جامعة المنصورة
كلية التربية

A Proposed Corpus Linguistics-Based Program to Develop EFL Student Teachers' Translation Competence and Reduce their Cognitive Load

By

Noha Basyouni Abdel Samad Basyouni
English Teacher at STEM Schools

Supervised by

Dr. Adel A. AlSheikh
Prof. of Curriculum & Instruction (TEFL), Faculty of Education, Mansoura University

Dr. Samah Rizk Hassan
Assistant Prof. of Curriculum &Instruction (TEFL), Faculty of Education, Mansoura University

Journal of The Faculty of Education- Mansoura University
No. 128 – Oct . 2024

A Proposed Corpus Linguistics-Based Program to Develop EFL Student Teachers' Translation Competence and Reduce their Cognitive Load

Noha Basyouni Abdel Samad Basyouni

Abstract

The current study aimed at exploring the use of a proposed corpus linguistics-based program to develop student teachers' translation competence and reduce their cognitive load. The study sample consisted of seventy-seven third year student teachers at the Faculty of Education, Mansoura University. The participants were divided into two groups: an experimental group (n=34) and a control group(n=43). To collect data the researcher designed a translation competence checklist, a pre-post translation competence test, and a cognitive load scale. Quantitative analyses of participants' performance revealed statistically significant differences between the mean score of the experimental group and those of the control group on the post-administration of the translation competence test and cognitive load scale favoring the experimental group and statistically significant differences between the mean scores of the experimental group on the pre- and post-administrations of the translation competence test and cognitive load scale favoring the post-administration. Besides, the qualitative analysis of results supported the significant impact of the corpus linguistics-based program on developing student teachers' translation competence as students' responses to the tasks were analyzed. It was recommended that the proposed program should be integrated into teaching translation courses for tertiary level.

Key words: corpus linguistics, translation competence, cognitive load.

المستخلص

هدفت الدراسة لبحث استخدام برنامج مقترح قائم على اللغويات النصوصية لتحسين مهارة الترجمة لدى الطلاب المعلمين وتقليل العبء المعرفي عليهم. تكونت عينة الدراسة من ٧٧ طالب معلم من طلاب السنة الثالثة في كلية التربية بجامعة المنصورة. تم تقسيم المشاركين إلى مجموعتين: مجموعة تجريبية ومجموعة ضابطة. شملت المجموعة التجريبية ٣٤ معلمًا طالبًا، بينما تضمنت المجموعة الضابطة ٤٣ معلمًا طالبًا، وقد اعدت الباحثة بطاقة مهارات الترجمة واختبار الترجمة ومقياس العبء المعرفي، وتوصل البحث للنتائج التالية:

١- يوجد فرق ذو دلالة احصائية عند مستوى ٠،٠١ بين متوسطى درجات طلاب المجموعة التجريبية والضابطة على التطبيق البعدى لاختبار مهارات الترجمة لصالح المجموعة التجريبية.

٢- يوجد فرق ذو دلالة احصائية عند مستوى ٠،٠١ بين متوسطى درجات المجموعة التجريبية والضابطة على التطبيق البعدى لمقياس العبء المعرفي لصالح التطبيق البعدى.

Introduction

Translation has always been featured in literature as a macro cognitive activity which implies several cognitive processes that take place synchronously such as decision-making, planning, monitoring, evaluation, and problem-solving. Recently, there has been a growing interest in using corpus linguistics to improve language learning and teaching. More specifically, there has been a focus on developing translation competence through using corpora. On a key note, cognitive translation, as a spin-off cognitive linguistics, addresses the need for linguistic and intercultural knowledge which turned to be an eligible requirement imposed by the competitive global market. Moreover, revolutionary artificial intelligence (AI)-powered instruments have garnered increasing debate about the future of data-driven learning. This literature review chapter explores the research on corpus linguistics-based programs designed to reduce cognitive load and improve translation competence among EFL student teachers.

Review of literature

This part aims to provide a comprehensive overview of corpus and language learning, data-driven instruction, and cognitive load reduction.

Translation Competence

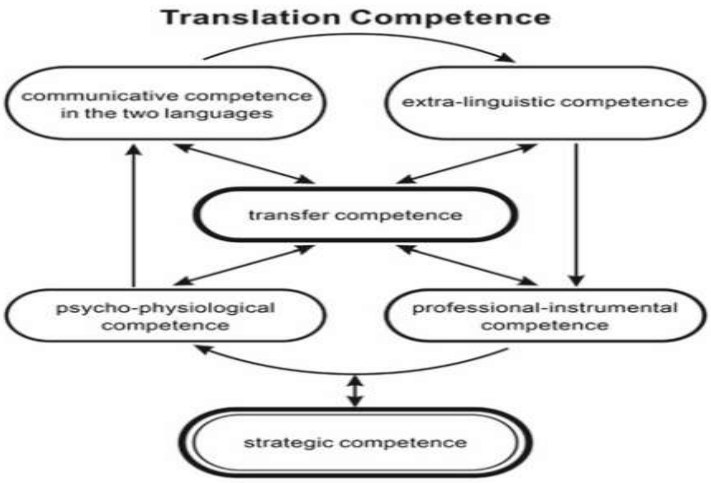
Translation competence is defined according to the pedagogical model of competence as the abilities, skills and attitudes required to execute an activity successfully and it therefore affects different aspects of the translator's training and work (Ressurrecció, Piorno, and Izquierdo ,2008). They view translation competence as an infinite state of acquisition that requires translators to continually embrace new knowledge, and hence, to be creative and adaptable to different situations. Neubert (2000) stated that there are five parameters that each translator has to develop to varying degrees depending on their competences and requirements. The five parameters that make up translation competence are language competence; textual competence; subject competence; cultural competence; and transfer competence. The interaction among these five competences is what distinguishes translation from other areas of communication.

Pym (2011) highlighted the students' abilities, interpersonal skills and attitudes that contribute to interacting with texts. Additionally, Pym stated that the development of translation competence is based on the improvement of students' problem-solving skills to help learners organize and plan better using their knowledge, skills and attributes. Problem-solving skills can be enhanced through immersing students in practice fostered by input sessions to promote, reconstruct and evaluate students' actual

knowledge, skills and attributes. Cheng (2017) stated that the pace of the development process of skills, knowledge and attributes does not synchronize with that of problem-solving skills though they are interrelated. As learners proceed in translation courses, they develop their ability to make better translation decisions based on acquired knowledge, enhanced skills and related attributes. Moreover, learners acquire organization skills which are also known as strategic competence.

In this section, the researcher compares five featured translation competence models:PACTE Model (2000), revised PACTE Model (2005,2011,2017), Göpferich's Model(2009), Alves and Gonçalves Model(2007), and Yang and li Model (2021). To begin with, PACTE (2000) reported that translation competence consists of six sub-competences: communicative competence in two languages, extra-linguistic competence, transfer competence, professional instrumental competence, psycho-physiological competence and strategic competence (PACTE 2000,2017, see Fig. 1)

Fig.(1) Translation Competence First Model



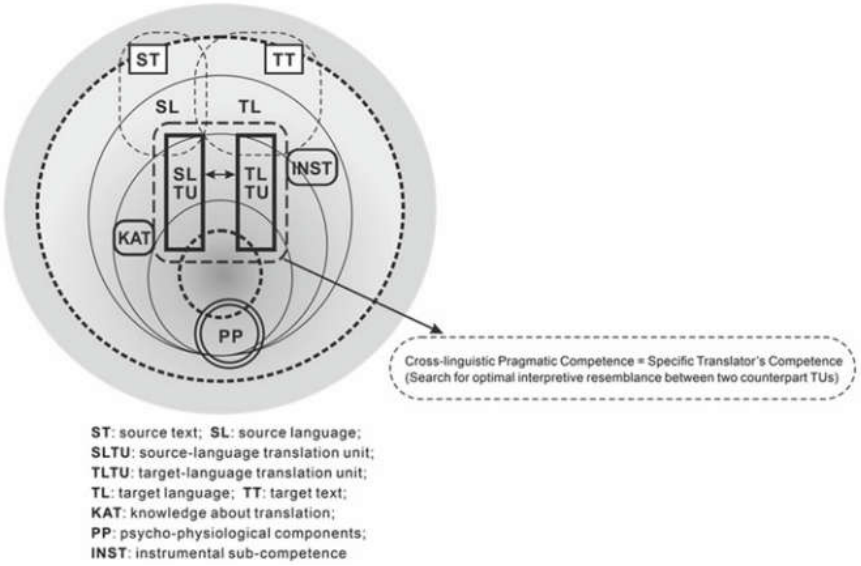
Source:(PACTE, 2017)

This model presented translation competence as a system of various technical skills and stressed that translation process is mainly procedural rather than declarative. PACTE (2005) conducted a major revision for their original model in which translation competence was defined as a specific form of communicative competence and was regarded as procedural knowledge rather than declarative. They stated that this model is extensive, considering translation competences as a combination of cognitive,

behavioral and psychomotor competences required to accomplish any translation task (memory, attention span, perseverance, critical thinking). PACTE revised model (2005, 2017) featured some of the core competences required for the translation process, namely, strategic sub-competence, instrumental sub-competence**,** Knowledge about translation. In the revised version of PACTE model, transfer competence was reconsidered based on the perception that it is implied in all other sub-competences. This reconceptualization of transfer competence informed the redefinition of communicative and strategic competences. In a similar vein, communicative competence in two languages was reconceptualized to be the bilingual sub-competence, and strategic sub-competence occupied a central role in the 2005 model instead of transfer. Instrumental-professional competence was broken down into instrumental sub-competence and knowledge about translation sub-competence because of the significance of knowledge of the translation process. Accordingly, Psycho-physiological competence was coined as psycho-physiological components taking the place of the strategic competence.

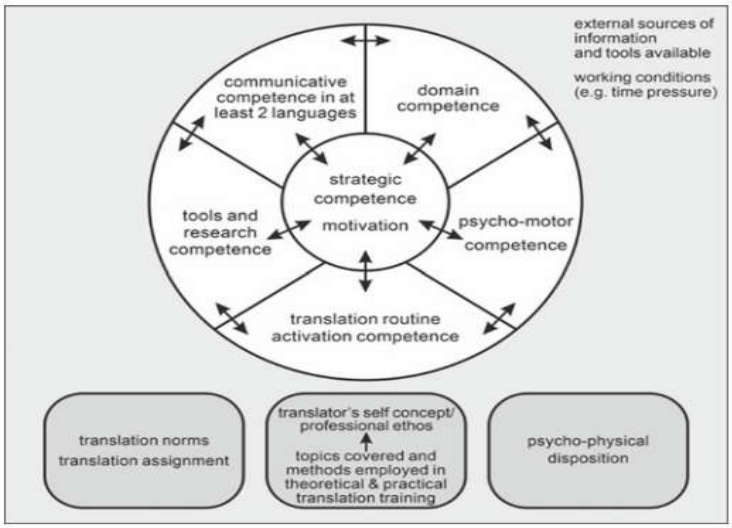
Based on Relevance Theory, Alves and Gonçalves (2007) innovated the concept of Specific Translator's Competence (STC), which views translation as "a progressive and recursive search for the interpretive resemblance between two counterpart translation units" (2007, p. 44). Additionally, Alves and Gonçalves's model Combined General Translator's Competence (GTC) and STC as well as emphasizing the cognitive sphere of the translator. Moreover, they hypothesized that translation competence progresses seeking optimal interpretive equivalent between the two texts. Hence, this model can be considered as a cognitive translation model. Additionally, Alves and Gonçalves's model corresponds to PACTE model in that they both involve instrumental, psycho-physiological, and knowledge about translation sub-competences. Yet, PACTE considered bilingual competence as a core competence while Alves and Gonçalves considered it as a prerequisite than a core competence. Moreover, strategic competence was not included because of the overlap with STC. Extra-linguistic competence was not included as it was considered irrelevant to the model proposed by Alves and Gonçalves.

Fig. (3) Alves and Gonçalves (2007) Translation Competence Model



Source:(Alves and Gonçalves ,2007)

Fig. (4) Göpferich's Translation Competence Model(2009)



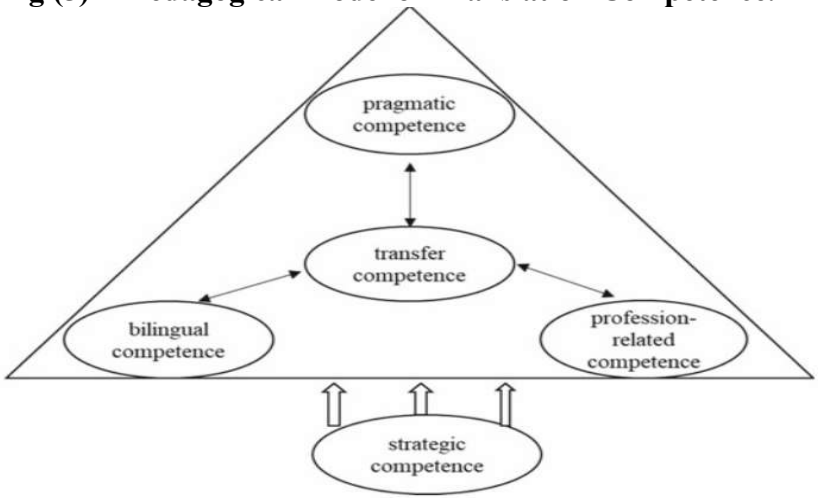
Source: Göpferich, (2009)

Drawing on PACTE's model, Göpferich (2009) proposed a translation competence model featuring the role of motivation as a key factor with strategic competence which corresponds to the strategic competence in PACTE'S model and distinguishes translators from bilingual

individuals with limited translation training. In other words, motivation may control how translators use strategic competence to coordinate other translation competence components.

In yang and Li's model (2021), transfer competence is defined as the proceduralized knowledge, which operates mostly through an automatic process, in choosing, arranging sentences, and structure to accomplish a translation task. Transfer competence is automatic and subconscious; advanced translators develop automized cognitive processing that can be remarkably distinguished from beginners. Among many indicators of procedural knowledge, time spent on translation has received noticeable attention from researchers. Whilst strategic sub-competence implies automatic processing because it incorporates procedural knowledge. On the contrary, Alves and Gonçalves (2007) capitalized the role of conscious and non-automatic processing. On one hand, Cognitive strategic competence is used to resolve translation problems at any phase of the process such as global reading before translation and translating while reading, memory pairing, and source text analysis. On the other hand, metacognitive strategic sub-competence incorporates functioning higher-order skills to guide cognitive functions which involves planning, monitoring, and evaluation. A number of studies (Alves and Gonçalves 2007; Angelone and Shreve, 2010) have emphasized that metacognition, which relies on conscious processing rooted in declarative knowledge, is a significant feature of translation competence; whereas transfer competence is characterized by automaticity and explicitness.

Fig (5) A Pedagogical Model of Translation Competence.



Source: (Yang &Li, 2021)

Corpus Defined

Corpus linguistics is one of the most recent trends in linguistics research as established a stronger connection between linguistics, methodology and technology especially with the influx of using Artificial Intelligence (AI) applications for educational purposes in the 21st century. Many researchers think that corpus linguistics defines an innovative era of linguistics as it helps educators alter methodological techniques approaching the same area of inquiry rather than merely focusing on the systematic study of different aspects of language.

Due to the rising cognizance of the significance of analyzing real language in use, Corpus linguistics has lately had a great effect on language teaching theories. Therefore, as Loukas, Fergadiotis, Androutsopoulos, and Malakasiotis (2021) pointed out, this rapidly growing area of corpus research has been utilized to explore topics with different applications in modern linguistics such as: language acquisition and language pedagogy, contrastive and translation studies, historical linguistics, the creation of lexicographical works, grammar reference books, natural language processing and language variation (Timmis, 2015).

Comparable and Parallel Corpora

Comparable corpora include authentic texts in two or more languages coordinated using specific criteria such as genre**.** Many of these types of corpora, being products of the internet age, are mega corpora that exceed the 100-million-word size. Monolingual comparable corpora incorporate texts in one language only either texts that are originally written in a target language or translated into it from source language. The importance of monolingual corpora lies in its potential to help translators explore the different features of authentic language use and patterns. Moreover, monolingual corpora can serve as a reference instrument to help translators find exact or semi-equivalent.

Another type of comparable corpora is bilingual comparable corpora which includes texts from the same genre, and it is very beneficial when translating technical texts. Bilingual comparable corpora might be considered as a variant of parallel corpora. while parallel corpora include bidirectional texts aligned at different equivalence levels (word, sentence paragraph). Bidirectional concordances manifest the frequent occurrences of a word or a phrase in the source language with their equivalents in the target language. Therefore, parallel corpora is beneficial to translators as it helps them find accurate equivalents for brand-new terminology that has no equivalent in the target language. Additionally, parallel corpus is an

exemplary resource to explore features of translated texts such as explicitation, foreignization and domestication. Meanwhile, parallel corpora is an ideal resource to train translators on employing variety of structure to identify and solve translation problems. On a separate note, instructors can help students create a learner's longitudinal parallel corpus that include their work over a period. Hence, instructors can track students' progress and identify students' strengths and weaknesses.

Parallel corpora proved to have an important role in language learning and teaching research. Tracing this idea, Pan and Liao (2021) explored news translation and proposed an interpretive framework for analyzing positions. They compiled news reports corpus of fifty-four Chinese news articles and one hundred twenty-nine texts in English. The reference phrases used the political parties were analyzed. The findings yielded revealed that news manipulation was allowed to change the attitude of the public that sympathize riot in Tibet and show a balanced official identity for the Chinese state. Moreover, results reported by Sittirak and Na Ranong's study (2023) confirmed that there is a growing interest in using electronic resources and they recommended that universities should dedicate more credit hours to develop students' instrumental competence to meet market requirements.

In contrast to the previous studies, Kavanagh (2021a) and Kavanagh (2021b) reported corpus usability problems encountered by in-service teachers who used GlobWBE, Netspead and COCA. Moreover, the study reported that different mastery level of students may restrict students' learning. Teachers reported that students weren't interested due to the complexity of the corpus instruments. Similarly, Poole's study (2022) reported relevant challenges from student teachers which affected autonomy, smoothness of guided discovery activities which limit the use of ready-made corpus. Yet, the study reported a positive attitude towards corpus-based methodology. The previously mentioned studies indicated that despite of the important role played by parallel corpora, there are two common concepts about corpora that may affect the impact of parallel corpus within a language classroom. The first barrier is that the language in the corpora is challenging for language learners and the second one is that even if the language level is appropriate, the tools are not user-friendly.

Corpora and Teaching English

The plea for making room for Corpus Linguistics in language and teacher education programs has been empirically examined. Literature abounds with findings in which the advantages of employing corpora in

teaching EFL are espoused. For measuring learners' competence to deploy corpora in translation tasks from Arabic into English. However, few studies have investigated the deployment of corpora instruments in translation courses. Mohammed (2022) utilized thinking aloud protocols and eye-tracking software and screen recording software to observe how students employed corpora to accomplish the task. Additionally, the researcher designed a questionnaire to explore students' attitude towards using corpora and project-based translation. Results manifested that learners developed a positive attitude towards the progress of their instrumental sub-competence using corpus and project-based translation tasks. Boulton (2009a,b) recommended this approach to beginners, refuting the unsupported claim that it could be very difficult at that level. However, he suggested that further empirical research needs to be done at that point. However, some other research reported that the increasing number of research conducted to integrate corpora in English teaching has not been successful to materialize in real-world classrooms (Charles,2020; Poole, 2022).

Farr and Leńko-Szymańska's study (2023) supports the results yielded from Bennett and Dhonnchadha's study (2023) who extolled the effectiveness of a proposed framework for corpus in student teachers as well as in-service programs. The proposed framework employed surveys and observations which might limit the generalizability of the study. Participants reported a positive attitude towards using corpora. They even reported that preparing corpus-based lesson plans consume as much time as regular lesson planning. This contrasts what Callie's study (2019) hypothesized that integrating corpus in English classrooms requires extensive training that might be beyond teachers' availability.

Arabic –English Parallel Corpora

Recently, the use of parallel corpus has witnessed an expanding interest among Arab researchers. Yet, there is a relatively few-Arabic English parallel corpora. Al-Ajmi (2011) and Ahmed, Zhang, Rezk, and Zaghouani (2024) explained that this dearth of studies can be attributed to the lack of software required to collect data as well as lack of funding authorities that believe in the effectiveness of parallel corpora.

One of the most remarkable corpora is the English-Arabic parallel corpus of the United Nations Texts. It includes 341 texts aligned at the paragraph level. It was compiled using two sub-corpora containing the English source texts and the translations. The corpus consisted of UN resolutions and reports issued by different UN bureaus. On a similar note, the European Commission funded a project to develop a multilingual

parallel corpus at the Language Technology Lab in Germany. The corpus includes 300 million words extracted from UN documents.

In an Arab context, Kuwait University developed a parallel corpus. It includes translations for some articles taken from the "World of Knowledge" book series. Unfortunately, the corpus is only available for the university staff and students. Amora is another corpus developed by Qatar Computing Research Institute. The main purpose of developing the corpus was to provide some machine translation tasks. This corpus included subtitles for videos taken from TED Talk, Khan Academy and other websites.

The promotion of machine translation was also the reason why AlKahtani (2015) designed a parallel corpus using Al Hayat newspaper and the Open Parallel Corpus. It tackles an innovative metric to verify translation of sentences using parallel Arabic-English corpus. This metric uses sentence length and compression code length. The results of the study manifested that mixing these two techniques improved the precision of determining adequate and inadequate sentence parallel translation. The proposed method proved effective in minimizing noise level, translation common mistakes, and improving the quality of translation. Tracing the same point, Abdelali, Mubarak, Samih, Hassan, and Darwish (2020) constructed bilingual tweets parallel corpus. The corpus included tweets from different eighteen Arabic country dialects. Twitter is considered an authentic source for modern authentic language patterns. In a relevant context, Altammami, Atwell and Al Salka (2020) collected a set of six Hadith reference books. This corpus included more than 10 million words.

Also, Zaghouani, Ahmed, Zhang, and Rezk (2024) constructed argumentative writing corpus. The researchers collected one hundred and ninety-five essays from EFL students whose mother tongue is Arabic. The generation of such Arabic-English corpus would spark an insight into examining writing style of Arabic EFL learners to help them promote their writing competence. Another example is the English-Arabic Movie Subtitles Corpus (EAMSC) which was compiled by Rayyash and Haider (2022). The researchers collected subtitles from Netflix and Orbit Showtime Network (OSN); The movies selected represent different decades from1930s to 1990s.The study recommended using this parallel corpus in training translators to apply different strategies to handle different translation problems like translating proverbs, idioms, and culture specific items. Similarly, AlFuraih and El-Jasser (2024) compiled a bidirectional parallel corpus for undergraduate translation students to avail dataset for teaching

and corpus-based research. They provided the procedures followed to build the corpus. The corpus included a corpus of translation projects and written assignments with over 75 million words.

The implementation of corpus-based studies in the classroom has been a revolutionary step in the path of corpus linguistics that used to be limited to discourse analytical studies to inform further research. Classroom application was a driving force that pushed many linguists to get involved in corpus-based research projects to aiming at broadening the manipulation and application of corpus-based studies to help students master different language skills. The boring traditional corpus interface and the complicated user features would never attract a Gen-Z learner to attempt using corpus tools. That was the reason researchers sought building user-friendly as well as mega general corpora like Sketch engine (SKELL).

Data-driven learning

Recent studies have highlighted the potential of corpus-based methodology in language teaching and learning. Data-driven learning (DDL) has demonstrated to be effective in developing language skills, especially vocabulary acquisition and academic writing (Lusta, Demirel, Mohammadzadeh, 2023; Friginal, Dye, Nolen, 2020). Integrating corpora into classroom through utilizing corpus-based language pedagogy (CBLP) combines corpus linguistics with traditional teaching methods (Ma & Mei, 2021). Despite these advantages, incorporating DDL in EFL classroom is limites, especially for non-English languages and lower proficiency levels (Vyatkina, 2020). DDL emerged as a pedagogical approach that studies corpora by software program called concordancer in order to identify regular patterns. Learners in DDL classrooms are not passive participants. Moreover, DDL capitalizes learning by discovery and problem-solving as students find out what linguistic features are emphasized while using concordancers (Friginal et al. 2020). Boulton and Cobb's meta-analysis (2017) of concluded that corpora can be used as a reference resource to help learners accomplish writing tasks as well as translation for specific purposes.

Timmis (2015) stated that corpora provide students with a data-rich learning environment and improve their knowledge of the language. In other words, students are engaged in analyzing actual data with the aim of learning about language patterns. Additionally, DDL exposes learners to a variety of contexts, giving them an opportunity to deepen their knowledge through the data provided about collocations, register, and form.

Corpora can be indirectly manipulated in language classrooms as it helps with the decision-making process of what to teach and when to teach it. Samoudi (2025) capitalized DDL activities as a game-changer that contributed to insignificant improvements in the accuracy level of students' writing tasks. Similarly, Ištvánová (2021) confirmed that indirect applications of corpora is far more effective in designing activities and teaching material. Meanwhile, successful implementation of direct corpus-based instruction requires teachers and learners to undertake tailored training to qualify them to manipulate direct corpora-based strategies.

Alotaibi (2017) argued that parallel corpora help teachers and learners overcome barriers that hinder engagement and L2 acquisition in DDL-based sessions. This is in consistency with the study conducted by Chujo, Kobayashi, Mizumato, Oghigion (2016) who proved that parallel corpora help low proficiency learners with their lexical and grammatical competences. On a separate note, DDL is based on the noticing hypothesis which presumes that language learning can be promoted through noticing and raising learners' awareness. Accordingly, Boulton (2017) argued that exposing students to the target language helps them notice, solve problems and develop language awareness. Another theoretical basis is for DDL is constructivism upon which learner's autonomy and inductive learning are based. Learners are engaged exploring language patterns as active learners. In other words, learners are considered researchers who propose hypotheses to solve language problems.

Yet, O'keefee (2021) stated that highlighting constructivism was at the expense of other theoretical bases that can be drawn from DDL if applied in real classroom such as the sociocultural impact. Lee and Lin (2019) compared using deductive and inductive reasoning approaches in the context of DDL. The findings of the study proved that both approaches improved the acquisition of vocabulary. They reported that inductive reasoning represents a problem if students are raised in a teacher-centered learning environment. The study recommended exploring other interpretations for how learning happens in DDL context other than constructivism. Similar results were reported by Moradi and Pasquarella (2024) who conducted a study to compare the effect of deductive DDL on the mastery of cohesive devices.

The case study conducted by Ma, Yuang, Cheung and Yang (2022) targeted the same point. The focus of the case study was exploring how two university English instructors integrated corpus-based instruction. The researchers utilized lesson observations and pre-post interviews to collect

data. Results showed an improved level of corpus-based language pedagogy after undertaking specialized training. Results also highlighted four elements in knowledge framework upon which corpus-based instruction is drawn: linguistic knowledge, context knowledge, knowledge of corpus technology, pedagogical knowledge and learning and practice knowledge. The research identified linguistic competence as a prerequisite. The study recommended using self-reflection and peer-feedback as well as integrating teaching with research to enhance teachers' motivation to use corpus. Jamal, Shafqat, Afzal's study (2021) confirmed the effectiveness of corpus-based instruction on improving teachers'/learners' motivation. Training focused on solving problems strategies and creating interactive student-centered learning environment. Jamal et al's study (2021) concluded that using corpus-based material boosts the reliability of these material.

Many studies raised concerns about the potential cognitive load caused by adopting constructivism due to independent learning and learners' autonomy. Hence, Educators relied on Vygotsky Zone of Proximal Development (ZPD). Scaffolding is a major principle of ZPD ZPD interprets learning as a process that takes place through different interaction patterns: student-teacher and student-student. Vygotsky (1978) claimed that without adequate guidance, students struggle with internalizing target language patterns.

The study conducted by Crosthwaite and Steeples (2022) provided an example of how DDL can be successfully used with younger learners as well as content teachers. In this study, they explored the impact of DDL on the development of receptive and productive skills regarding the use of passive form in writing scientific research. To collect data, pre-post tests, a questionnaire and an interview were conducted after the training. The results yielded manifested a remarkable progress in using passive form in writing scientific research. Crosthwaite and Steeples (2022) stated that the use of corpora has proved to help writers understand how language is used across a wide range of contexts. The implementation of DDL at the elementary and secondary classroom is hindered by the lack pedagogic processing of existing materials and lack of corpus literacy reported for pre-service as well as in -service teachers. Additionally, there are no corpora tailored for young learners or teenagers. Meanwhile, exposing young learners and teenagers to authentic L1 corpus data is potentially challenging because students they are still developing their L1 literacy. Thereby, teachers in DDL classrooms take critical responsibility in modifying the content to match their students'

mastery level. Furthermore, there is a significant role for teachers to play in preparing their students for DDL.

It is thought that all the limited capacity of the cognitive processes, whether automatic or controlled, add load to the working memory. Hunziker Heeb (2016) reported that experienced translators' capacity to manage additional load is higher than novice translators' due to automized routine. In the light of the most recent trends of research in cognitive science and the fact that translation does not follow any mental schema pattern; instead, they are guided by translator's interpretation. It is thought that it is challenging to realize the cognitive load caused by a translation task, and the limited working memory space. Nonetheless, the characteristics and qualities of the translator may boost cognitive load during task performance. This is the main reason why many scholars adopted cognitive load in translation studies.

Cognitive approaches to translation try to explain how a translator's mind function to accomplish a translation task successfully. Cognitive translation studies provide cognitive interpretation for certain strategies employed by translators, the different approaches translators follow to develop translation competence, and the impact of translators' cultural and linguistic background on the behavior and choices of translators (Xiao and Muñoz,2020). Martin (2021) pointed out that cognitive translation research is relevant to the translation process research as both of them endeavor to delve into the subsequent mechanisms upon which cognitive concepts are drawn to make the neurological processes taking place in the translator's brain visible. Key common areas between cognitive research and translation process research include memory and attention, problem-solving strategies and expertise development.

Cognitive Load Theory

Cognitive Load Theory provides a framework to understand how learners internalize new information. Additionally, it provides support for curriculum designers to fit the instructional material within the limits of the working memory (Sweller, Van Merriënboer, Paass 2019). Because of the nature of translation as a problem-solving activity that requires using different types of support and making conscious and unconscious decisions. Eventually, these decisions lead to the target text. PACTE (2005) and Prassl (2011) stated that translators can accomplish their tasks with the help of two types of support: internal and external support. Internal support refers to the information retrieval from the long-term memory, while, external support refers to the use of external resources, such as dictionaries, parallel or comparable texts.

Cognitive load is a term used to describe the amount of mental effort and resources required to complete a task. It is an important concept in cognitive psychology, as it can have a significant impact on how well people learn and remember information. Cognitive load theory (CLT) has been used to explain how the amount of information that needs to be processed can affect the ability of learners to successfully complete tasks. This literature review will explore how cognitive load can be reduced for translation major students in order to improve their performance and understanding.

Cognitive load theory (CLT) was developed by John Sweller in 1988 as a way of explaining how learners process information when completing tasks. Sweller (2010,2020), Zhang (2013), Center for Education, Statistics and Evaluation (2017) highlighted the distinctive features of the three types of cognitive load: intrinsic, extraneous, and germane. Intrinsic cognitive load is the amount of mental effort required to understand and process the material being studied. This type is influenced by the difficulty of the content and the learners' prior knowledge. Extraneous cognitive load is caused by poor instructional design elements that do not contribute directly to learning, such as complex graphics or text formatting. Germane cognitive load is considered the effective cognitive load and refers to the mental effort required for learners to construct meaningful connections between new information and prior knowledge in the long-term memory which processes intrinsic load to maintain attention. Working memory resources are manipulated to manage encroaching factors. CLT suggests that reducing extraneous and intrinsic cognitive loads can help learners better understand material and improve their performance on tasks related to it (Azamnouri, Pishghadam, & Naji Meidani, 2020).

Table (1) Cognitive Load Types

Load type	Source	Cognitive processes	Effect on learning
Intrinsic cognitive load	Domain complexity (element interactivity) x prior knowledge	Necessary to hold interacting elements active in working memory in parallel	Harmful in that a too high ICL may cause cognitive overload
Extraneous cognitive load	Poor instructional design	Irrelevant to schema construction and automation; processes aimed at overcoming problems caused by bad instructional design	Harmful, ineffective
Germane cognitive load	Supportive instructional design	Relevant to schema construction and automation; higher-level cognitive processes related to deeper processing	Helpful, effective

(Source: Center for Education&Statistics and Evaluation, 2017)

The focus on Cognitive load used to highlight extraneous load and design brand new instructional methods to reduce extraneous load. Recently, the scope of the research extended to include intrinsic and germane load as well as the interactions between instructional methods and the level of expertise of the learner. The first type, intrinsic cognitive load, refers to the level of interaction of elements within the learning material (Paas et al., 2003). The interactivity of the items refers to the number of items that must be processed simultaneously in order to be understood. The intrinsic cognitive load is determined by the interaction of elements at different levels and cannot be changed by instructional intervention cannot change it. The reason is that essentially all information structures are composed of elements and the difficulty level is determined mainly by the "interaction between elements".

This is because the level of difficulty is likely to be determined primarily by the degree of element interactivity. Information with fewer interactive elements is easier to learn because the elements can be learned independently and so do not overload working memory. Simple tasks that omit interactive elements can also reduce the intrinsic cognitive load (Paas &van Merriënboer, 2020). Students can understand and learn each individual element and understand and learn. some instances of intrinsic cognitive load in language learning can be learning new words without reference to other items in language learning, it is impossible to learn grammatical structures without considering vocabulary. In this case, syntax is perceived of high interactivity. Consequently, language learning involves a high intrinsic cognitive load, as many items have to be processed simultaneously in working memory (Sweller, van Merriënboer, & Paas ,2019; Castro-Alonso& Sweller, 2020). In other words, the only way to promote intrinsic cognitive load is by constructing other schemata or by automating previously acquired schema or by dropping some important information.

The second category of cognitive load is extraneous cognitive load which is created by applying teaching procedures that do not take into account cognitive architecture (Sweller et al, 2019). Traditional reading comprehension questions require students to find the answer to a question in the text, but the question is often at the end of the text. This makes it difficult for students to match the text and the question, an example of the "split attention" phenomenon. Similarly, extraneous load refers to the additional cognitive load created by poorly designed instruction, leading to inappropriate cognitive activity in schemata construction and automation.

Thus, learners find it difficult to integrate the text and the question, providing an example of the split-attention effect discussed below. In a similar vein, extraneous cognitive load which is related to poor instructional design and learning activities usually fails to construct and automate schema. Using effective instructional design can reduce extraneous cognitive load which frees a space in the working memory leading to increasing germane cognitive load. In contrast, germane load facilitates the construction and automation of schema. In other words, there's an asymmetric relationship between the three categories of cognitive load (Sweller et al, 2019; Paas & Van Merriënboer, 2020).

Cognitive load can only be deducted by assessing amount of the cognitive effort exerted during the task. The researcher agrees with Muñoz Martín (2014) and Muñoz Martín, Sun and, Li (2021) that the architecture of cognitive load does not consider important sides such as the learning environment, self-concept, and affective aspects such as motivation. Moreover, the researcher assumes the idea of categorizing different types of cognitive load into effective and ineffective load may imply some theoretical application. It is also pivotal to consider areas like working memory and long-term memory and how they serve perception and action as well as schema activation.

While analyzing a highly cognitive-demanding task such as translation, it's significant to comprehend the way in which emotions and cognitive load interact. Research has scrutinized the effect of emotions on cognitive processes. For example, Trémolière, Gagnon, and Blanchette (2016) examined cognitive load on analytical thinking and they offered evidence that the task processing can be interrupted by emotion as individuals are likely to deploy most of their cognitive resources to handle emotions. They added that emotions blocked the participants' cognitive functioning to perform any steps relevant to the task. Another study conducted by Trémolière, Gagnon, and Blanchette (2016) hypothesized that cognitive load can distract the brain from processing emotions. The participants of the study reported stress as a form of emotional response.

Identifying the problem

Previous research shows a need for developing translation pedagogy at the university level as a crucial level for mastering translation competence and that the cognitive load has to be considered in relation to the sub-competences of translation. There is a need for a more innovative program to support such a development. So, the researcher piloted a translation test to fifty third-year student teachers at the faculty of Education, Mansoura

University for estimating the extent to which Egyptian student teachers are competent at translation sub-competences. Table (1) reports results of the pilot study.

Table (2): Pilot Study Translation Sub-Competence Test Results

Translation sub-competences	No.of questions	Lowest score	Max. score	Mean	SD	%
Linguistic	**2**	**1**	**5**	**1.5**	**0.614**	**30**
Bilingual	**2**	**1**	**5**	**1.42**	**0.731**	**28.4**
Strategic	**2**	**1**	**5**	**1.36**	**0.722**	**27.2**

Results in table (2) show that EFL student teachers have deficiencies in translation sub-competences as the mean score of each of these defined skills is relatively low. This problem was further substantiated by informal interviews conducted by the researcher with some EFL translation professors at the faculties of Arts and Education. During these interviews, the professors were asked questions about the problems student teachers face. Results showed that students suffer from weak sentence structure, interference between their mother tongue and target language, and semantics. Moreover, professors clarified that students struggle with vocabulary and structure ambiguity and lexical holes where one language requires a phrase to state what another language expresses using a single word in addition to style problems.

Statement of the problem

Based on the results of the pilot study and previous studies, it can be concluded that:

"Egyptian student teachers have deficiencies in translation competence."

Regular EFL translation programs have become inefficient to develop student teachers' translation competence, so a new learning milieu utilizing both corpus linguistics and technology should be provided to improve this competence. Therefore, a corpus linguistics-based program was proposed to develop EFL student teachers' translation competence.

Questions of the Study

The problem of the present study was investigated through answering the following main question:

To what extent can a corpus linguistics-based program contribute to the improvement of English major student teachers' translation competence?

This main question led to the following sub-questions:

1- What are the translation sub-competences necessary for English major student teachers at the faculty of Education?

2- What are the features of the proposed corpus linguistics-based program?
3- What is the effect of the proposed corpus linguistics-based program on developing English major student teachers' translation competence?
4- What is the effect of the proposed corpus linguistics-based program on reducing English major student teachers' cognitive load?

Purpose of the Study

The primary purpose of the present study is to develop English major student teachers' translation competence and the secondary purposes were:

1- Identifying a corpus-based program that can be adopted to English major translation teaching.
2- Identifying translation sub-competences that should be mastered at the tertiary level.
3- Providing guidelines for a proposed corpus-based program for developing English major translation competence at the undergraduate level.
4- Measuring the effectiveness of the proposed corpus-based program on reducing English major student teachers' cognitive load.

Significance of the Study

The present study could be significant for the following reasons:

1- It tackles a complex human activity which is translation.
2- It deals with the educational implication of corpus-based studies.
3- It relates the EFL education to one paramount tendency of the age; namely internet and technology.
4- The study may be the first Egyptian study that deals with the educational implications of corpus in teaching translation at the undergraduate level.
5- The study may stimulate curriculum designers to integrate corpus and technology into undergraduate translation programs.

Delimitations of the Study

The study proceeded within the following delimitations:

1- Some translation sub-competence appropriate for the undergraduate level.
2- A selected sample of third year student teachers at the Faculty of Education, Mansoura University.

Hypotheses of the Study

In order to answer the research questions, the following hypotheses were formulated to be tested at the 0.01 level of significance:

1- There is a statistically significant difference between the mean scores of the control group and that of the experimental one on the post-administration of the translation competence test favoring the experimental group.
2- There is a statistically significant difference between the mean scores of the experimental group on the pre- and post-administrations of the translation competence test favoring the post-test.
3- There is a statistically significant difference between the mean scores of the control group and that of the experimental one on the post-administration of the cognitive load scale favoring the experimental group.
4- There is a statistically significant difference between the mean scores of the experimental group on pre- and post-administrations of the cognitive load scale favoring the post-administration.

Method of the Study

Method of the current study included the participants, instruments, design, and procedures followed to carry out the study**.**

Participants

Participants of the study included a group of English major student teachers at the Faculty of Education, Mansoura University. They were divided into two groups: one control and one experimental.

Design

The study adopted the quasi-experimental design using two groups: an experimental and a control group. The experimental group received the proposed corpus-based program, while the control group received the regular teaching practice. The following figure illustrates the quasi-experimental design of the study.

Instruments and Materials of the Study

Different instruments for gathering data were developed and administered by the researcher. These include:

1- Translation sub-competences checklist.
2- Translation pre-post test.
3- A rubric for the translation test.
4- A parallel corpus including different text genres (literary- news-scientific).

5- A cognitive load scale.

Procedures of the Study

The following procedures were carried out:

1- Reviewing related literature and studies to identify the existing translation teaching strategies.
2- Reviewing related literature and studies to identify the translation sub-competences that should be mastered by EFL student teachers at the undergraduate level.
3- Preparing a list of translation sub-competences that should be mastered by student teachers.
4- Presenting the list to a group of specialists to determine the suitability and importance of each sub-competence.
5- Setting the list in its final form according to the jury's feedback.
6- Designing the corpus-based program and presenting it to a jury to determine its readability and applicability to develop student teachers' translation sub-competences.
7- Preparing the program in its final form according to the juror's recommendations.
8- Preparing the instruments of the study in its initial form.
9- Presenting the instruments to jurors to verify its validity.
10- Refining the study instruments in their final forms according to juror's recommendations.
11- Selecting the sample of the study and dividing it into two groups; one was experimental and the other was a control group.
12- Administering the study instruments to the two groups of the study at the beginning of the experiment(pre-administration)
13- Implementing the program for nine weeks.
14- Administering the study instruments again after the implementation of the proposed program.
15- Collecting data and analyzing them statistically, using the suitable statistical methods.
16- Discussing results, drawing conclusions and presenting recommendations for further research.

Results and Discussion

Testing the First Hypothesis

The first hypothesis stated that

"There is a statistically significant difference between the mean score of the control group and that of the experimental one on the post translation competence test favoring the experimental group".

In order to verify this hypothesis; the "t" value of the difference between EFL student teachers of experimental and control groups on the post Translation competence test was calculated. Results are shown in table (3).

Table(3) Comparing The Control and Experimental Groups on The Post-Administration of the Translation Competence Test

Skills	The group	N.of cases	Means	S.D	df	T.Value	Sig.
Linguistic Competence	Control	**34**	**4.56**	**1.236**	**75**	**45.153**	**0.01 Sig.**
	Experimental	**43**	**15.47**	**0.882**			
Bilingual Competence	Control	**34**	**3.41**	**1.373**		**32.309**	**0.01 Sig.**
	Experimental	**43**	**13.67**	**1.393**			
Strategic Competence	Control	**34**	**2.26**	**1.928**		**29.850**	**0.01 Sig.**
	Experimental	**43**	**12.77**	**1.130**			
Total Score of Test	Control	**34**	**10.24**	**3.901**		**42.368**	**0.01 Sig.**
	Experimental	**43**	**41.91**	**2.644**			

Results in table (3) indicate that the mean score of the experimental group students on the total translation competence test (M=41.91) was greatly higher than that of students in the control group (M=10.24), that's why "t" value was high (t=42.368) and significant at 0.01 level in favor of the experimental group. Results in table (3) verify that there was a statistically significant difference between the experimental and control groups on the post- administration of the translation competence test in favor of the experimental one. Consequently, the first hypothesis was accepted, this means that there is a statistically difference between the mean scores of the control group and the experimental on the post-administration of translation competence test in favor of experimental group.

Testing the Second Hypothesis

The second hypothesis stated that

"There is a statistically significant difference between the mean score of the experimental group pre translation competence test and that of the post translation competence test favoring the post-test".

For the purpose of testing the second hypothesis of the present study, a test was used to compare scores of students in the experimental group in the pre and post administration of the translation competence test. Results are shown in table (4)

Table (4)Comparing the Performance of the Experimental Group on the Pre and Post Administrations of the Translation Competence Test

Skills	Application	N.of cases	Means	S.D	DF	T.Value	Sig.
Linguistic Competence	pre – test	**43**	**4.05**	**0.722**	**42**	**69.704**	**0.01 Sig.**
	post – test	**43**	**15.47**	**0.882**			
Bilingual Competence	pre – test	**43**	**2.44**	**1.593**		**33.124**	**0.01 Sig.**
	post – test	**43**	**13.67**	**1.393**			
Strategic Competence	pre – test	**43**	**1.58**	**1.867**		**31.447**	**0.01 Sig.**
	post – test	**43**	**12.77**	**1.130**			
Total Score of Test	pre – test	**43**	**8.07**	**3.801**		**46.127**	**0.01 Sig.**
	post – test	**43**	**41.91**	**2.644**			

Results in the above table illustrate that the mean score of the experimental group students in the post administration on the total test (M=41.91) was greatly higher than that of students in the pre-administration of the translation competence test (M=8.07), that's why the t-value was high (t=46.127) and significant at the 0.01 level in favor of the post-administration of the test. The results verify that there was a statistically significant difference between pre and post administration of the translation competence test. Consequently, the second hypothesis was accepted.

Testing the Third Hypothesis:

The third hypothesis stated that

"There is a statistically significant difference between the mean score of the control group and that of the experimental one on the post cognitive load scale favoring the experimental group".

For the purpose of testing the third hypothesis of the present study, a t-test was used to compare scores of students in both experimental and control groups in the post administration of the cognitive load scale. Results are shown in table (5).

Table(5)Comparing The Control and The Experimental Groups on The Post-Administration of The Cognitive Load Scale

Skills	The group	N.of cases	Means	S.D	df	T.Value	Sig.
Intrinsic Cognitive Load	Control	**34**	**18.56**	**3.518**	**75**	**6.456**	**0.01 Sig.**
	Experimental	**43**	**13.33**	**3.544**			
Extraneous Cognitive Load	Control	**34**	**17.47**	**2.549**		**7.024**	**0.01 Sig.**
	Experimental	**43**	**13.35**	**2.589**			
Germane Cognitive Load	Control	**34**	**20.26**	**3.369**		**2.872**	**0.01 Sig.**
	Experimental	**43**	**22.42**	**3.187**			
Total Score of Scale	Control	**34**	**56.29**	**5.397**		**5.705**	**0.01 Sig.**
	Experimental	**43**	**49.07**	**5.612**			

The above table illustrates that t-test for independent samples was used to compare the mean score of the control and experimental groups. Table (8) shows that the mean score of the experimental group students in the three domains and in total (M=49.07) were lower than those of the control group (M=56.29). The table illustrates also that the estimated t-value is significant at 0.01 level. This indicates that there are statistically significant differences between the experimental and control groups in the three domains and in the total score on the post-administration of the scale. These significant differences are in favor of the experimental group. Consequently, the third hypothesis was accepted.

Testing the Fourth Hypothesis:

The fourth hypothesis stated that

"There is a statistically significant difference between the mean score of the experimental group on pre cognitive load scale and that of the post cognitive load scale favoring the post-administration".

In order to verify fourth hypothesis, the "t" value of the differences between mean scores of experimental group on the pre and post administration of the attitude towards reading scale was calculated. Results are shown in table (6).

Table (6) Comparing the experimental group's pre-post administrations of the cognitive load scale

Skills	Application	N.of cases	Mean	S.D	df	T.Value	Sig.
Intrinsic Cognitive Load	pre – test	**43**	**19.65**	**3.631**	**42**	**8.298**	**0.01 Sig.**
	post – test	**43**	**13.33**	**3.544**			
Extraneous Cognitive Load	pre – test	**43**	**17.02**	**4.149**		**5.002**	**0.01 Sig.**
	post – test	**43**	**13.35**	**2.589**			
Germane Cognitive Load	pre – test	**43**	**18.65**	**3.429**		**5.131**	**0.01 Sig.**
	post – test	**43**	**22.42**	**3.187**			
Total Score of Scale	pre – test	**43**	**55.33**	**7.223**		**4.332**	**0.01 Sig.**
	post – test	**43**	**49.07**	**5.612**			

Results in the above table illustrate that the estimated t-value is significant at 0.01 level. This reflects that there is a statistically significant difference between the mean score of the pre-post-administration of the attitude towards reading scale in the three domains and in the total score. This significant difference is in favor of the post-scale.The mean score of the students' of the post administration of cognitive load scale on the experimental students on the total test (M=49.07) was relatively lower than

that of the pre-administration of the cognitive load scale of the experimental students group(M=55.33). That's why the t-value was significant at 0.01 level in favor of the post-administration of the scale. These results verify that there was a statistically significant difference between the pre and post administration of the cognitive load scale in favor of the post one. Consequently, the fourth hypothesis was accepted.

Discussion:

Comparing students' performance at the beginning, middle and end, corpus linguistics-Based program affirmed the progression of students' translation competence as well as the reduction of students' cognitive load. At the beginning, students manifested lack and knowledge required for the use of corpus, strategic, linguistic and bilingual sub-competences.

This began to disappear while moving through the program different sessions. Students were able to identify the appropriate words to be used, identify different word contexts relationships as well as interlexical relations, identify culture-specific items, connect ideas linguistically to produce lexically and structurally coherent and cohesive translated text, use collocations and idioms in both language, identify translation problems, propose solutions for the problems, apply knowledge of translation strategies, and select the most appropriate strategy to translate different text genres.

Albeit, there were many drawbacks for corpus-based data-driven learning. These disadvantages include difficulties that non-proficient or younger learners encounter as well as the complicated user interface that require solid corpus research background. A game changer took place when user-friendly corpus websites like CorpusMate and SKELL were released by the beginning of 2023. Concurrently, OPENAI released ChatGPT by the end of 2022. This gigantic AI-based linguistic model precipitated a revolutionary influx of Generative-AI (Gen-AI) applications that dramatically evolved the human interaction schemes with data sets.

Since then, a number of studies researched the relevancy of DDL to analyze and provide data amidst the quick, continuous and recursive evolution of Gen-AI linguistic models(Mizumoto,2023; Kohnke, Moorhouse& Zou,2023; Zappavigna, 2023; Misra&Chandwar,2023, Siiman, Rannastu-Avalos, Pöysä-Tarhonen, Häkkinen, & Pedaste,2023; Rahman, Terano, Rahman, Salamzadeh & Rahaman, 2023; Rahaman, 2023; Qureshi,2023; Kocoń, Cichecki, Kaszyca, Kochanek, Szydło, Baran, Kazienko, 2023). Linguists stated that corpus-based DDL can potentially vanish if it did not address the power of AI to bring DDL to a wider

community of learners. In other words, building DDL-based mindsets would definitely unleash new potentials for DDL, instead of confining it to analyzing concordance lines.

The immediate availability and affordance of ChatGPT models provide learners with various linguistic patterns; yet, they are not empirically verified at the classroom level. Despite the fact that corpus data may be unsuitable for the target audience and students are overwhelmed with the concordance lines. Many meta-analyses and bibliometric reviews (Boulton and Cobb, 2017; Lee &Lee, 2019; Dong, Zhao &Buckingham, 2023) reported that extensive research studies highlighted the positive results yielded due to consulting corpus in classes. Furthermore, O'keeffe (2021) stated that the gains recorded were at both at achievement and sociocultural levels.

Moreover, the texts from which the corpus are derived are identified, whereas verified corpora like BNC 2014, CorpusMate, SKELL, COCA provide a citation for every extract in the corpus. Additionally, corpus data is authentic as it is generated by humans compared to Gen-IA language models which produce non-linguistic chunks that might not be commonly used in a natural English-speaking context. Another advantage for copora over GenAI is that corpus findings are replicable for the same query. Yet, the results for GenAI queries are unique for every query even if they are identical. Funnily, if a student tries to question GenAI findings, for example, write a prompt for a ChatGPT result asking about the reasons for its answer. The language model would change the answer. Finally, OPENAI promoted ChatGPT as an inductive-based language model. However, this promotion is pointless because ChatGPT is responsible for the induction not learners.

Recommendations

The findings of the present study have some practical implications for corpus linguistics. Based on the findings of this study. The following recommendations could be drawn:

- Integrating corpus linguistics-based programs and activities into teaching different courses for university student level.
- Promoting the notion of "student-researcher" which is pivotal in the artificial intelligence era.
- Using AI to maximize the strengths of DDL such as critical thinking skills and differentiation.
- Promoting students' autonomy and self-learning attitudes.

- Workshops should be held to encourage university instructors to use corpus as well as AI tools effectively in teaching different courses for university student level to eliminate boredom of conventional classes.

Suggestions for Further Research

The following suggestions are offered:

- A similar research can be conducted for a longer period of time, at different educational levels and with a larger sample for more genuine results that confirm the result of the present result.
- Further research can be conducted to measure the effect of corpus linguistics-based program on developing EFL critical listening, reading, and writing skills.
- Further research can be conducted on the development of translation competence as an important skill in EFL education.
- Further research can be conducted to measure the effect of corpus linguistics-based program in EFL contexts on self-efficacy and motivation.

Conclusion

This current study is aspired to unlock new potential for curriculum designers for not adhering to the framework of the regular translation teaching strategies. Developing translation competence enables student teachers to handle different translation problems while using corpus tools. Based on the results of this study, it would be concluded that the treatment was effective in enhancing both translation competence and reducing cognitive load of EFL student teachers.

References

Abdelali, A., Mubarak, H., Samih, Y., Hassan, S., & Darwish, K. (2020). Arabic dialect identification in the wild. ArXiv. Cornell University.

Al-Ajmi, Hashan. (2011). A New English?Arabic Parallel Text Corpus for Lexicographic Applications. Lexikos. 14. 10.5788/14--696.

Ahmed, A. M., Zhang, X., Rezk, L. M., & Zaghouani, W. (2024). Building an annotated L1 Arabic/L2 English bilingual writer corpus: The Qatari corpus of argumentative writing (QCAW). *Corpus-Based Studies across Humanities*, *1*(1), 183-215.

Alkahtani, S. (2015). Building and verifying parallel corpora between Arabic and English. Unpublished Dissertation. Bangor University (United Kingdom).

Alfuraih, R. F., & El-Jasser, N. M. (2024). Exploitation and Evaluation of an Arabic-English Composite Learner Translator Corpus.

International Journal of Arabic-English Studies, 24(1), 155-172.
Altammami, S., Atwell, E., & Alsalka, A. (2020). The Arabic-English Parallel Corpus of Authentic Hadith. *International Journal on Islamic Applications in Computer Science and Technology*, 8(2).
Alves, F., and Gonçalvez. J. L.(2007). A Relevance-Theoretic Approach to Effort and Effect in Translation: Discussing the Cognitive Interface between Inferential Processing, Problem-Solving and Decision-Making. In Proceedings of the International Symposium on New Horizons in Theoretical Translation Studies, edited by the Department of Translation, 1–12. Hong Kong: Chinese University of Hong Kong Press.
Azamnouri, N., Pishghadam, R., & Naji Meidani, E. (2020). The role of emotioncy in cognitive load and sentence comprehension of language learners. *Issues in Language Teaching*, *9*(1), 29-55.
Beeby, A., Fox, O., Albir,A., Kuznik, A., Neunzig, W. Rodríguez-Inés, P., Romero, L., Wimmer , S. Albir, A., H. (2017). PACTE Translation Competence Model, A Holistic, Dynamic Model of Translation Competence. In Albir, A.,H.(ed.).(2017). *Researching Translation Competence by PACTE Group,*127.
Bennett, C., & Dhonnchadha, E. U. (2023). Becoming corpus literate: An in-service EFL teacher education framework for integrating corpora into EFL teaching. *Applied Corpus Linguistics*, *3*(1), 100048.
Boulton, A. (2009a). Corpora for all? Learning styles and data-driven learning. In Proceedings of 5th Corpus Linguistics Conference, (July 2009). [Conference Presentation], Liverpool, United Kingdom.
Boulton, A. (2009b). Data-driven learning: on paper, in practice. *Corpus Linguistics in Language Teaching.*, 17-52.
Boulton, A., & Cobb, T. (2017). Corpus use in language learning: A meta‐analysis.Language learning,67(2),348–393.
Callies, M. (2019). Integrating corpus literacy into language teacher education. *Learner corpora and language teaching*, 245-263.
Castro-Alonso, J.C., Sweller, J. (2020). The Modality Effect of Cognitive Load Theory. In: Karwowski, W., Ahram, T., Nazir, S. (eds) Advances in Human Factors in Training, Education, and Learning Sciences. AHFE 2019. *Advances in Intelligent Systems and Computing*, vol 963. Springer, Cham.
Centre for Education Statistics and Evaluation. (2017). *Cognitive load*

theory: research that teachers really need to understand. Retrieved1st March 2022 from: https://www.cese.nsw.gov.au//images/stories/PDF/cognitive-load-theory-VR_AA3.pdf. Accessed 1 March 2022

Cheng, S. (2017). Translation competence development among learners: A problem-solving perspective. Unpublished PhD Dissertation. The University of Manchester (United Kingdom).

Charles, M. (2020). From take-up to take-off? A longitudinal view of data-driven learning in English for academic purposes. [Paper presentation]. *Teaching and Learning Corpora, Europe*. Teaching and Learning Corpora, Europe 2020, Perpignan, France. TaLC main conference – Langages et identités (hypotheses.org)

Chujo, K., Kobayashi, Y., Mizumoto, A., & Oghigian, K. (2016). Exploring the Effectiveness of Combined Web-based Corpus Tools for Beginner EFL DDL. *Linguistics and Literature Studies*, 4(4), 262-274.

Crosthwaite, P., & Steeples, B. (2022). Data-driven learning with younger learners: exploring corpus-assisted development of the passive voice for science writing with female secondary school students. *Computer Assisted Language Learning*, *37*(5–6), 1166–1197.

Farr, F., & Leńko‐Szymańska, A. (2023). Corpora in English language teacher education: Research, integration, and resources. *TESOL Quarterly*.

Frıgınal, E., Dye, P., & Nolen, M. (2020). Corpus-based approaches in language teaching: Outcomes, observations, and teacher perspectives. *Bogazici University Journal of Education*, *37*(1), 43-68.

Gavioli, L.(2005). Exploring Corpora for ESP Learning. Amesterdam/ Philadelphia:John Benjamins.

Göpferich, S. (2009). "Towards a Model of Translation Competence and its Acquisition:The Longitudinal Study 'TransComp'." In Göpferich, S., Jakobsen, A.& Mees(eds.). *Behind the Mind: Methods. Models and Results in Translation Process Research*. Copenhagen Studies in Language (37), 11–37. Copenhagen: Samfundslitteratur.

Hunziker Heeb, Andrea.(2016). Professional translators' self-concepts and directionality: indications from translation process research. *The*

Journal of Specialised Translation 25, 74–88.

Hurtado Albir, A., Beeby, A., Fernández, M., Fox, O., KUZNIK , A., Neunzig Serra, W., Rodríguez-Inés, P., Romero, L., & Wimmer, S. (2011). Results of the Validation of the PACTE Translation Competence Model: Translation Project and Dynamic Translation Index. In S. O'Brien (Ed.), *Cognitive explorations of translation* (pp. 30-53)

Ištvánová, M. (2021). On the Use of Corpora in Second Language Acquisition–Chinese as an Example. *Acta Linguistica Asiatica*, *11*(2), 131-142.

Kavanagh, B. (2021a). Bridging the gap from the other side: How corpora are used by English teachers in Norwegian schools. *Nordic Journal of English Studies*, *20*(1).

Kavanagh, B. (2021b). Norwegian in-service teachers' perspectives on language corpora in teaching English. *Nordic Journal of Language Teaching and Learning*, *9*(2), 90-106.

Loukas, L., Fergadiotis, M., Androutsopoulos, I., & Malakasiotis, P. (2021). EDGAR-CORPUS: Billions of tokens make the world go round. *arXiv preprint arXiv:2109.14394*.

Lusta, A., Demirel, Ö., & Mohammadzadeh, B. (2023). Language corpus and data driven learning (DDL) in language classrooms: A systematic review. *Heliyon,9(12)*.

Ma, Q., & Mei, F. (2021). Review of corpus tools for vocabulary teaching and learning. *Journal of China Computer-Assisted Language Learning*, *1*(1), 177-190.

Mohammed, T. A. (2022). The Use of corpora in translation into the Second Language: A project-based approach. *Frontiers in Education*, 7, 849056.

Muñoz Martín, R. (2014). Minding translation. Con la traducción en mente. MONTI Monografías de Traducción e Interpretación. Número especial, 1.

Muñoz Martín, R., & González Fernández, C. A. (2021). Cognitive Translatology: A primer, revisited. *Studies in Language, Communication & Cognition*, *1*(4), 131-165.

Martín, R. M., Sun, S., & Li, D. (Eds.). (2021). *Advances in cognitive translation studies*. Springer.

Neubert, A.(2000). "Competence in language, in languages, and in translation". In Developingt translation Competence, C. Schäffner and B. Adabs (eds.), 3–18. Amsterdam/Philadelphia:

John Benjamins. doi: 10.1075/btl.38.03.
O'Keeffe A. (2021).Data-driven learning – a call for a broader research gaze. *Language Teaching*, 54(2):259-272.
Paas, F., Tuovinen, J., Tabbers, H., & Van Gerven, P. (2003). Cognitive load measurement as a means to advance cognitive load theory. Educational Psychologist, *38*, 63–71.
Paas, F., & van Merriënboer, J. J. G. (2020). Cognitive-Load Theory: Methods to Manage Working Memory Load in the Learning of Complex Tasks. *Current Directions in Psychological Science*, 29(4), 394-398.
Pan, L., & Liao, S. (2021). News translation of reported conflicts: a corpus-based account of positioning. Perspectives, 29(5), 722-739.
Poole, R. (2022). "Corpus can be tricky": revisiting teacher attitudes towards corpus-aided language learning and teaching. *Computer Assisted Language Learning*, *35*(7), 1620-1641.
Prassl, F.(2011). Translators' decision-making processes in research and knowledge integration. In Göpferich, S., Alves, F., Mees, I. (Eds.). *New Approaches in Translation Process Research*. Samfundslitteratur Press .
Pym, A.(2011). Training Translators. In Kirsten Malmkjær, and Kevin Windle (eds), *The Oxford Handbook of Translation Studies*. Oxford University Press, 475–489.
Rayyash, H. A., & Haider, A. (2022). Construction of a parallel corpus of English-Arabic movie subtitles: a genuine source for audiovisual translators. *The International Journal of Humanities Education*, *21*(1), 21.
Ressurrecció, V., Piorno, P, Izquierdo, I. (2008). The Acquisition of Translation Competence through Textual Genre. *Translation Journal*, 12(4).
Samoudi, N., & Modirkhamene, S. (2022). Concordancing in writing pedagogy and CAF measures of writing. *International Review of Applied Linguistics in Language Teaching*, 60(3), 699-722.
Salah, A. & Hassan, S.(2019). A Virtual Environment Based on DAISY Technology for Developing EFL Reading Comprehension Skills of Preparatory Stage Visually- Impaired Pupils and Reducing their Cognitive Load. *Faculty of Education Journal, Manoura University*,107.

Shreve, G. M., Lacruz, I., & Angelone, E. (2010). Cognitive effort, syntactic disruption, and visual interference in a sight translation task. *Translation and cognition*, *15*, 63-84.

Sittirak, N., & Ranong, S. N. (2023). Investigating Novice Translators' Instrumental Competence in Translating from and into a Foreign Language. *LEARN Journal: Language Education and Acquisition Research Network*, *16*(2), 273-290.

Sweller, J., van Merriënboer, J., & Paas, F. (2019). Cognitive architecture and instructional design: 20 years later. *Educational Psychology Review*, 31, 261–292.

Sweller, J. (2010). Element interactivity and intrinsic, extraneous, and germane cognitive load. *Educational psychology review*, *22*, 123-138.

Sweller, J. (2020). Cognitive load theory and educational technology. Education Technology Research Development, 68, 1–16.

Trémolière, B., Gagnon, M. and Isabelle, B. (2016). Cognitive Load Mediates The Effect of Emotion on Analytical Thinking. *Experimental Psychology,* 63 (6): 343–350.

Vyatkina, N. (2020). Corpus-informed pedagogy in a language course: Design, implementation, and evaluation [Book Chapters]. In Kruk, M. & Peterson, M. (Eds.). *New technological applications for foreign and second language learning and teaching* ,(pp. 306–335). IGI Global.

Yang, Z., & Li, D. (2021). Translation competence revisited: Toward a pedagogical model of translation competence. *Advances in Cognitive Translation Studies*, 109-138.

Zaghouani, W., Ahmed, A., Zhang, X., & Rezk, L. (2024, May). QCAW 1.0: Building a Qatari Corpus of Student Argumentative Writing. In *Proceedings of the 2024 Joint International Conference on Computational Linguistics, Language Resources and Evaluation (LREC-COLING 2024)* (pp. 13382-13394).

Zhang, J. (2013). Decreasing Cognitive Load for Learners: Strategy of Web-Based Foreign Language Learning. *International Education Studies*, 6 (4), 134- 139.

فؤاد ابو حطب ,امال صادق: (٢٠١٠) مناهج البحث وطرق التحليل الاحصائى فى العلوم النفسية والتربوية والاجتماعية .القاهرة .مكتبة الانجلو المصرية.