT.2018070102.

Nation, P. (2001). *Learning vocabulary in another language*. Cambridge: Cambridge University Press.

Nazari, M., & Xodabande, I. (2020). L2 Teachers' Mobile-related Beliefs and Practices: Contributions of a Professional Development Initiative. *Computer Assisted Language Learning*. https://doi.org/10.1080/09588221.2020.1799825.

Norris, L., & Kukulska-Hulme, A. (2017). Teacher Training and PD in Mobile Pedagogy for English Language Teaching. In R. Power, M. Ally, D. Cristol, & A. Palalas (Eds.), *IAmLearning: Mobilizing and supporting educator practice* (pp. 112–148). International Association for Mobile Learning.

Richards, J. C., & Farrell, T. S. C. (2005). Professional Development for Language Teachers: Strategies for Teacher Learning. In *Cambridge Language Education*. Cambridge University Press. https://doi.org/10.1017/CBO9780511667237.

Seyyedrezaie, Z. S., Ghonsooly, B., Shahriari, H., & Fatemi, A. H. (2016). Examining the effects of google docs-based instruction and peer feedback types (Implicit vs. Explicit) on EFL learners' writing performance. *CALL-EJ*, *17*(1), 35–51. http://callej.org/journal/17-1/Seyyedrezaie_Ghonsooly_Shahriari_Fatemi2016.pdf.

Yamaç, A., Öztürk, E., & Mutlu, N. (2020). Effect of digital writing instruction with tablets on primary school students' writing performance and writing knowledge. *Computers & Education*, *157*, 103981. https://doi.org/10.1016/j.compedu.2020.103981.

Zheng, B., & Warschauer, M. (2017). Epilogue: Second language writing in the age of computer-mediated communication. *Journal of Second Language Writing*, *36*, 61–67. https://doi.org/10.1016/j.jslw.2017.05.014.

Appendix

Mobile Screenshot Representing the Report of Learners' Errors by Teachers