

Impacts of a Corpus Linguistics Course on in-Service EFL Teachers' Corpus Literacy

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Abstract

In recent years, corpus-based technologies have received unparalleled expansion and development. Along these lines, corpora have extended into various educational contexts, especially in language teaching and learning. In line with this increasing attention, the present study reports on the impacts of a professional development course structured around corpus use on six Iranian EFL teachers' corpus literacy. Data were collected at three junctures in time including before, after, and delayed phases via semi-structured interviews, reflective journals, and classroom observations. Data analysis showed that the course was able to expand on the teachers' conceptual and pedagogical knowledge of corpora. Moreover, the teachers gradually engaged in further use of corpora in their classes, which was realized in multiple corpus-initiated practical efforts. These findings provide novel ways for (re)interpreting the role of teachers in corpus-related initiatives. The study argues that corpus-informed pedagogy should receive further attention from policymakers to initiate institutional initiatives that highlight the central role of the corpora in the organizational undertaking.

Keywords: CALL teacher education, Corpus literacy, Teacher beliefs, Professional development, Corpus-informed pedagogy

Introduction

The use of corpora, corpus tools, and corpus linguistics research in language education is gaining increased attention (Boulton & Cobb, 2017; Braun, 2007; Chambers, 2019; Dang, 2019; Römer, 2011; Vyatkina, 2020). A corpus is defined as a principled collection of naturally occurring language in a machine-readable form, which makes it possible to obtain information about the frequency of lexical items, collocations, patterns of language use, and related statistics (McEnery & Hardie, 2011). It has been argued that corpus linguistics (CL) has revolutionized language teaching in many ways (Römer, 2011), including the production of new dictionaries (Mayor, 2009), reference grammars (Biber et al., 1999), course books (D. Lee & Swales, 2006; McCarthy et al., 2005), and broadly through data-driven learning (DDL) that involves learners directly accessing and using corpora with concordancers (Vyatkina, 2016). The application of corpora in language teaching and learning has also been focused on diverse areas such as vocabulary, grammar, reading, writing, pragmatic competence, and rhetorical functions/awareness (Bardovi-Harlig et al., 2014; Boulton, 2009; Chambers, 2005; Chan & Liou, 2005; Johns et al., 2008; D. Lee & Swales, 2006; Liu & Jiang, 2009; Poole, 2016). Furthermore, findings from recent meta-analyses highlight the effectiveness of corpus-aided approaches that point to a growing recognition of various affordances provided by corpora for language education (Boulton & Cobb, 2017; H. Lee et al., 2019).

Despite this promising scholarship and with the continuous advancement and integration of new technologies into educational practices, training pre-service and in-service teachers to use such technologies has remained a major concern (Angeli, 2005; Egbert & Borysenko, 2019; Nazari & Xodabande, 2020, 2021; Polly et al., 2010). Leńko-Szymańska (2014) believes that to optimally use corpora, language teachers need to be competent users of the available tools and resources. Breyer (2009) also highlights the significant role of teachers in introducing corpus-informed practices to classrooms as “the decision to incorporate corpora into language teaching lies ultimately with the teacher” (p. 154). Consequently, given the pivotal role of teachers, a growing body of literature has argued for developing teachers’ corpus literacy, and the inclusion of corpus linguistics courses in teacher education programs (Abdel Latif, 2020; Breyer, 2009; Callies, 2016; Chambers et al., 2011; Chen et al., 2019; Crosthwaite, Luciana, & Schweinberger, 2021; Crosthwaite, Luciana, & Wijaya, 2021; Ebrahimi & Faghih, 2017; Farr, 2008; Farr &

O’Keeffe, 2019; Frankenberg-Garcia, 2012; Heather & Helt, 2012; Leńko-Szymańska, 2014, 2017; Mukherjee, 2004; O’Keeffe & Farr, 2003; Poole, 2020; Zareva, 2016).

Corpus literacy, as a “complex phenomenon comprising multiple sub-skills”, has been defined as teachers’ ability to use CL technology to experiment with a language whose aim is facilitating students’ language development (Heather & Helt, 2012, p. 417). Nonetheless, although CL is asserting for a more prominent role of corpus-based findings in language education (Heather & Helt, 2012), and despite the availability of some free-to-access and user-friendly corpora, their potentials for language learning and teaching have remained underemployed (Römer, 2011; Zareva, 2016). Previous research has identified a number of reasons for teachers’ reluctance to exploit various affordances of corpora, including lack of computer literacy among teachers and students (Boulton, 2010; Yoon & Hirvela, 2004), access to technology, time pressures, and lack of trained teachers (Çalışkan & Gonen, 2018; Lin, 2019; Mukherjee, 2004; Zareva, 2016). Against this increased interest in promoting teachers’ corpus literacy, the integration of CL courses into second language teacher education (SLTE) has remained very limited (Farr & O’Keeffe, 2019). In this regard, although Computer Assisted Language Learning (CALL) has become an integral component in most SLTE programs (Hubbard & Levy, 2006; Torsani, 2016), corpus-based language teaching as a sub-area of CALL lags far behind other developments in the field. Along these lines, the current study aimed to investigate the contributions of a professional development initiative with a focus on practical applications of CL into English language teaching. The study contributes to the growing body of knowledge in this area and adds to our understanding of different outcomes of corpus-based approaches in SLTE.

Review of the literature

Previous studies have investigated the impacts of CL courses on pre-and in-service language teacher education. Research focusing on pre-service teachers has examined their attitudes towards corpora, the impacts of CL training on their immediate and long-term practices, and the application of various corpus-related tools and technologies (Breyer, 2009; Ebrahimi & Faghieh, 2017; Farr, 2008; Heather & Helt, 2012; Leńko-Szymańska, 2014; Zareva, 2016). Although the number of studies addressing in-service teachers is

growing, the majority of studies have targeted pre-service language teachers. This section provides an overview of studies focusing on in-service teachers and situates the current study within the related literature.

In one of the early studies with a focus on in-service English language teachers in Germany, Mukherjee (2004) investigated teachers' knowledge of corpora and their attitudes towards using corpus linguistics tools in the classroom before and after participating in a series of applied CL workshops. The study found that more than 80% of the teachers were unfamiliar with CL before the workshops. Nonetheless, after receiving training in major applications of corpora in language teaching including the use of concordance-based materials, creation and correction of tests, using word lists, and learner-centered activities (such as corpus browsing), almost 95% of the teachers believed corpora can benefit English language teaching in many ways. Despite this change in teacher beliefs, the study found "a bias towards teacher-centered corpus activities" (p. 242), and most teachers reported that they wanted to use the corpora themselves rather than considering them beneficial for their students. Moreover, the study also found that although teachers were using corpus-based materials such as dictionaries, they were largely unaware of the role of CL in the production of such materials. The study concluded that in order to bridge the gap between developments in CL and its impacts on language teaching and English language teacher knowledge, there is a need to systematically familiarize language teachers with the foundations, implications, and applications of CL.

Naismith (2017) added corpus training to the Certificate in English Language Teaching to Adults (CELTA), which is a four-week teacher training program. The focus of the study was on the use of web-based corpus tools to get frequency information for lexical items, and both trainees' and trainers' perspectives were investigated using a questionnaire, an observation table, and field notes. The study reported that during the CELTA course, the trainee teachers had a high interest in the corpus tool, regardless of their actual implementation of such resources. The findings also revealed that despite having some experience in teaching, the majority of the trainees were not familiar with corpora and associated tools, and only one among 16 trainees reported using them prior to the course. As utilizing corpus tools was optional in CELTA, approximately half of the candidates used the tools in some of their lessons, and the level of teaching experience in the classroom was a crucial factor in using the corpus tools voluntarily. Moreover, an

important finding from this study was that most candidates used corpus tools much more in lesson planning than in the classroom and with learners, preferring unassessed settings with no time pressure, and at ease with insecurities of using the technology while teaching. The study highlighted that although corpus tools have considerable potential in developing teachers' language awareness and assisting them in lesson planning, immediate application of learned skills (such as DDL) into language teaching is idealistic and less likely to occur.

Çalışkan and Gonen (2018) investigated university instructors' opinions on the use of concordances in English vocabulary instruction. The participants were three in-service teachers, and they participated in a four-week course on corpus-based language pedagogy, with a focus on vocabulary learning and designing and implementing concordance lines in order to enhance their instruction. Data were collected before the course interviews, reflective journals during the course, and an open-ended questionnaire administered at the end of the course. The findings of the study revealed that the teachers had very limited knowledge of CL and its applications in language teaching, as a result of a lack of training in these areas during their pre-service years. After participating in the course, the teachers realized the benefits of incorporating concordances in their instructional practices because such materials provide learners with authentic data on language use and associated patterns in various contexts. Nonetheless, the teachers regarded corpus-based materials more suitable for advanced and higher proficiency-level learners, and for teaching particular lexical items including collocations, prepositional verbs, and confusing words. Difficulties in designing corpus-based materials limited the applicability of concordances for teaching some lexical items, and level appropriateness was identified among the reasons for the teachers' hesitations in using corpora.

Chen et al. (2019) investigated the results of a DDL-focused teacher training workshop on corpus-assisted academic writing for in-service English language teachers in Hong Kong. The researchers administered a questionnaire after running the workshop, examined the teachers' attitudes in accepting or rejecting DDL for academic writing, and found that most of the participants had positive experiences of the training they received. The findings from this study also revealed that prior knowledge and experience in using corpora, teaching experience, and motivation for professional development were significantly correlated with the teachers' perceptions of the difficulties in using corpus tools in the classroom, and with their inclination to implement data-driven learning in

their future teaching. The teachers also considered time as a major obstacle in using corpora.

Lin (2019) investigated the development of a DDL teacher in Taiwan. After a four-month intensive training project to use DDL in grammar classes, the study explored the perceptions of the in-service teacher in both learning about DDL and teaching with this approach in the classroom. The data collected via reflective journals and interviews revealed that despite facing some technical difficulties in consulting a corpus, the participant teacher considered integrating DDL as a supplement to traditional teaching practices (grammar-translation) in his future grammar classes. Hands-on experience with DDL and applicable models of DDL were identified among the key factors that encourage a teacher to continue practically using the approach. Moreover, the study reported that although the teacher faced serious challenges concerning the time and effort required to implement DDL, he gained faith in the positive outcomes resulting from DDL.

Abdel Latif (2020) added a corpus literacy component to a graduate CALL course and investigated teachers' perceptions of corpora and their expectations about using them in language learning, teaching, and research. The participants were 24 PhD students in Saudi Arabia, and they received corpus literacy-related training in three sessions (three out of a 15-week academic semester). The data were collected through focus group interviews following the corpus literacy component, and the follow-up questionnaire sent to the teachers after two years. The findings revealed that teachers had no experience in using corpora for language teaching and had no knowledge of any corpus websites. Focus group interview and follow-up questionnaire data showed that the teachers' immediate and long-term perceptions of corpora and corpus literacy integration in the SLTE program were very positive, and most of them were aware of the pedagogical benefits of corpora. The follow-up questionnaire also revealed that half of the teachers introduced corpus-related resources and materials to their students and only six teachers reported direct use of corpora in their classes. This direct use of corpora was mostly related to introducing some online corpora in the class and asking students to use them for doing some assignments on their own, and not for working with concordances during classroom lessons. The study concluded that the corpus literacy instruction resulted in some positive gains but fell short of achieving the desired changes in the teachers' long-term practices.

Finally, Poole (2020) studied six English for Academic Purposes (EAP) teachers' attitudes towards implementing corpus-based instruction in a writing course. The

instructors were second-year graduate students in a Master's program in TESOL and Applied Linguistics, and all reported being exposed to research on corpus study for language education, and five had previous experience on using a corpus analysis tool. After administrating an initial survey instrument, three instructors agreed to implement corpus activities in their classrooms, and during an academic term, they completed additional surveys. Three instructors participated in a sixty-minute project overview session, and their students received a 75-minute corpus training module. Over the course of the academic semester, 4-6 corpus activities were implemented in the classes, and the teachers completed three anonymous surveys. The findings of the study revealed that both participating and non-participating teachers had positive views on corpora and corpus-based instruction, nonetheless, they had concerns for time pressure and workload in implementing corpora into their teaching. In the final survey, all the three participating teachers expressed their intentions to use corpus-based activities in the future, developed more positive attitudes towards corpora in language education, believed that students responded positively, and regarded corpus-based instruction applicable in different language learning contexts. Moreover, the study found that the use of readily available materials in corpus-based instruction created some tensions. First, after completing the activities, the students did not seem to engage in discovery-based or inductive learning, the types of learning that corpus-based approaches strive to achieve, and second, the ready-made materials and activities were regarded by teachers and students to be only marginally relevant to their EAP writing course.

In sum, the literature indicates that the integration of CL courses into teacher training courses has been perceived positively by in-service teachers, most of whom regarded corpora as valuable resources for their personal uses, and students' language development. Nonetheless, previous findings also point to the fact that despite efforts made by teacher educators, the application of corpora in the classrooms has remained limited. In this regard, there is a need for further studies to shed more light on the complexities involved in implementing corpus-based materials and engaging learners directly with corpora in the language classroom. Moreover, the majority of previous studies have focused on a limited number of corpus tools and resources (such as using corpora for teaching grammar and vocabulary), and most of the courses were delivered in short-time periods. Considering that short-term interventions might not create desired changes in teachers' beliefs and practices (Borg, 2012, 2019), CL courses covering major

applications of corpora in language education delivered through professional development initiatives can benefit teachers more. More importantly, the long-term impacts of adding corpus components into SLTE courses have remained largely unexplored and only a few studies traced changes in teachers' practices after receiving relevant training. The current study aims to address these gaps. The following overarching research question was thus formulated:

What are the contributions of participating in a corpus linguistics course to in-service teachers' corpus literacy development?

This question was broken down into two questions:

1. What are the contributions of participating in the CL course to the teachers' corpus-related beliefs?
2. What are the contributions of participating in the CL course to the teachers' corpus-related practices?

Method

Participants and context

The participants of the study were 6 English language teachers (3 females, 3 males), recruited by convenience sampling procedures from two private schools in Tehran, Iran. All the teachers had a Master's degree in Teaching English as a Foreign Language (TEFL) and their ages ranged from 26 to 35. The teachers had 3 to 10 years of teaching experience at different private language schools. The selection of teachers was based on three criteria. First, given the demands of the CL course in terms of language proficiency and academic skills, we selected those teachers who had completed advanced academic courses in the past. Second, to gauge the impacts of the course on their literacy, those teaching students in different proficiency levels were chosen. Third, the teachers' interest to participate in the course was also taken as an entry criterion. The context of the study was private language teaching schools, which offered conversational and communicative courses for

adult language learners, to prepare them for international English language tests including IELTS and TOEFL. The materials used in the schools were designed originally in English-speaking countries (UK and USA), but the teachers were allowed to modify and adapt the materials based on their local needs. The research adhered to ethical considerations by ensuring the participants about the confidentiality of the obtained data and retaining their anonymity.

The corpus linguistics course

As the study aimed to examine the impacts of a CL-oriented course on the teachers' literacy development, first a ten-session syllabus was designed. Table 1 indicates the modules covered during the course. In designing the course, we used several resources (Friginal, 2018; Jones & Waller, 2015; Rühlemann, 2019; Szudarski, 2018; Timmis, 2015) and the course was informed by recent discussions emphasizing the interactive and engaging nature of teacher education courses (Johnson & Golombek, 2018). This perspective holds that course effectiveness is largely dependent on teachers' active engagement, rather than being mere knowledge receivers (Desimone, 2009). In this regard, one of the researchers (the first author) implemented the online course using hands-on activities and tasks, where after giving a short introduction to the module, the participant teachers were engaged in using corpus-based tools themselves. The researcher's role in the course was mainly the coordinator and facilitator, as the whole course was a shared experience among the participants. Moreover, the researchers were in contact with the participants during the PD, provided them with additional help and guidance on doing assigned tasks, and supported them in technical aspects of using corpus analytic tools.

Table 1

The CL course syllabus

Week	Module	Topics covered
1	Introduction to the course	Course objectives, defining a corpus, types of corpora, what can we do with a corpus? (quantitative corpus analysis, qualitative corpus analysis)
2	Building a corpus	How to build a corpus? Introducing COCA corpus and its features
3	Corpora and lexis	AntWordProfiler, obtaining frequency data from corpus, corpus-based vocabulary lists, Corpus-based teaching resources for vocabulary
4	Corpora and grammar	Concordancers, collocations, chunks, bundles, patterns in language use
5	Learner corpora	English Vocabulary Profile (EVP), English Grammar Profile (EGP), building a learner corpus
6	Data-Driven Learning (DDL)	DDL for Vocabulary, DDL for grammar, DDL for writing
7	Corpora and pragmatics	Speech acts, evaluation, pragmatic markers
8	LancsBox	Starting and identifying the key functions of the software, Building a corpus
9	LancsBox	Frequency, dispersion and keywords, Identifying collocations, graphcoll
10	Q & A	Wrapping up the course and answering the questions

Data collection

Our operationalization of literacy development in this study was informed by Mukherjee (2004) and Callies (2016), who identified four components for teachers' CL:

- 1) Understanding basic concepts in corpus linguistics (What is a corpus and what types of corpora are available and how? What can you do – and cannot do – with a corpus?)
- 2) Searching corpora and analysing corpus data using corpus software tools, e.g. concordancers (What is corpus software and how can it be used to search a corpus? How can corpus output be analysed?)
- 3) Interpreting corpus data (How may general trends in language use/change [can] be extrapolated from corpus data?)
- 4) Using corpus output to generate teaching material and activities (p. 395).

This conceptualization informed the process of data collection in the study. To tap into the teachers' understanding, engagement, and practice of using corpora, we employed three research methods of interviews, reflective journals, and classroom observations, respectively.

Before the course

Initially, before the CL course, four sessions of each teacher's classes were observed. We started the study with classroom observations to eschew the possibility of sensitizing the teachers to specific theoretical information modifying their classroom practice. These observations aimed to document any practices related to using corpora and corpus tools and resources in the classroom. Using corpora was operationally defined as any type of direct or indirect uses of corpora-related tools and resources in the classroom, encompassing a wide range of activities and tasks including, for example, the use of different general or academic word lists to inform teaching vocabulary, the use of concordances to teach grammar or collocations, browsing corpus by the learners to explore language use and the use of readily available corpus-based activities. In this regard, the classes were observed non-participatively to minimize the possible interferences with the teachers' regular practices. Following the initial classroom

observations, semi-structured interviews were conducted (on average 20 minutes per teacher) to examine the teachers' understanding of corpora. The questions of the interview were informed by the components of corpus literacy identified by Mukherjee (2004) and Callies (2016). These interviews, as with the other ones, were run in Persian (the teachers' L1) and were audio-recorded for further analysis.

During the course

During the course, which lasted for 10 weeks, the teachers were asked to write reflective journals (Richards & Farrell, 2005), to examine their engagement in using corpora for learning about language, and also their ongoing perceptions about the course. Each session one journal was written by the teachers, except the final session, which was a wrap-up. Thus, 54 journal entries were written by the teachers. The questions guiding the journals were adapted from previous studies that investigated in-service teachers' attitudes and perceptions in using corpora and corpus-based resources in language teaching (Chen et al., 2019). The teachers could write their journals either in L1 or English. We then translated the Persian journals into English to be used for analysis.

After the course

After the course, another round of interviews was conducted, which lasted for 45 minutes per teacher. The focus of this round of interviews was on the teachers' understanding of corpus, similar to the pre-course interview, coupled with queries about the impacts of the course on them. Additionally, another round of classroom observations (four sessions per teacher) was conducted to document any changes in the teachers' practices. These observations were done one week after the course, to minimize the immediate impacts of the course on the teachers. The procedure of these observations was similar to the before-course observations.

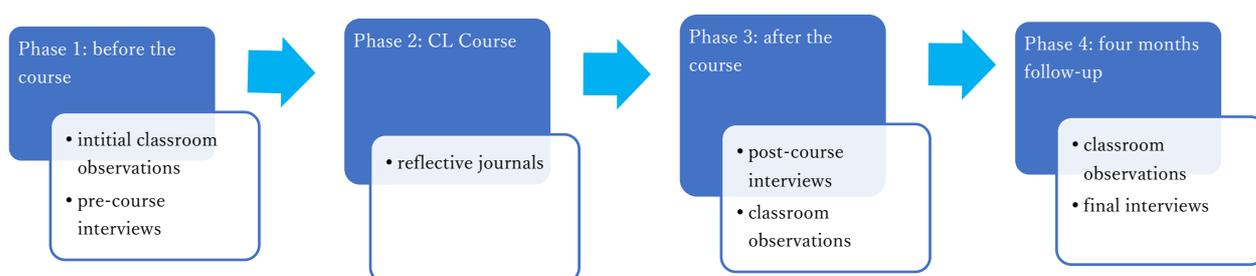
Delayed data collection

Moreover, to investigate the long-term impacts of the course on the teachers' beliefs and practices, after four months, we observed four more sessions of the teachers'

classes and conducted another interview with them to gain further understanding regarding any developmental changes in their beliefs and practices. This step was in line with Barnard and Burns (2012) and Desimone (2009) regarding the importance of developmentally examining teachers' beliefs and practices to track the impacts of professional development initiatives on their cognitions and performances. The stages of data collection are summarized in Figure 1.

Figure 1

Data collection stages



Data analysis

The data obtained via semi-structured interviews and teachers' reflective journals were analyzed using Nvivo software (version 10) through a process of cyclical and evolving coding and recoding (Saldana, 2013). In this regard, in the first cycle analysis, a holistic coding method was used to divide each interview section or reflective journal entry into various components related to corpus literacy developments and associated beliefs and practices. The second cycle analysis proceeded by cross-referencing within and across interview transcripts and reflective journals for recoding, categorizing or discarding evolved codes from the first cycle, and pattern coding was used to aggregate codes into categories. As for classroom observations, the teachers' corpora-related practices were grouped and categorized based on activity types and targeted language

skills. The observation data also informed the preparation of interview questions to gain deeper insights regarding teachers' beliefs and practices in using corpora in teaching.

Findings

Teachers' corpus literacy before the course

The findings from the initial classroom observations revealed that before participation in the course, the teachers used little corpora and associated tools in their classes. More specifically, besides a focus on some academic vocabulary by one of the participant teachers, we observed few direct or indirect uses of corpora in the classes. The teacher in this class highlighted the importance of one vocabulary item as an academic word (Coxhead, 2000) based on information provided in the dictionary. The results of pre-course interviews further indicated that the teachers did not have deep knowledge of corpus linguistics and the role of corpora in language teaching and learning. The inadequate knowledge was noticeable in their understanding of the types of corpora, their applications, and uses, corpus software tools such as concordancers, interpreting corpus data, and using corpus output to produce materials and activities for their classes. Nonetheless, two teachers reported using Google (as a corpus) for teaching vocabulary and deciding on the relative value of learning different vocabulary items:

When my students ask about a new word, I let them Google it, and see its meaning, synonyms, and sometimes collocations. Google also provides the usage trends for vocabulary items over time. If there is a raising trend, I give them more information and encourage them to focus on those words. (T5)

Moreover, although some teachers knew that most available dictionaries and some course books were produced based on corpora, they considered the corpus use as something “*behind the scene*” (T2) done by experts wherein teachers have no role to play. Moreover, three teachers mentioned that the use of corpora is more applicable in teaching English for specific purposes (ESP) rather than general English courses, as in the latter the production and selection of the materials are dictated by the institutes:

As far as I know, the use of corpora is highly important in teaching specialized courses like business English. In the language institute that I am working, they want me to finish the course book on time. I have no say in materials selection; they just want me to make small changes in the activities and tasks. (T3)

Furthermore, most teachers believed that they received insufficient training in corpus linguistics during their teacher education programs. In this regard, they attributed their insufficient knowledge of corpora mostly to university courses and professors who were not adequately familiar with corpora and their applications in language teaching themselves. As one teacher put it:

During my master's program we didn't learn much about corpora. The corpus came out few times in materials development and ESP courses, but no one had a clear understanding of its application for language teaching. Initially, I was very interested in this area, but one of my professors told me [that] most corpus studies are descriptive and have limited practical value in real affairs of language teaching (!) and after reading a corpus study one has to ask "so what?" (T6)

In general, pre-course observations and interviews revealed the inconvenient truth about teachers' inadequate corpus literacy and their beliefs regarding the restricted application of corpora and corpus tools in their teaching.

Changes in teachers' corpus literacy after the course

The analysis of reflective journal entries and post-course interviews revealed that teachers developed positive attitudes towards corpora over time and developed their knowledge in all areas of corpus literacy by the end of the course. Moreover, the teachers reported their increased engagement with corpora and associated tools and resources in their teaching practices, which was the result of their exposure and involvement with the course materials over the 10 weeks of the PD course. This sub-section summarizes the findings from journal entries and post-course interviews and observations.

An emergent theme from the journal entries written during the course was related to *increased language awareness* among the participants. In this regard, the teachers realized that “*the language presented in the ELT textbooks sometimes differs from its actual uses in the real world*” (T2), and they appreciated the way corpora helped them to learn more about “*exceptionally rare uses of some grammatical rules*” (T5) that they previously used to emphasize in the classes. Moreover, as revealed by journal entries, participants considered corpora to be especially helpful for them as non-native English teachers, which facilitated a sense of *autonomy and professionalism* among them:

The information provided by corpora can help me a lot in preparing my lessons. Sometimes in teaching advance levels, we have to provide extra examples for grammar lessons. Although there are plenty of data available online, the use of corpora seems to be among the best options. In this way, I don't have to spend much time on asking questions from colleagues or checking different sources to come up with good examples. (T4)

The data obtained from the post-course interviews shed more light on changes in teachers' beliefs about using corpora and their implementation of various resources provided in the CL course in language teaching. In this regard, all teachers believed that the use of introduced resources and techniques can result in more effective and informed teaching practices in the future. The teachers also believed that discovery and corpus browsing learning activities have considerable potential in increasing students' motivation and engagement in the classes. However, given that the PD course covered a variety of modules targeting different aspects of language, most teachers believed that the direct and indirect uses of corpora align best with teaching vocabulary and grammar (and not with teaching other aspects like pragmatics):

Although we have learned about different applications of corpus tools in language teaching, I believe that the most interesting tools were those related to teaching grammar and vocabulary. I usually have a lot of focus on vocabulary that is the most important aspect of language learning. Besides, we have some focus on form in teaching grammar. I think the integration of these tools and resources can help

me in doing so. I am always looking for new and more motivating tools for teaching grammar, and corpora seem to be of much value in this case. (T6)

The findings from the post course interviews also highlighted teachers' growing interests for using corpora for preparing materials before the classes. In this regard, two teachers mentioned increased use of English Vocabulary Profile (<https://www.englishprofile.org/wordlists>) in preparing vocabulary lessons. These teachers reported a growing reliance on corpora rather than dictionaries or teaching experience. For example, T1 said: *“an amazing feature of English vocab profile is that it gives valuable information for choosing different senses and meanings of the words for different levels! This information is mostly missing in learner dictionaries”*. Moreover, the teachers regarded the corpora as a valuable resource for teaching and learning collocations, and believed that the use of concordance lines is an effective strategy to deal with this important aspect of vocabulary knowledge:

The use of concordances for teaching collocations can make a real difference. When I as the teacher tell the students about the collocates of a specific vocabulary items, this is simply a process of information transfer, where some learners pay attention to it, and some ignore the information. But I think if I can make it possible for my students to work with concordance lines, the same process changes to an active learning effort. When students are more engaged, they learn better and progress faster (T3).

As for teaching grammar, participation in the CL course was mainly associated with the teachers' increased awareness concerning their beliefs about grammar teaching, which in turn impacted their practices. The changes in the beliefs systems of the teachers were of two types. First, most teachers learned that corpora provide valuable and reliable information for the use of language in different discourse types (for example spoken language), which impacted the way they presented grammar lessons to the learners. Second, for some teachers, the use of corpora resulted in fundamental changes in grammar teaching beliefs, which resulted in a more reflective approach to their practices, where they critically analyzed some of their own early beliefs and practices. The latter aspect was best articulated by one of the teachers in the post-course interview:

I sometimes teach difficult grammar lessons to very advanced students. One of the last lessons that I focused on was the usage of 'is going to have been'. I spent around 20 minutes on providing examples (like a good dinner is going to have been made). After learning about frequency information in corpora, I decided to check it on the COCA corpus. To my surprise, the search of the 'is going to have been' returned only one hit in a corpus with a billion words! Seeing this, I decided to reconsider my approach to grammar teaching, as no longer I want to waste my own and my students' time with teaching and working on such bizarre structures anymore. (T5)

The data obtained in post-course classroom observations revealed teachers' increased interest in using corpora in their classes and uncovered some challenges that were associated with the use of such resources. Over the observed classes, we noted that teachers tried to implement more corpus-based materials and approaches and used a number of tools and resources introduced to them during the CL course. In this regard, in three classes, the teachers asked students to search vocabulary items in the COCA and iWeb corpora and provided them with additional support to use the information given in the corpora for vocabulary learning. One teacher introduced mobile applications developed based on corpus-based research for learning core and academic vocabularies in English and asked about students' progress and perceptions in the following sessions. Additionally, one of the teachers made use of concordance lines to teach grammar in two sessions. Three teachers assigned homework to their students that involved using freely available corpora. In all these instances, the focus of using corpora was mostly on vocabulary and then on grammar. No use of corpora resources was recorded for teaching other aspects of language (e.g. writing, pragmatics). The limited use of the corpus-based tools and materials in the classroom was associated with some classroom management issues for all teachers, and some teachers faced problems in coordinating the learning activities as they had to control classroom time and deal with technical problems, too. Nevertheless, in all sessions that the participating teachers used corpus-based materials, the students were engaged in the activities with interest and learned about some affordances of corpora for language learning.

Delayed observations and interviews

The findings from delayed classroom observations revealed that although the initial enthusiasm for using corpora had subsided among the teachers, the instances of implementing corpus-based materials and resources remained considerably high compared to the pre-course observations. A distinctive feature in all teachers' practices was their attempt to use corpora for improving students' learning by relying more on mobile devices and internet connections. The integration of mobile devices and corpus-based resources enabled some teachers to develop effective strategies for engaging students with DDL for vocabulary and grammar. In one of the observed classes, T6 used this approach successfully for teaching grammar using concordance lines accessed on mobile devices. Another teacher (T4) recommended her students focus on graded readers (4000 words level) to improve their vocabulary and reading fluency.

The final interviews provided deeper insights into the evolving nature of teachers' corpora-related beliefs and practices and their perceptions concerning the challenges associated with implementing corpus-based materials. Data analysis revealed that, over time, the teachers developed more confidence in using corpus-based resources in teaching, and gradually expanded the scope of their application into teaching other language skills (in addition to vocabulary and grammar) such as listening, reading, and writing. In this regard, two teachers reported regular use of vocabulary profiling programs to help students in their reading and listening:

I know that some of my students are watching a lot of movies and TV series. Mostly, they do it by using L1 subtitles. Recently, we collect transcripts for some popular TV series (like How I Met Your Mother, Friends), and I use vocab profiler with BNC/COCA lists to analyze and identify challenging words based on students' levels. In this way, students watch one episode several times, and I provide them with a list of words occurring in the third to fifth lists with L1 translations. This really helps with vocabulary learning and listening comprehension improvement.
(T1)

Before working with Compleat Lexical Tutor, I had no idea on pre-teaching difficult vocabulary in my extensive reading assignments. Now I analyze the

readings by tools provided in the website, and add dictionary definitions for words that might be difficult for the learners. (T3)

Moreover, one of the teachers reported using Text Inspector (<https://textinspector.com/>) website to analyze students' writing assignment:

I am currently using this amazing website in teaching writing. As my students are preparing for the IELTS exam in the near future, I analyze the essays and paragraphs written by them for lexical diversity, average sentence length, spelling errors, vocabulary profile, logical connectors, and etc. I give them detailed feedback to improve their writing. (T1)

Data analysis further revealed that despite increased integration of corpus-based resources and tools for teaching different language skills, most teachers regarded corpora as more useful for themselves rather than their students. In this regard, they believed that corpus-based resources contribute significantly to teacher autonomy and help them in preparing the materials before the classes. The teachers also identified some challenges that impede corpus-based language teaching. More specifically, teachers viewed school policies and administration as major concerns, and believed that it was sometimes difficult for them to add corpus-based activities to the courses due to various restrictions in the teaching context:

Sometimes I have to explain it to the supervisors that why I am not covering some activities in the course book, and using DDL instead. The school regards the use of mobile devices a distracting factor and asks the students to switch off their phones during the classes. Then it is really difficult for me to have my students working on their mobiles or tablets. (T6)

Moreover, some teachers considered classroom management, time pressure, access to the internet, mobile device ownership, and learning culture among the other obstacles that limited the application of corpus-based resources in their classes. In general, the delayed interviews revealed that teachers expanded the scope of corpora application in their teaching practices, gradually developed strategies to overcome some of the problems

associated with using corpora in the classes, and regarded corpora as tools that promote their autonomy and professionalism as non-native English-speaking teachers.

Discussion

This study examined the impacts of a professional development course on EFL teachers' corpus literacy. Collectively, the study findings showed that the course was able to bring about changes in the teachers' corpora-related beliefs and practices. One notable dimension of the present study is that it systematically delved into the extent to which CL is actualized at the classroom level, which was a novel aspect of the study. In this sense, CL-related teaching practices were also found as being positively influenced by the PD content.

The findings of the study align with the previous body of knowledge as to the positive effect of CL on teachers' beliefs (e.g., Chen et al., 2019; Mukherjee, 2004). In this regard, after the course, the teachers developed their knowledge of various CL-related dimensions. This finding could be interpreted in light of the interactive nature of the course, which gradually contributed to their increased understanding of CL knowledge base. Johnson and Golombek (2020) and Desimone (2009) argue that for teacher education to distill course content effectively into teachers' cognitive makeup, teachers' active participation and engagement are required. This agenda informed the approach adopted in the course, which seems to have effectively contributed to the teachers' internalization of course content.

As to the practices, post-PD observations revealed that besides the increased use of CL-related resources, the teachers attempted to contextualize such affordances in response to student engagement. There is a large body of research emphasizing that teachers need to develop their knowledge of CL to hone their associated skills (e.g., Callies, 2016; Lin, 2019; Naismith, 2017). This finding is promising in that as teachers are exposed to CL-driven PD courses, they are likely to extend their learning to their classes. This finding could have two reasons. First, as the teachers underscored, CL-related emphasis in tertiary education of the country is missing, while technological advancements are progressively informing language education (Son, 2018; Torsani, 2016). In this sense, the teachers seek initiatives that provide them with adequate skills

for expanding on their learning and, in turn, concretizing their learning in the class. This might work more effectively for teachers who are already interested in using technology, as with the teachers of this study. Second, one notable feature of course enactment was that we persistently sought the teachers' ongoing engagement and implementation of CL, both in their journals and our personal communications. This was intentional (Barnard & Burns, 2012; Golombek & Johnson, 2020) as it could sensitize the teachers to how CL could be practically actualized and provide them with the understanding that they could extend their learning to their classes. Such hidden agendas are ontologically rooted in effective PD enactment that one of the major reasons for course failure is the lack of a symbiotic nexus between PDs and classroom instruction (Desimone, 2009). We aimed to both engage the teachers with CL realization and developmentally contribute to their literacy whose major realization here was developing a nested, instructional literacy.

The findings from delayed data sources revealed that the teachers gradually kept the track of using CL-oriented resources, most notably the use of mobiles for actualizing their plans (Nazari & Xodabande, 2020). It seems that the teachers have attempted to employ a specific type of CL tool (mobiles) that responds well to their own and students' needs. Such persistence was accompanied by psychological benefits for the teachers and leveling up student learning outcomes. It seems that the PD course has been able to effectively help the teachers internalize notions that both respond to their own needs and contribute to student learning, which is cardinal to effective PDs (Barnard & Burns, 2012). However, it must be acknowledged that the teachers' interest in technology adoption has been instrumental in their sustained employment of CL in practice.

Conclusion

Despite much progress in corpus linguistics and associated tools and resources for language teaching, the implementation of this approach to language pedagogy lags behind other developments in mainstream CALL research. The current study showed that familiarizing language teachers with available resources has a great potential in bringing considerable changes in teachers' beliefs and practices. These changes have been realized in different aspects of teachers' knowledge and practice in general, and their technological pedagogical content knowledge (TPACK) in particular (Koehler et al.,

2013; Mishra & Koehler, 2006). In this regard, the PD contributed to the teachers' increased language awareness (content knowledge), resulted in using new technologies and resources such as concordance lines and mobile devices in the classroom (technological knowledge), and fostered reflective teaching among some teachers as they critically analyzed some of their practices and altered them (pedagogical knowledge). TPACK development results from the complex interaction among these interrelated knowledge bases for teaching (Koehler et al., 2013). Moreover, the findings indicated that although the PD resulted in only limited changes in the classroom practices immediately after the CL course, the participating teachers expanded the scope of their corpora-related practices over time, which benefited their students. The present study highlights the importance of giving the teachers some time to overcome the challenges they face in bringing the corpora to the classroom, which results in their confidence in experimenting with new teaching approaches leading to positive outcomes in students' learning. Helping teachers with their corpus literacy development is the first step in promoting corpus-informed language pedagogy.

The findings of this study also imply that initiatives promoting teachers' literacy need to be institutionalized to renew the curricula and syllabi that feature little attention to the role of technology in general and corpora in particular in their policy and planning. Such an undertaking requires infrastructural affordances that provide easy and fast access to corpus-driven materials. In addition, such shifts demand cultivating a culture of technology that gradually develops in teachers and teacher educators more recognition for and focal attention to the effectiveness of corpora for language learning. The above agenda could be a productive line of research in future studies. Examining how corpora are understood and formally recognized at the institutional level has been little addressed, yet it merits due attention. Moreover, exploring how students perceive the offerings of corpus-driven pedagogy, which was a limitation of the current study, would expand the boundaries of research in this area. The current study was also conducted by using convenience sampling procedures and investigated corpus literacy development among six EFL teachers. Given that the teachers also volunteered to take part in the study, these limitations negatively impact the scalability of the findings and should be accounted for in interpreting the results. Overall, we hope that the outcomes of this study could help extend the research line and become institutionally enacted.

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