

Exploring the Effectiveness of DDL in an L2 Context through a Non-control-group Asynchronous Experimental Design

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Abstract

This study aims at a rediscovery of the extent to which a DDL-based intervention could become instrumental in facilitating grammar instruction with a specific focus on EAP and learner autonomy and reducing the number of repeating learners in a preparatory program participated mostly by Turkish-L1 learners studying EAP. It also provides a context-restricted longitudinal depiction of the effectiveness of a DDL-based grammar instruction endorsed by teacher (also referred to as the researcher) mentorship across groups asynchronously, thus re-testing the limits of DDL-oriented corpus pedagogy in contexts where a control group is not available, unlike the traditional control-group study design. To this end, a corpus was compiled out of the existing reading and listening materials in use ad hoc by the name of the Alternative Corpus of Academic Texts (ACAT), and a total of 19 grammar lessons covering topics in the curriculum of the second level of the grammar course taught were developed using the ACAT. Blind pre and post-test procedures were administered with all four experimental groups independent of each other to gradually build up a local understanding of the governing pattern of learner achievement through DDL and corpus-based teacher-prepared materials at the end of each intervention period. The data analysis demonstrated a rise in student achievement across all groups despite the lack of a teacher disseminating knowledge to students in class in the traditional sense, thus showing that a sense of autonomy could be gained through DDL-enhanced teaching. With the design being unorthodox compared to most other DDL studies in the literature, this study shows that the triple powers of DDL, self-discovery, occasional teacher supervision, and corpus-based teaching materials, could help learners of English survive autonomously no matter how hectic the curriculum run at an institution is. All in all, further research is needed to deepen this insight so that this sort of DDL practices could be implemented at the institutional level.

Introduction

English for Academic Purposes (EAP) instruction at preparatory schools of English as a Medium of Instruction (EMI) universities running a dense and relatively hectic curriculum might require learners to take up much of the responsibility of their own learning. When taught as discrete skills, EAP learning might turn out quite challenging for learners with a shallower background in English. These unforeseen challenges might cause learners to distance themselves from the input provided by teachers, course books, or other sorts of teaching material in the traditional sense, thus altering their attitude towards learning the target language by raising their affective filters (Krashen 1981). Grammar instruction in an EAP context, in particular, can therefore become less and less meaningful for learners, as each learner in a class might have different needs and pacing during different periods of teaching/learning even though they study the same content, especially concerning a heightened level of anxiety caused by intense input. The effectiveness of exposure can, therefore, be said to be directly proportionate to the personal variables every learner in a class possesses differently at varying levels. It is shown in many studies (Johns 1991; 1997; Kennedy and Miceli 2001; Braun 2005; Chambers et al. 2011) that Data-driven learning (DDL; Johns 1991) can provide struggling EAP learners with an opportunity to self-adjust the level of the input, particularly within EAP settings where non-native speakers of English teach grammar and lexis (.....

2017). "With its greater capability to vary the language exposure" (Egbert, Paulus and Nakamichi 2002, p. 111; O'Sullivan and Chambers 2006:62; Reppen 2009) unlike hardcopy coursebooks, which are retail products designed and published for different needs and different levels of learners and hard to alter, adapt or adjust on the go, DDL can offer a much more comfortable and flexible journey into any grammar curriculum meeting learners with an easy-to-update and expand content under the supervision of language teachers (Farr 2008). (2015) discusses that L2 learners might not satisfactorily be able to manipulate language in an L1 fashion, hammering down prolific spoken or written language production. A number of studies underscore the use of teacher-prepared corpus-based teaching materials along with learners' hands-on experience with corpora to address similar issues in L2 settings (Tribble and Jones 1990; Johns 1991; Zohairy 2012; Boulton 2016; Boulton and Landure 2016; Boulton and Cobb, 2017; 2017: 28).

Within the specific context of this study, learners were having difficulty adapting to the density and load of input mainly due to the fact that the existing class materials used particularly at the second level of the grammar course were resting up mainly on fabricated exemplars representing only the mechanical aspects of grammar forms, touching superficially on function and meaning in discourse, representing only the world knowledge and view of the natives who prepared them a long time ago. This was observed to be directly linked to the increasing number of repeating learners (Rs) along with many first-time takers (Fs) of the course losing motivation and risking spending another two-month term studying exactly the same content through exactly the same set of materials produced in-house. This seemed to be an urgent issue to be sorted out leading the way to the commencement of this particular research. With a view to dealing with these issues in the grammar course at level two and reconceptualizing learner autonomy within the periphery of the researcher, despite context-specific restrictions and time limitations, the following research questions were addressed:

- 1.To what extent can corpora be incorporated into curriculum development procedures of a preparatory program featuring EFL instruction?
- 2.To what extent can the corpus-based teaching materials prepared by the researcher out of the reading and listening materials be used in the corresponding skill courses to foster autonomous learning of grammar in the EFL setting featuring EAP and ESP instruction?

Literature Review

With constructivism (Piaget, 1973; Vygotsky, 1978) being the umbrella concept, this study employs the adoption of DDL and self-discovery of language patterns (Zhang and Lu, 2015) as a teaching method that utilizes teacher-prepared (Reppen 2010) corpus-based materials to address the problem of an increasing number of repeating learners in the second level of a grammar course, which is the equivalent of CEFR B1, taught at the preparatory school of a state university in Turkey.

Constructivism and DDL

DDL is said to be directly related to the constructivist approach to learning languages as it transforms learners into linguistic researchers actively taking the responsibility of their own learning and teachers into research leaders or mentors guiding learners (Bruner 1966; Schank 1975; Flavell 1987; Roth 2000; Marlowe and Page 2005; Roblyer and Doering 2010). Using this kind of a hands-on experience, learners are allowed to interact with the genuine language occurring naturally (Sinclair, 1991) or the authentic use of certain forms by natives, or near native users of the target language through various combinations of many different sources of input, thus becoming autonomous (Reinfried, 2000). Johns (1991) defines learner autonomy by pointing at the requirement for learners to build up linguistic knowledge independently, without needing the teacher function as a knowledge dispenser. Non-native speakers of English teaching EAP might resort to coursebooks as they offer a safer ecosystem, though through limited authenticity in input (Biber and Reppen, 2002). This highly acclaimed and preferred comfort zone may well result in undesired consequences such as failing to achieve curricular goals.

Retrospectively, it may be argued that the traditional teacher-fronted language instruction during secondary education might come costly for prep schools adopting learner centeredness (LC) and autonomous learning as part of their curricula. With LC being emphasized by authorities of education, such as the Ministry of National Education (Altinyelken 2011) in Turkey, there seems to be resistance to it by teachers (Gitlin and Margonis 1995; van Veen, Slegers and van de Ven, 2005) on a global scale. This discrepancy between the learners' previous language learning experiences and the requirements of the preparatory program they attend give them a stun, which can heighten their level of anxiety. In grammar classes, the use of linguistic corpora may save valuable time, energy and resources, as this 'condensed exposure' (Gabrielatos, 2005:10) can draw their energy and focus onto a rather wholistic picture of how L2 occurs naturally in authentic texts in their personal comfort zone. This diverse linguistic environment can open up new gateways for EAP practitioners and help them gain new insights into the language ultimately reaching a factual understanding of language patterns (Guilquin, and Granger 2010). This may help teachers spend more time moderating between the curriculum and learners' needs more efficiently.

DDL and the Use of Corpora in Language Classrooms

Corpora can be defined as vast machine-readable collections of any sort of language produced by the speakers of that language (McEnery, Xiao and Tono 2006: 5). There are different types of corpora, such as spoken or written corpora, monolingual, bilingual or multilingual corpora, parallel corpora for translation studies or comparable corpora for academic purposes (Chambers et al. 2011) and pedagogical corpora for language learning (Braun, 2005). The pedagogical use of corpora, which appeals directly to the design of the present study, for learning and teaching a language goes back to the 80 s.

To help international EAP students learning academic writing, Johns organized "one-to-one consultation sessions" in which the teacher and the learner explored corpora to identify problems with the way learners used the language (Vincent and Nesi, 2018:1). These consultation sessions, in which corpora were used as a source of empirical evidence to demonstrate how English works without the learner interacting directly with corpora (Johns 1986), were the first couple of steps taken into what Johns later defined as "data-driven learning" (Johns 1991: 2). Learners had the chance to see the correct usage of expressions

which appeared erroneously in their own writing (Johns, 1994). However, as Bernardini (2004) acknowledges, data-driven learning (DDL) has evolved into a more autonomous way of learners' effort put into learning since then.

Several studies have shown that, by providing positive exposure to the correct use of expressions, DDL causes the learners to modify their outputs, which is what Swain (1995: 125) formulates as "output hypothesis". In a similar vein, Seidlhofer (2002) exploits corpora compiled by trainee English teachers, and reports that this had a positive effect on linguistic hypothesis testing (Smith 2004). As cited in Boulton (2012c), Maia (1997) compiled a themed corpus together with some Portuguese-English translation students, first by transforming paper documents into digital ones and later using the web as the main source of reference to provide bilateral positive reinforcement. Castagnoli (2006) argues the effectiveness of using the web as a source of reference for DDL practices, as the web can be a vast source for different possible combinations of words and expressions forming the meaning in particular contexts. Additionally, Sha (2010: 375) refers to Google as a "super corpus" in comparison with BNC (British National Corpus).

With the help of a concordancer (Sha, 2010), DDL can help language teachers out when they are out of resources (Johns 2002; Rüschoff 2002; Hunston 2002). Language teachers can foster linguistic self-confidence in learners (Kennedy and Miceli 2001) and engage their cognitive mechanisms (Chambers 2005) through DDL. By comparing concordance lines with the sentences they write, learners can correct the way they use them autonomously (Sha 2005), and they can also self-regulate the amount and the level of linguistic input (McEnery and Wilson 1997; Gaskell and Cobb 2004; Renouf, Kehoe and Benerjee 2007), thus gradually building up their personal experience in the target language (Sinclair 1991: 109). Bernardini (2002) discusses that the use of corpora increases learner satisfaction as it provides an abundance of written examples (Chambers, 2005) with a specific grammatical or lexical focus within a variety of contexts. Similarly, Seidlhofer (2002) exploits corpora compiled by trainee English teachers and reports on a positive effect on linguistic hypothesis testing (Smith, 2004). This effect of DDL on learners' syntactical competence in language use has a strong connection with what Hoey (2005) defines as lexical priming. Through the hands-on experience with level-appropriate corpora, learners can develop native-like strategies (Gaskell and Cobb 2004), which is also defined as "intercollocability" by Cowie and Howarth (1996: 83).

DDL through the use of pedagogically relevant corpora has been on a rise across the DDL literature over the last two decades (Bernardini 2000; Hyland 2002; Argris 2004; Braun 2005; Meunier and Gouverneur 2009). With the teacher being a 'research director and a collaborator' in linguistic activities (Chambers. Farr and O'Riordan 2010; Talai and Fotovatnia, 2012), or a mediator (Braun 2005), learners explore linguistic data and discover language forms and meaning through DDL corroborated by pedagogically-engineered corpora. By introducing learners to 'pedagogic corpus' (Willis 1993: 163), teachers help them improve their linguistic proficiency in an anxiety-free learning environment (Gilquin and Granger 2010; Braun 2005). The advent of Internet and computer technologies (ICT) have implications about language teaching (Smith 2004), which might augur well for DDL activities. Using a computer, learners can easily

adapt the level of linguistic input, and gradually improve at their own pace (Cobb 1997; Braun 2005; Chambers, 2005). Learners' enthusiasm for technology can segue into an L2-oriented pedagogical exploration of a language through a scaffolded introduction to ICT for DDL. Flowerdew (1993) uses transcriptions of lectures that learners attended in an ESP course. Osborne (2001; 2002) makes use of a sequence of native-speaker and learner corpora as a source for teaching materials. Aston (1997) and Roe (2000) suggest using small-size corpora engineered in accordance with learners' needs and interests. Johns (1997: 100) advocates the idea that it is the responsibility of the teacher to alleviate the transition to DDL methods by preparing corpus-based materials as a "first stage", which is what Widdowson (2003: 5) defines as "pedagogic mediation of corpora". As to the technical side incorporating corpora into language teaching through DDL, newly emerging ICT and mobile technologies seem to be promising (Johns, 1997), which is apparently and still an ongoing process in 2020. O'Keeffe et al. (2007) and Gilquin and Granger (2010) consider computer assisted language learning (CALL) compatible language classrooms an opportunity for adopting DDL in EFL settings.

The need for further research on how to incorporate corpora into language teaching is emphasized by Barbieri and Eckhardt (2007: 320) and O'Keeffe et al. (2007). Despite all the potential it offers for language learners and teachers, DDL has not been able to find its way into "mainstream language teaching" (Boulton, 2009: 38). This increases the importance of the educational research carried out by DDL enthusiasts teaching English. There seems to be only a few studies conveying practical pedagogical implications for teachers addressing teenagers through DDL (Braun, 2005). There are several DDL studies focusing on the qualitative aspects of the methods; however, there seems to be a need for more others focusing on the quantification of the extent to which DDL can foster learning (Chambers, Farr and O'Riordan, 2011), which is among the aims of this particular study as well. Stevens (1995) tries to understand the quantitative impact that DDL makes concluding that learner performance increased after DDL procedures. Belz and Viyatkina (2008) point at an urgent need for studies exploiting "pedagogically relevant" (Braun, 2005: 47) corpora that can address the needs of learners, which corresponds directly to the primary objectives of this study.

Methodology

Having embarked on a problem solution task via DDL methodology underpinned by teacher-engineered pedagogically nourishing corpora for grammar instruction at a tertiary level EMI setting and teacher-prepared DDL-ready materials, this study employs a multi-layered methodological approach to cope with the institutional challenges that might have hindered the continuation of the study. That is to say, the experimental nature of the study had to be reshaped to fit into the mainstream studies at the institution where this study was carried out. This was considered to be necessary so that data collection, analysis, and discussion of the findings could be meaningful within the particular institutional setting.

Getting to Know the Research Environment: A SWOT Analysis

Even though one would argue that a needs analysis would be the first step into data collection, as the dynamic nature of the prep program and curriculum allowed little space for a research-centered manipulation of the time allocated for interaction with learners on the researcher's side, the study had to begin with a SWOT (strengths, weaknesses, opportunities, threats) analysis. In other words, the intervention designed specifically for this study had to squeeze into the program rather than taking a detour, isolating the experimental groups from control ones for objective observation of the extent to which the intervention could make a difference when compared to the control groups. A strategic move in Total Quality Management (TQM) of the late 90s, SWOT analyses helped corporations established a common ground as to what quality is (Pfeffer and Coote, 1991), and increase their understanding of what to improve, thus ensuring efficient time and resources management. The adoption of TQM by educators was envisioned to establish quality in education (Peters and Waterman 1982; Sallis 1996) with direct reference to learner centeredness. In a similar vein to Knop and Meunier (2014), who adopted a SWOT perspective on understanding the research environment, the present study adopts the same philosophy instead of needs analysis due to practical reasons and institutional restrictions.

On the one hand, in light of the SWOT philosophy, the strengths and opportunities can be listed as a) the institutional emphasis on learner autonomy, b) high-end technical infrastructures, c) learners having laptops, d) the use of learning management system (LMS) Schoology which communicates directly to 'digital natives' (Prensky 2001), e) the gamified approach to language learning which can be a source of motivation for learners (Ybarra and Green 2003), f) teaching materials being developed in-house, g) the multi-national on-campus community that provides a basis for the need to learn and use the target language by learners (Gardner 1985; Dörnyei 1994). The weaknesses and threats, on the other hand, can be listed as a) the lack of linguistic input for Turkish-L1 learners off the campus, b) a lack of linguistic self-confidence in local learners unlike the international ones, which raises their affective filters (Krashen 1981), c) time constraints due to the density of the course content, d) the dynamic nature of the preparatory program, e) a lack of institutional decision taken about outposts materials developed, f) the dull nature of concordancing software which may not appeal to Gen-Y and Gen-Z.

With a view to addressing the linguistic needs of the learners participating in this study and objectives designated by the curriculum, a corpus database of approximately one million words was compiled out of the academic texts used in reading classes in addition to the transcriptions of listening materials (mostly academic lectures) in a machine-readable format (with a .txt extension) ready to be analysed on AntConc (Laurence 2014). This corpus was then called The Alternate Corpus of Academic Texts (the ACAT), which was later combined with a corpus of graded readers that was previously compiled by the researcher to serve a similar purpose and to increase the representativeness of the database. The total volume is approximately 5 million words. Table 1 below shows the design criteria.

Table 1: The Design Criteria of the ACAT

Source	Level	Size
Listening archive	Levels 1-4 (CEFR A1-C2)	10%
Reading corpus	Levels 1-5 (CEFR A1-C2)	40%
Graded readers library	Levels 1-6 (CEFR A1-C2)	50%

As the present study aims to train learners to be self-sufficient and autonomous learners rather than understand linguistic phenomena unlike studies like Nesselhauf (2004) or Cheng (2010), the ACAT was not compared to native speaker corpora; such as BNC, BAWE, BASE, COCA or LOCNESS.

Development and Piloting of the Corpus-based Teaching Materials

Unlike single-register corpora like VOICE (Seidlhofer 2002; 2004) or ELFA (Mauranen 2003), the ACAT offers a combination of spoken and written registers, providing learners with a relatively broader panorama of naturally occurring (Sinclair, 1991) language in authentic academic texts and speech. another advantage to working with corpora compiled out of texts already in use within the curricula can be that learners will have increased exposure to the language specific to their field of study in their faculties. This can also allow teachers to keep the 'momentum' (Kounin 1970: 96) without needing to intervene to boost motivation. Furthermore, learners can find breathing space when they feel overwhelmed by the level of complexity of the pre-selected exemplars in the handouts, as they can find some others that can eventually facilitate their understanding.

Based on the ACAT, a new set of LA2 materials were developed ad hoc. The implications of this are twofold. Firstly, the LA2 syllabus seemed not to be supported efficiently by the reading and listening materials. In other words, learners had little chance to see the grammar they learned in LA2 take effect in reading and listening classes. Therefore, learners were performing relatively poorly in writing classes. Secondly, the existing set of LA2 materials were poor in contextuality even though they were prepared by native speakers. They bore a relatively narrower range of contexts, representing only the intuition of the writers often depicting solely the mechanical functions of grammar forms. However, there were also moments when even the ACAT endorsed by the readers' corpus fell short of representing the grammar forms at a satisfactory level. Online corpora such as <http://fraise.it> or <http://skell.sketchengine.co.uk> (Kilgariff et al. 2014) was instrumental to make up for this shortcoming. Table 2 below shows the dispersion of sources used in corpus compilation.

Table 2: The Selection Criteria for the Examples

Source	Primary Selection Criterion
The Readers Corpus	Level 1-3 mainly
The Listening Archive	Level 1-3 mainly
The Graded Readers Corpus	Level 1-4 mainly

To ensure the face validity of the materials developed, a group of native and non-native language instructors was asked to pilot the materials and comment on the following criteria:

- Effectiveness in addressing the grammar focus; whether the material successfully addresses the grammar focus of each lesson
- Level of difficulty; whether exemplary statements are level-appropriate or not
- Self-attainability; how the tasks can affect learner motivation and uptake

After the feedback on the above-mentioned criteria had been received, necessary alterations and adaptations were made before the material was put in use.

Getting the Learners Au Fait with DDL

First impressions matter when learners are introduced to novelty in education and reinforcing new habits can be challenging for teachers. Affective barriers in language classrooms are quite sensitive to changes. Even though learners usually tend to welcome new applications, teaching, and learning media, devices, or software, it is teachers' responsibility to mediate between what is new and what is already there to alleviate resistance stemming from affective issues. Especially, when it comes to using specialized linguistic software with learners, a lot of handholding and reassurance might be crucial so that learners can move on.

Experiencing something new, say the first ride on a roller coaster at an amusement park, can be the hardest however much one is willing. Things might get all the more difficult when it is all about reshaping cognitive mechanisms enabling one to study grammar in a language class in a way that is not familiar to them. Hence, a language teacher with DDL in mind needs to undertake some responsibilities, such as performing as expertly as possible on the computer and with the software, knowing their subject well, providing learners with reassurance and guidance, emotional leadership along with academic resourcefulness. It is also the case that a competent language teacher foresees possible issues and contingencies and design and implement strategies to get over any contingencies rather than offering help candidly and aiming at accompanying learners throughout their journey into the uncharted territories ahead instead of inculcating precepts, helping them mingle with the language more when learners begin slithering, and letting them go independent as much comfortably as possible as they grow more and more confident in themselves.

At moments of heightened anxiety, code-switching to L1 can be of great ease especially in monolingual settings. Imprudently sticking with L2 as a medium of instruction might subvert the whole effort. However, L1 should be resorted to as a means of reassurance rather than communication between the teacher and learners. Teachers need to make it clear to the learners that they know what they are doing; or else, valuable class time might be wasted swaying back and forth like a pendulum swing. A well-tailored and monitored discourse employing elements of both learners' L1 and L2 might get them to dip their toes into the water (a metaphor here) as quickly as possible. Once this is ensured, the rest will be cognitively less challenging on the learners' side, but physically more for teachers as they will need to rush about the class responding to distress signals sent silently, calls for help, and individuals, duos, or trios crowing like a football coach during a training emitting positive energy.

Teachers themselves will also be urged to put their hands on the computer by the learners. Teachers need to opt for an attitude of a research leader, rather than an instructor, aloof, disseminating messages from a distance, or behaving like a game warden (another metaphor) alerted by trespassers destroying the rule. Mistakes by learners should be welcome and taken care of with utmost conscience and leniency. All of these are necessary steps towards establishing a learner-friendly atmosphere that can foster learning and lessen the adversities that might result from having to interact with specialized software.

From what has thus far been discussed, it follows that the familiarization period should be well-engineered by teachers so that a possible backlash could be eliminated.

The use of a learning management system, such as Schoology, can facilitate the communication of the novelty to the learners in a well-organized manner. Colour coding folders and sub-folders can work well as visual aids helping teachers out with time classroom management. Getting learners to work in pairs or groups of three could also give a lot of leverage to teachers. Assigning each group to work on a different part of the specific content of each lesson and then asking members of different groups to mix to interact and share with others what they have studied might also help the novelty introduce to take root in learners.

Learners can vary greatly as to how adept they are at using technology. Therefore, teachers are advised to be vigilant so that they can identify individual learners who are more prone to using technology than others. These learners can be asked to help others out with their computers and the software for good measure. Otherwise, the tech-enhanced nature of a DDL classroom might inadvertently drown some learners like shifting sand.

Introducing the learners to how they can interact with and use the software and the corpus to help themselves learning more easily at their own pace are indeed indispensable first steps of a DDL classroom. The motto 'less is more' needs to be adopted because the more complicated something is, the harder it becomes to learn it. Teachers are, therefore, responsible for scaffolding the familiarization period. Focusing on only a few functions of the software and teaching learners how to vary some basic functions such as keyword in context (KWIC) searching might adequately fulfill the deed.

Bearing all that is discussed above, attempts were made to ensure a smooth passage from a teacher-fronted language instruction, which the learners forming the sample of the present study are believed to be used to, to a DDL-based one orienting to micro-scale linguistic research for language learning. The learners were asked to experience AntConc and the ACAT through trial and error at the initial stages until they felt much more comfortable. And, as they grew more self-confident with AntConc and the ACAT, the teacher gave the floor to the learners, incrementally allowing them more space alone.

Introducing the Learners to the Corpus-based Teaching Materials

Since it was not possible to isolate the groups to whom the intervention was applied from the rest of the institution, the corpus-based set of course materials developed using AntConc and the ACAT had to be dressed onto the existing syllabus. The then-current syllabus in effect featured 30 lessons covering 20 different grammar focus points. This corresponded to 28 hours of DDL instruction in each of the four groups which the researchers studied.

The facilities ubiquitous onsite were employed to establish a DDL-oriented repertoire of addressing the learner needs. The LMS used institutionally, Schoology, played a crucial role in the delivery of the resources and made available some means making it possible for the learners to reach out to the researcher offsite. The related course pages on Schoology were re-designed to fit the novelty introduced. The researchers walked the learners through the folders and sub-folders as part of the hand-holding process. Figure 1 demonstrates the course page design for DDL instruction.

Bypassing the existing curriculum without changing the ultimate curricular goals, a brand-new set of corpus-based materials was developed by the researchers and put into action. These were comprised of two main bodies. First, learners were exposed to the authentic use of the target grammatical forms in the ‘Grammar Introduction’ parts (GIs). Reading through concordance lines curated by the researchers, learners got exposed to the level appropriate input. To reinforce this reading practice, learners were guided through exploring the ACAT performing simple keyword-in-context searches on AntConc in a hands-on fashion, which is formulated as “simulated academic reading” (SAR) in(2019), and Çakır and (2020). This teacher-guided self-paced reading activity to build up personal knowledge of L2 grammar enabled the learners to segue their way into the ‘Grammar Application’ parts (Gas), where they were asked to do exercises in four main categories as outlined in Table 3.

Table 3: Subsections in the GAs

Task type	Task objective
Gap-filling	Learners are prompted to fill in the gaps with the correct forms
Error identification and correction	Learners are prompted to find errors and correct
Finding the meaning	Learners are prompted to find paraphrases for given sentences
Simple sentence writing	Learners are prompted to write simple sentences using the form

Sampling

Driven by the then prominent timetabling issues, the researchers had to include the groups of learners they taught in this study. This resulted in the casting of four different groups of learners in two consequent terms each of which lasted eight weeks. The dispersion of the groups and the terms are shown in Table 4.

Table 4: Selected LA 2 Groups

Group	Term
1	A
2	A
3	B
4	B

In term A the researchers worked with two level-two groups, both of which were included in the study. Then, in term B, there were three level-two groups available, two of which were selected randomly. The learners in these four groups were all Turkish-L1 learners who succeeded at Level 1 in a previous term as well as several others who failed the second level at the end of the same term. The terms differed in terms of the members in each of the four groups. Hence, the asynchronous nature of the data collections results from the fact that the study was participated by different groups and individuals in two consecutive terms. This also caused an unorthodox experimental design where the groups in each discrete term featured de facto control groups comprised of learners repeating the second level of the course. This is so because the researchers had learners who hadn't had any DDL experience in both terms. Also, each group was participated by a group of repeaters.

Data Collection and Analysis

Quantitative and qualitative data collection tools were used in the study. Quantitative data were collected through the application of a pre and post-test of a seven-week "deductive DDL" (Cresswell 2007: 270) instruction. Both the pre and post-test followed the same format as the teaching materials developed ad hoc. As the researchers were institutionally restricted to intervene in the official exam procedures, learner achievement in these was disregarded, thus making this study a quasi-experimental one. Unlike studies like Goudarzi and Moini (2012), Kılıçkaya (2015), or Kabir and Kisai (2017), this study does not feature a delayed post-test due to time constraints. A paired-sample T-test, rather than a one-way ANCOVA, was calculated as the number of the variables to be compared was two. The qualitative data were collected through a semi-structured interview with the participation of 26 learners, which accounts for almost 33% of the samples. Table 5 shows the demography of participants in the focus group interview.

Table 5: The Participants of the Focus Group Interview

Term	Group	Number of participants
A	2	13
B	4	13

The participants were asked to provide written responses to a survey of three open-ended questions. The responses were then compiled into a small-size corpus for frequency analysis. Common codes/themes emerging in the survey were listed and interpreted.

Findings And Discussion

This study aimed to expand and deepen our understanding of the ways DDL activities can be incorporated into grammar instruction in an L2 context for fostering autonomy and creating effectiveness of learning for EFL learners. Although several studies so far have examined the effectiveness of DDL for ESL/EFL learners most of them are based on limited data and it seems that more empirical studies are needed to validate the DDL approach for language learners. It is also clear that DDL approach needs to be examined from the perspectives of “evaluation of the attitudes, practices of the learners, and efficiency” (Boulton 2008: 41). We believe that examination of the effectiveness of the DDL activities in an L2 context will be a new contribution to the field. The qualitative and quantitative findings obtained from the study seem to suggest that the learners performed noticeable progress in learner performance of both tests with DDL instruction. This relative success can be given to several factors as well as the positive role of DDL instruction. Research logs used by the researchers revealed several content words for further analysis. The focus group interview data also revealed a positive reaction towards DDL-based grammar instruction. It is also revealed that DDL-based grammar instruction helped increase the learners writing through serving as a tool to provide many contextual examples. Finally, AntConc software was found to be an ideal tool for DDL-based grammar learning activities.

Quantitative Data

Quantitative data was collected through the application of a pre-test and a post-test. As previously stated, the pre-test was designed to look similar to the official midterm examination while the post-test was designed to look similar to the official final assessment so that they can also serve as alternate exam practice materials, with the extent of the latter being larger than the former. The marking scheme for both the pre and the post-test were similar to that used for official exams administered at the institution. This was done intentionally to increase the learners’ commitment and attentiveness so that they can perform at an optimal level. The marking was blindly carried out by two colleagues of the researcher.

The test scores of the learners taking part in the study were first categorized and interpreted and later analyzed on SPSS to see whether the DDL instruction made a statistical difference or not. For this purpose, a paired sample T-test analysis was carried out on SPSS. The statistical difference between their pre and post-test scores was calculated and interpreted.

Pre-test

The study commenced with 78 learners; however, due to various personal reasons, 6 learners dropped (F-DROP) the course after 4 weeks, causing the initial size to fall to 72. The study was completed with 72 learners. 5 out of these 6 learners dropping the course were first-time takers (F) who joined the preparatory program language awareness courses at level 1 in the previous term. Learners 2 and 16 in group 4 and 20 in group 3, who are also F-DROPs, took the pre-test but did not answer any questions. Learners 11 and 12 in group 4 took the pre-test but scored below 50 points. Table 6 shows the number of learners in each group

Table 6: Number of Learners in Each Group Participating in the Study

Group	Number of learners	Term
1	20	A
2	18	
3	20	B
4	20	

The study commenced with the application of a pre-test. There were 40 points available in the test so that the test could represent the official exam pattern. The scores of the learners are calculated first out of 40 points, and then out of 100 and the percentages were rounded off to a bigger decimal. The difference between the pre-test performances of Rs (n=32; later n=31) and Fs (n=46; later n=41) was as shown in Table 7.

Table 7: Average Pre-test Scores of Repeating Learners (Rs) and First-time Takers (Fs)

Rs average pre-test score	Fs average pre-test score
53	55

In general, Rs started with a slightly lower performance when compared to Fs excluding F-DROPs. After a closer inspection of the demography of the Rs, it was observed that, out of 32 Rs, 15 were learners from the previous academic year who had to repeat LA 2 for another time and 17 were those who started taking LA 2 at the beginning of the academic year in which this study was carried out. The latter 17 Rs are freshmen who joined the preparatory program right from LA 2 after coming out of the exemption exams with their grammar knowledge being identified as adequate for level 1. The contrast between the success rate of Rs and Fs can be seen in Table 8.

Table 8: The Demographic Diversity of Rs in Terms of Learnership

GROUP 1	Category	Times repeated the same level
L3	R1	3
L4	R2	1
L5	R3	3
L7	R4	1
L13	R5	3
L17	R6	1
L20	R7	1
L21	R8	1
GROUP 2	Category	Times repeated the same level
L4	R9	1
L5	R10	3
L6	R11	1
L8	R12	3
L10	R13	1
L12	R14	3
L14	R15	3
L15	R16	1
L18	R17	1
L19	R18	1
GROUP 3	Category	Times repeated the same level
L7	R19	3
L11	R20	3
L15	R21	1
L18	R25	3
L19	R24	1
GROUP 4	Category	Times repeated the same level
L1	R25	3
L4	R26	1

L5	R27	3
L6	R28	3
L9	R29	1
L10	R30	3
L13	R31	3
L15	R32	1

LA 2 learner population of the preparatory program at the beginning of the academic year was 68 and 17 of these learners, which accounts for 25% of the total LA 2 population right at the beginning of the same educational year, had to repeat the same level of LA in the second term of the educational year, which is when this study was initiated, after receiving LA 2 instruction with non-corpus-based lesson materials and/or deductive DDL instruction even though autonomous learning and self-discovery were under the spotlight. Although it doesn't seem to be a big number at first sight, considering the continuously and gradually increasing number of LA 2 takers, the number of learners succeeding LA 2 needs to be higher than its present value for the curriculum to be carried on without compromising the overall philosophy and simplifying the level of difficulty. As the number of learners taking LA 2 can vary from one term to another, more teachers might need to be assigned to teach LA 2, which can affect teachers adversely by increasing the workload. Therefore, it can be assumed that the less is more principle works very well for the existing system. Bearing these in mind, the pre-test scores of the Rs were promising; however, the post-test scores of the learners should be compared with these pre-test scores to reach a final decision about the real situation in the stated terms.

Post-test

Following the implementation of the innovation through DDL and corpus-based teaching materials developed ad hoc, the learners were given the post-test. The post-test tasks were the same as that of the pre-test with a difference in the topics covered. The learners seemed to have performed seemingly better on the post-test by and large. However, attributing all the credit to the DDL techniques would be unrealistic as the depth of the change made seems to be profound considering the educational habits and backgrounds of the learner-participants. There can be other factors that contributed to learner performance such as collaboration with other learners, which was promoted by the researcher, aptitude, and positive motivation along with social factors.

When the pre and post-test scores of the learners are compared, only 9 students appear to have scored lower on the post-test than the pre-test. Table 9 shows the learners whose pre and post-test scores did not indicate a positive change.

Table 9: Learners with Decreased Performance on the Post-test

GROUP 1	Pre-test score	Post-test score	% of Change	Result	Category
L4	45	42	-6,66	NEGATIVE	R2
L7	37	37	0	NEGATIVE	R4
L11	78	72	-7,69	NEGATIVE	F7
L17	49	41	-16,32	NEGATIVE	R6
GROUP 2	Pre-test score	Post-test score	% of Change	Result	Category
L10	64	59	-7,81	NEGATIVE	R13
GROUP 3	Pre-test score	Post-test score	% of Change	Result	Category
L18	67	65	-2,98	NEGATIVE	R23
L19	64	63	-1,56	NEGATIVE	R24
GROUP 4	Pre-test score	Post-test score	% of Change	Result	Category
L1	70	64	-8,57	NEGATIVE	R25
L15	70	54	-22,85	NEGATIVE	R32

As the figures in Table 9 above show, 8 repeaters and 1 first-time taker were not able to demonstrate a positive change in the post-test. There may have been various reasons, so many that this could become the incentive for follow-up research. However, as the demographic mobility of learners through this utterly dynamic preparatory program cannot be controlled by the researcher, these possibilities have to be ignored.

Analysis of the Quantitative Data

A paired sample t-test was calculated to see whether the innovation could cause a statistically meaningful increase in test scores of the participants who finished the term within the study. The pre-test mean scores were compared with the post-test mean scores of the learners in each group. The Sig. (2-tailed) value of the paired samples t-test has to be below 0.5 so that the training can be considered to have made a statistical difference. Sig. (2-tailed) values are as shown in Table 10.

Table 10: Sig. (2-tailed) Values for Groups 1-4

Group	Sig. (2-tailed) value
1	0,000 < 0,5
2	0,000 < 0,5
3	0,000 < 0,5
4	0,252 < 0,5

As can be seen in Table 10 above, the deductive DDL instruction seems to have made a statistically significant difference at the end of 7 weeks. With these being the statistical output of SPSS, it is not possible to give all the credit to the DDL methodology, though. It is pretty much obvious that other factors are contributing to the efficiency of the techniques one of the most significant of which can be motivation. Towards the end of any given term learners were observed to be intrinsically motivated more than they had been at the beginning and during the application. This may have also contributed to the learners' relatively increased success on the post-test.

Qualitative Data

The qualitative data were collected using a research log and a semi-structured interview. The respondents to the latter were asked to provide written replies to an online survey in either Turkish or English.

The Research Log

Throughout the application of DDL techniques, in terms A and B, the researchers had one-on-one talks about what the learners thought and how they felt about the new technique that they went through. The researchers also kept a research log, the entries to which represented their personal experiences with the learners to provide future researchers with insights into possible opportunities and obstacles that an educational researcher may have to deal with throughout studies like the present study. Table 11 shows the common codes/themes emerging in the research log.

Table 11: Encoded Representation of the Codes/Themes that Emerged in the Research Log

Keyword	Frequency	Number	Codes and Themes
Learners	12	1	... without my instruction learners autonomously started to ...
		2	... positive. During lessons learners yielded positive feedback ...
		3	... embraced by some learners though the number ...
Database	7	4	... add new text into the database and make it ...
		5	... of having a database of academic texts ...
Students	5	6	... they are university students I do not ...
		7	... or, are the students only trying to ...
		8	... I see some students though only a [few]...
Grammar	4	9	... texts and study grammar through these was [embraced] ...
		10	... others referring to grammar reference books as ...
		11	... why they consulted grammar books and if ...
		12	... understanding of the grammar element they were ...
Asked	4	13	... some even asked if it was [possible] ...

As can be seen in Table 11, five content words appeared to have analytical value. ‘Learner’ is the most frequently used word in the research log. This may indicate that a large number of learners hesitated to trust and adopt novelty, and they demonstrated an increasing level of engagement with the new techniques. The word ‘database’ demonstrates learners’ commitment into the application of the new techniques in two concordance lines only. The idea of having one’s language database seemed to be in close interaction with the establishment of learner autonomy. The words ‘learners’ and ‘students’ appear to be of different qualitative value in this research. The word ‘learners’ can be associated with a more positive atmosphere while ‘students’ appears to be used when there arose an issue with operational procedures of the new techniques applied. ‘Grammar’ and ‘asked’ received 4 hits each on the frequency analysis. Although these two words have the same number of occurrences, ‘grammar’ seemed to have greater qualitative value as four concordance lines provide insights into realities of the samples. It can be argued that DDL was not able to fully change the learners’ minds about traditional language instruction. Instead of abolishing their learning habits altogether, they somehow tended to keep one foot on the safe territory, which seems to be “grammar reference books” for them. As for the word ‘asked’, it denotes the effort of some individuals to speculate about the usefulness of and manipulate the new techniques to address their personal pedagogical needs as language learners.

The Focus Group Interview

Two focus group interviews were held with group two in term A and group 4 in term B to increase the scope and the reliability of the findings through the analysis of the qualitative data collected. Groups two

and four were interviewed at different times. Group two was interviewed within week four of term A and group four was interviewed at the end of week seven in term B. The groups were interviewed on a two-week-lapse in terms A and B so that the researcher could understand how the learners would react to the techniques over time and if the motivation levels of the learners decrease or increase considering the official exams being close. There was a total of 26 respondents, 13 respondents from each group, accounting for almost one in every three learners participating in this study. The questions that were asked are as follows:

1. Do you think DDL techniques helped you improve your grammar? Yes; how? No; why?
2. Do you think DDL can also help you improve your academic writing skills? Yes; how? No; why?
3. What is your overall opinion about DDL techniques? Please, share.

Analysis of the Interview

A frequency analysis was conducted for the responses to each question separately to see the common codes/themes emerging. The frequency list yielded by the software demonstrated a positive atmosphere as shown by Table 12.

Table 12: Encoded Representation of the Codes/Themes that Emerged in the Focus Group Interview for Question 1

Question 1	Codes/themes	Responses
Do you think DDL techniques helped you improve your grammar?	Yes	1, 6, 7, 8, 9, 10, 11, 14, 18, 19, 20, 22, 26
	improve my grammar	4, 11, 12, 13, 20, 21,23
	help me/us learn	15, 8, 19, 4, 23, 10, 26, 11, 6, 21

The first question of the interview was aimed at investigating the overall attitude towards and perception of the computational techniques of the study. As can be seen from table 28 above “yes” was a frequent answer to the question, which demonstrates an overall positive attitude towards the methodology applied. The second most common code/theme that appeared in the responses represented the fact that the students thought DDL techniques helped “improve their grammar”. With a strong connection to this, the third code/theme also confirms this affirmative trend in the responses with 10 respondents reporting that they thought DDL techniques “helped them learn” grammar.

Table 13: Encoded Representation of the Codes/Themes that Emerged in the Focus Group Interview for Question 2

Question 2	Codes/themes	Responses
Do you think DDL can also help you improve your academic writing skills?	Yes	1, 6, 7, 8, 9, 10, 11, 14, 18, 19, 20, 22, 26
	I can improve/remember/learn	4, 11, 12, 13, 20, 21,23
	different sentences/forms/usages	15, 8, 19, 4, 23, 10, 26, 11, 6, 21

As can be seen in table 13 above, 13 out of 26 respondents replied saying “yes”, 7 of them reported that they thought they could improve their writing as DDL helped them remember and learn more. 10 other respondents clarified their positive attitude by referring to the fact that DDL is a source of “different example sentences, forms and usages” which eventually increased their exposure to the naturally occurring language.

Table 14: Encoded Representation of the Codes/Themes that Emerged in the Focus Group Interview for Question 3

Question 3	Codes/themes	Responses
What is your overall opinion about DDL techniques?	(AntConc) is a good application	1, 6, 7, 8, 9, 10, 11, 14, 18, 19, 20, 22, 26
	(I/We) can use/learn	4, 11, 12, 13, 20, 21,23
	(DDL/AntConc) is helpful	15, 8, 19, 4, 23, 10, 26, 11, 6, 21

The third interview question aimed at receiving subjective wording of what the respondents thought about DDL techniques. As table 14 shows, 13 out of 26 students said that the software was a “good” application. With only a few suggesting a mobile application that could have facilitated the procedures, 7 said that they were able to use the software to learn while 9 others reported AntConc to be a helpful tool for learning grammar.

Conclusion, Implications, and Limitations

From a broader perspective, it should be accepted that any experimental study in education can yield positive or negative results depending on the variables and circumstances defining the flow of applications. In this study, whose aim was to see the extent of the effects that the interaction between learners taking LA 2 and DDL techniques, the results were in favour of what is frequently put forth in DDL literature reviewed in this study. In the study, the learners were required to carry out KWIC searches using a specified corpus database named the ACAT so that they can notice patterns and inform their future language performances. These direct and teacher-guided experiences of learners with corpora helped the

researcher understand the impact caused by DDL both quantitatively and qualitatively, which offers a multidimensional perception of these realities of the samples of the present study, though.

Thinking back to the initial phase of this study, the researchers were inspired by the idea that when learners are allowed to explore the language by their own means making use of computers to analyse digitalized compilations of naturally occurring language, it would be easier to both satisfy the needs of the learners and the curricular requirements and objectives of an institution teaching English as a foreign language. Therefore, individual differences between learners would not be much of an issue as the level and speed of the input are adapted by the learners themselves rather than an outsider which is the teacher in a language classroom. Problem-solving skills, self-determination, and a sense of independence appear to be the essential survival skills for individuals with an academic outlook on life.

From a more technical point of view, it is possible to say that in today's rapidly changing and growing world, learners need to become self-sufficient in terms of accessing information so that they can keep up with the pace. Therefore, the abundance of digital technologies, which allow users to access information wherever and whenever they need them, can easily find solid grounds as a source of inspiration for technology enthusiasts teaching languages to incorporate these into their teaching to provide their students, who were born into a relatively more digitalized world, with better opportunities than traditional printed teaching materials, which remain unchanged and become obsolete in a very short period after learners obtain them, may not. In this same vein, in the context of the present study, to introduce the notion of combining computer technologies and, also web to some extent, as a source of information with self-guided learning as a study skill and a major technique to utilize to learn a language, AntConc 3.4.4 (Anthony, 2014), freeware available online that can be used for linguistic inquiries in and outside classrooms by learners, was exploited all the way through.

To sum up, even in the absence of a genuine control group, it can be possible to establish an experimental design referring to varying demographics in classes. This study aimed to demonstrate a novel approach to experimental designs in DDL studies, ruling out the need for an external control group but rather focusing on internal demographics to get a deeper insight into how two different kinds of learners forming a group could react to the same inductive language instruction. The present study concludes that DDL can diminish the chances of failing a grammar course when learners approach from a self-regulated perspective whether they take the same course once or twice. DDL can help learners self-diagnose their conditions which could otherwise be hidden from teachers' sight in a traditional language learning setting.

As for what can be said about the future of teaching English through DDL methods, this study, which suggests DDL as a practical approach to both learning and teaching English as a foreign language, may not be able to fulfill its purpose without the statement of some future implications for researchers studying in the field of corpus linguistics and its educational applications, language learners, language teachers who are eager to update, improve and enrich their teaching through research as well as tertiary-

level curriculum developers who are in search of experimental solutions for the long vexed and concurrent problems in language teaching and learning.

Regarding the particular context of this study, it can also be claimed that the adopted methodology for the study bears educational practicality and that educational research carried out by teachers in real-life settings can be a way of understanding the learners' potential within a certain context. As mentioned previously, learners' achievement in academic writing is expected to be higher even though this may not always be the case. This may result from a lack of enough reading at an academic level. A survey on how learners perceive themselves as academic writers and how faculty teachers evaluate the learners' current status can yield data supporting the findings of this research and inspiring further research that can contribute to the literature. Moreover, further practice materials exploiting corpora other than the ones used in this study can be developed and deepen the understanding of the issues emerging in classrooms and the effect of the techniques applied in this study.

Every year, the number of students accepted to universities in Turkey increases due to the growing population of young people. In the particular context of this study, the primary implication of this is twofold: first of all, it means there are now more learners to go through this peculiar system which increases the burden on teachers teaching subjects like LA and writing which require the teacher to provide individual feedback for every learner unless the number of teachers doubles, which seems to be a weak possibility. Secondly, the aptitudinal characteristics of new learners may not be favourable enough to support a curricular structure that highlights autonomous learning and self-sufficiency of language learners. These increase the importance of the need for the learners' self-efficacy and self-determination considering their own learning. It can be assumed that DDL techniques and a curriculum based on the use of these techniques can facilitate possible difficulties posed by external variables. Therefore, the application of these techniques and teaching materials is highly advisable in the particular context of the preparatory program. This research is therefore significant and considerable in that it offers insights into the utilization of DDL techniques as a means of problem solving in educational contexts.

To sum up, universities offer greater opportunities for researchers studying in language teaching and provide them with flexibility. DDL as a concurrent theme in corpus linguistics is capable of making a change in the way English is, or in more general terms, languages are taught. DDL seems to be the perfect fit for language schools that run on a tight schedule as it highlights learner autonomy with the use of technology carrying language learning beyond the walls of classrooms. Therefore, DDL could be a remedy for concurrent shortcomings of in-class language teaching and a language learning skill for the perpetuation of learning at one's own pace

It may be highly unrealistic to say that a single study can ask and answer all the possible questions and find solutions for every single issue that may arise. However, it could be possible to say that a combination of multiple studies can compensate for what individual studies in the same field lack. Therefore, it can be assumed that the scope of this study can be further extended through applications of

other studies that focus on different aspects of the educational applications of corpus linguistics and different elements of English which this study doesn't.

Having said all of these above, it should be mentioned that this research aimed at understanding the realities of a specific and relatively small group of learners. While the following statements may be true about the sample of this study, they may not apply to the whole population of learners even in the same institution. Therefore, it would be more feasible to limit the future implications of this particular study with the specific context of LA 2 learners for the following terms.

Abbreviations

Alternative Corpus of Academic Texts (ACAT), English as a foreign Language (EFL), English for Academic Purpose (EAP), Data driven Learning (DDL)

Declarations

Ethics approval and consent to participate

The authors confirm that this study does not need ethics committee approval. (Date of Confirmation: 16.01.2021)

Not applicable

Consent for publication

Not applicable

Availability of data and materials

The data is available in the form of a MA thesis in the following link.

<https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp>

All other data supporting our findings can be found in the reference section.

Competing interests

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Authors' contributions

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Figures

The screenshot shows the Schoology interface. At the top, there is a red navigation bar with 'COURSES', 'GROUPS', 'RESOURCES', and 'TOOLS'. On the right side of the bar are icons for search, grid view, calendar, email, notifications (14), and a user profile for 'Mustafa Özer'. Below the navigation bar, the left sidebar contains 'My Resources' with categories: Search, Personal (Home, Learning Objectives, Downloads, Public), Public (Data-driven Learning, Lexical Priming, Listening), Group, and Apps. The main content area is titled 'Data-driven Learning' and shows a list of resources. At the top of this list are 'Add Resources' and 'Options' buttons. The list includes:

Title	6 of 6
The ACAT Added by You · Feb 3, 2019	
Readers Corpus Added by You · Feb 3, 2019	
AntConc Added by You · Feb 3, 2019	
Pre-test Added by You · Feb 3, 2019	
Post-test Added by You · Feb 3, 2019	
Corpus-based Course Content Teaching Materials Added by You · Mar 4, 2019	

Figure 1

The DDL page preview on Schoology