



## The Role of Data-Driven Learning in Developing Trait Emotional Intelligence

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**Abstract:** Technology-mediated instructional activities have received increasing attention in second language acquisition (SLA) studies. Yet, research on the role of technology in language learners' emotional intelligence has been limited. More specifically, the role of data-driven learning (DDL) using concordancing, as a technology-mediated approach to learning English, in developing emotional intelligence has been left unattended. Through a mixed-methods explanatory sequential design within a quasi-experimental comparison group pretest-posttest design, the present study examined if DDL statistically significantly influenced the English learners' trait emotional intelligence (TEI) and its attributes, including emotionality, self-control, well-being, and sociability. The results of questionnaires, open-ended surveys, and semi-structured interviews with 92 female undergraduate English learners indicated that DDL did not statistically significantly influence their TEI and its attributes. However, in terms of well-being, learners in the experimental group were slightly higher than learners in the control group. Finally, analysis of the qualitative data pointed to an increase in the learners' TEI through enhancing self-confidence, stress management, and emotional perception.

**Keywords:** Data-driven Learning, Concordancing, Trait Emotional Intelligence, EFL Learners, Intervention.

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## Introduction

Studies on emotional intelligence (EI) have shown that EI reinforces positive emotions, especially enjoyment in foreign language learning environments (e.g., An et al., 2021; Gregersen et al., 2014; Li, 2020). According to positive psychology, EI and emotions are the two core components of the learners' well-being (Oxford, 2016). Trait emotional intelligence (TEI), a personality trait comprising of a series of dispositions and self-perceptions linked to emotions, with four constituent attributes, including emotionality, self-control, well-being, and sociability (Petrides & Furnham, 2003), has been recognized as a key construct that has a significant impact on the learners' emotions in the language learning process (e.g., Li & Xu, 2019; Shao, Yu, & Ji 2013).

At the same time, recent research has highlighted the role of technology-mediated instruction in shaping students' emotions in education in general (e.g., Angelaki & Mavroidis, 2013; Henrie, Halverson, & Graham, 2015; Loderer, Pekrun, & Lester, 2020) and language learning in particular (e.g., Kukulska-Hulme & Viberg, 2018; Lee & Lee, 2021; Xiangming, Liu, & Zhang, 2020). One example of the use of technology-mediated instructional activities in language learning is the use of language corpora through concordancers (Zare, 2020; Zare & Aghajani, 2022, 2023; Zare & Karimpour, 2022; Zare & Keivanlou-Shahrestanaki, 2017; Zare et al., 2022, 2023). A concordancer is a specialized software that exposes learners to a plethora of instances of authentic language use. Unlike traditional language teaching which was mostly guided by the teacher, a concordancer engages learners in data-driven learning (DDL) where they take a more active and agentic role by searching through concordance lines and inferring regular patterns. DDL seems to arouse learners' interest in language learning and develop in them certain positive emotions such as self-confidence, self-esteem, enjoyment, and fun (e.g., Barabadi & Khajavi, 2017; Gilquin & Granger, 2010; Guan, 2013; Willis, 2011). As Guan (2013, p. 111) notes, DDL, as a learner-centered discovery-based learning mode, makes learners "get the satisfaction of success, enhance their self-confidence, and further stimulates their interest in learning".

Several attempts have been made to highlight how TEI is related to classroom emotions (e.g., Li & Xu, 2019; Resnik & Dewaele, 2020), learning language skills (e.g., Abdolrezapour & Tavakoli, 2012; Chen & Zhang, 2020), and technology-assisted instructional activities (Abdolrezapour, 2017; Kessler, 2018; Yang, Quadir, & Chen, 2019). Yet, no attention, to the best of our knowledge, has been paid to the role of DDL, as a technology-mediated approach, in developing positive emotions in learners. More specifically, the impact of DDL on the students'

TEI has not been addressed at all. In order to bridge this gap, the present study aimed to examine whether DDL statistically significantly influences the learners' TEI and its attributes, including emotionality, self-control, well-being, and sociability.

## Review of the Literature

### *Emotional Intelligence*

The concept of emotional intelligence (EI) has been recognized as prominent by the seminal work of Salovey and Mayer (1990). EI is defined as the capacity to interpret emotions, to bring about emotions in order to comprehend feelings and emotional knowledge as well as managing emotions thoughtfully as a means to develop emotional growth (Mayer & Salovey, 1997). Goleman (1995) construes EI as a combination of five facets: being aware of one's emotions, handling one's emotions, motivating oneself and controlling one's feelings, perceiving others' emotions, and managing relationships. To Goleman, success in life is 20% contingent upon intelligence quotient and 80% upon different factors that shape an individual's emotional intelligence. As Petrides et al. (2016) note, EI is multidimensional and multifaceted. It consists of a wide array of emotions that are embedded in a person's characteristics. In this regard, TEI is defined as "a constellation of emotion-related self-perceptions and dispositions, located at the lower levels of personality hierarchies" (Petrides, Pérez-González, & Furnham, 2007, p. 26). TEI is viewed as a componential construct, consisting of four main attributes: emotionality, self-control, well-being, and sociability which are all personality traits (Petrides, 2017; Petrides & Furnham, 2001). Well-being is described as the ability to feel happy, to have self-confidence and self-esteem, and to be satisfied and optimistic with life. Emotionality refers to the ability to vicariously understand the emotional experiences of a person (empathy), perceive others' feelings clearly (emotional perception), express emotions to others (emotional expression), and in turn, form interpersonal relationships. Self-control is characterized by the ability to handle emotions (emotional regulation), not surrender to impulses, tolerate pressure, and handle stress (stress management). Sociability is related to the ability to manage other people's emotions (emotional management), defend one's rights (assertiveness), and be socially aware (social awareness) (Chen & Zhang, 2020; Dewaele, 2019).

Research shows that students' TEI is affected by technology use in second language learning (Abdolrezapour, 2017). Yet, DDL, as a technology-driven approach, has not been studied in relation to TEI.

### *DDL*

The incipient appearance of DDL as an inductive and discovery-based approach by the pioneering work of Johns (1986) changed the scenery of the language learning landscape in the early 1990s. DDL stems from a constructivist approach, concentrating on learner-centeredness and developing learners' agency by posing language as a problem to them and involving them in a problem-solving task (e.g., Boulton, 2010, 2017; Boulton & Cobb, 2017; Flowerdew, 2015; Gilquin & Granger, 2010; Lenko-Szymanska & Boulton, 2015). That is, the heavy burden of learning is put on the learner's shoulder and he/she is required to act as a researcher in the learning path, explore the corpora, and induce lexico-grammatical rules (Boulton, 2017; Gilquin & Granger, 2010). This is normally done by the use of a concordancer. A concordancer is a specifically designed search tool, used to explore linguistic data and investigate how language works in different contexts (Boulton, 2015). Concordancers can play a facilitative role and act as a "linguistic informant" (Flowerdew, 1996, p. 92) to raise both the teachers' and learners' awareness of the lexical and grammatical features of the language. DDL has redefined teachers' and learners' roles. In DDL, teachers are no longer perceived as the sole knowers of knowledge (Boulton, 2010). Instead, within a DDL approach, the learner is involved in an inquiry where s/he adopts the role of a "detective" (Johns, 1997, p. 101) and induces the rules of naturally occurring language forms in a more or less active and autonomous manner (Gilquin & Granger, 2010). Yet, the teacher may still have a facilitative role by guiding learners and providing them with support (Zare, 2020).

### *Research on TEI and DDL*

There has been an emerging body of research on the crucial role of TEI in language learning (e.g., Abdolrezapour, 2013, 2017; Abdolrezapour & Tavakoli, 2012; Chen & Zhang, 2020; Li, 2019). Research on TEI is classified into three major strands of inquiry. The first strand concerns the link between TEI and classroom emotions, either positive or negative. In this regard, research shows that TEI is negatively associated with foreign language anxiety (FLA) and positively linked to foreign language enjoyment (FLE) (e.g., Dewaele, Petrides, & Furnham, 2008; Li, 2019; Li & Xu, 2019; Resnik & Dewaele, 2020; Shao et al., 2013). Dewaele et al. (2008) found that learners with higher levels of TEI experience lower levels of communicative anxiety and foreign language anxiety across languages and situations. In addition, Li and Xu (2019) observed that EI training leads to a dramatic increase in TEI and FLE and a decrease in FLA. Research also shows that TEI is positively correlated with English language proficiency (e.g., Li, 2019; Shao

et al., 2013). In this regard, Li (2019) observed that TEI is positively linked to FLE and FLE mediates the impacts of TEI on perceived achievement as well as actual achievement. Collectively, these studies have concentrated on the interrelationship between TEI and FLA/FLE. FLA and FLE are linked to the well-being dimension of TEI in that they shed light on how reducing negative emotions (e.g., anxiety) and boosting positive emotions (e.g., enjoyment) can help language learners improve their TEI and subsequently their language learning.

The second strand of inquiry focuses on the relationship between TEI and learning language skills. The findings demonstrate that TEI boosts language learning performance (e.g., Abdolreza-pour, 2013; Abdolreza-pour & Tavakoli, 2012; Chen & Zhang, 2020). In this respect, Abdolreza-pour (2013) observed that exposure to literature response activities causes the learners to perform better in writing and the incorporation of the TEI strategy positively affects their writing performance. Moreover, Abdolreza-pour and Tavakoli (2012) noticed that learners who are exposed to literature response activities show a better performance on reading comprehension tests and have higher levels of TEI, thus indicating a positive relationship between them. Finally, Chen and Zhang (2020) investigated the nexus between EFL learners' TEI, including its four constituent facets (emotionality, self-control, well-being, and sociability), and the four aspects of their language performance. The results pointed to a significant correlation between the learners' language learning performance and their global TEI, well-being, and sociability. Besides, only well-being had a significant influence on listening performances. Therefore, the findings corroborate that TEI is a multifaceted construct whose dimensions exercise various interactive effects on L2 learning.

The third strand refers to a current inclination towards the link between TEI and the innovative use of technology in language learning. Research suggests that the use of technology can enhance TEI (e.g., Abdolreza-pour, 2017; Chen & Flowerdew, 2018; Cobb & Boulton, 2015; Gilquin & Granger, 2010; Yang et al., 2019). In this regard, the findings show that exposure to computer-mediated emotional activities boosts the learners' TEI, and this, in turn, has a positive influence on their oral fluency (Abdolreza-pour, 2017). Additionally, Yang et al. (2019) found that utilizing a digital game-based English learning environment helps learners with a high TEI perform better in gaming as well as learning English, whereas those with lower TEI have a lower performance.

Research on the use of corpora, concordancers, and DDL also indirectly points to the role of concordancing in fostering and boosting positive emotions which is a sub-component of well-being, as one of the major facets of TEI (Chen & Flowerdew, 2018; Cobb & Boulton, 2015). In a

study on the use of concordancing, as an application of DDL, Cobb and Boulton (2015) found that learners with different learning styles use corpora in an enjoyable manner. Chen and Flowerdew (2018) also found that the experience of working with corpora via DDL is comfortable and joyful for learners.

Although the literature reviewed above has investigated the link between TEI, positive or negative emotions, technology, as well as language skills, to the best of the researchers' knowledge, no study has explored if DDL influences the learners' TEI specifically. Taking into account that TEI is a complex and multi-faceted construct that can influence and be mediated by technology in a technology-assisted language learning context, the present study examined the impact of using DDL in comprehending English academic lectures through concordancing on TEI and its four major attributes. The study was an attempt to answer the following research question:

Does DDL statistically significantly affect the students' TEI and its attributes, including emotionality, self-control, well-being, and sociability?

## **Methods**

### ***Setting and Design***

The study was conducted in Iran where English is considered a foreign language. The study followed a mixed-methods design, i.e., explanatory sequential. This design requires collecting and analyzing both quantitative and qualitative data where the collection and analysis of quantitative data are followed by the collection and analysis of qualitative data. In such designs, qualitative data are used to explain and expand the results of quantitative data (Creswell et al., 2003). The explanatory sequential design was implemented within a quasi-experimental design, i.e., comparison group pretest-posttest. The purpose of the quasi-experimental design was to investigate the impact of DDL on the students' global TEI and its attributes. Hence, after the students were pretested, they were divided into the control and experimental groups. Next, they were exposed to the placebo and treatment, respectively. Finally, they were post-tested.

### ***Participants***

We began the study with 243 Iranian female English language learners who volunteered for the study. Next, they were given a Preliminary English Test (PET), an academic English lecture comprehension test, and a TEI questionnaire. The purpose of this phase of the study was to select learners with an intermediate level of general English language proficiency, a similar level (low

level) of academic English lecture comprehension, and a similar TEI. This resulted in the selection of 92 undergraduate English learners who were asked to sign a written informed consent form, outlining the purposes and requirements of the study. Of this number, 41 were third-year students (44.56 %) and 51 were fourth-year students (55.44 %). Among the learners, 48 were studying English language and literature (52.17 %) and 44 were studying English language teaching (47.83). The age of the learners ranged from 21 to 27 ( $M = 22.58$ ,  $SD = 1.39$ ).

### ***Instruments***

We used a PET and an academic English lecture comprehension test, piloted with 243 Iranian female English language learners for this study ( $\alpha = 0.84$ ,  $0.81$ , respectively) to pretest the students on their general English language proficiency, and academic English lecture comprehension, respectively. The academic English lecture comprehension test was borrowed from the study by Zare (2020). It consisted of 10 four-choice questions. Each question asked the students to identify the important points of a short academic English lecture. The test took 60 minutes overall to finish.

To measure the students' global TEI and its attributes, we used the Trait Emotional Intelligence Questionnaire which was translated from English into Persian (i.e. the Short Form or TEIQue-SF) (Petrides, 2009). The TEIQue-SF is a 30-item questionnaire, measuring the students' global TEI and its four attributes, including emotionality, self-control, well-being, and sociability. The items in the questionnaire are responded to on a 7-point Likert scale, ranging from 1 (completely disagree) to 7 (completely agree). The internal consistency of the TEIQue-SF was  $\alpha = 0.81$  for the global trait emotional intelligence,  $\alpha = 0.76$  for emotionality,  $\alpha = 0.79$  for self-control,  $\alpha = 0.72$  for well-being, and  $\alpha = 0.78$  for sociability. In addition to the TEIQue-SF of 92 learners, we used a survey comprising an open-ended item. The item defined emotional intelligence in plain Persian and asked learners to explain in great detail if the program influenced their emotional intelligence.

In addition to the questionnaire, and the one-item survey, we held semi-structured interviews with six voluntary learners from the experimental group, after the completion of the treatment. The interviews were one-on-one and were held online in Persian. During the interviews, they responded to the following questions: 1) What do you think of the approach, i.e., DDL, used in the program? 2) Do you think it has influenced your emotional intelligence? 3) If so, in what respects, did you find it more effective? 4) Is there anything else you'd like to discuss in relation to the program? The length of each interview was between 20 and 30 minutes.

We used AntConc to provide learners with access concordance lines. Through AntConc, we gave learners access to a total of 240 concordance lines on importance marking in English academic lectures, which were derived from a former study by Zare and Keivanloo-Shahrestanaki (2017).

### ***Procedures***

Having pretested the students on a PET and an academic English lecture comprehension test, we selected learners with an intermediate level of general English language proficiency and a similar level of academic English lecture comprehension and emotional intelligence. This led to the selection of 92 learners who were divided into two groups, i.e., one control and one experimental group (46 students per group). In doing so, we followed stratified random sampling, taking into consideration their academic major, year of study, and age. Next, we introduced the treatment and placebo. The purpose of both treatment and placebo was to teach how importance is marked in English academic lectures. However, the treatment involved doing so through a DDL approach using AntConc with the teacher's scaffolding, whereas the placebo used traditional teacher's explicit instruction. Hence, we exposed the learners in the experimental group to a concordancing program, comprising fifteen 90-minute sessions (three sessions a week) who were required to identify important information in lectures. The purpose of the concordancing program was for the students to realize how importance is marked in English academic lectures without any explicit instruction by the teacher. The expressions are highlighted in corpora. To this end, through AntConc, we provided the students with concordance lines of importance markers (e.g., *This data is vital here, And more importantly, it ..., The point is that ..., I also want you to have in mind ..., The thing you need to bear in mind is that ...*).

Transcripts of the lectures selected from the British Academic Spoken English (BASE) corpus in a previous study by Zare and Keivanloo-Shahrestanaki (2017) were used in AntConc. The students were informed that they had to explore the concordance lines and figure out how importance marking worked in English academic lectures with the teacher's help. The concordance lines were supplemented with tasks dealing with detecting importance markers and their associated proportions of text, considered important. On the other hand, we offered the learners in the control group a placebo in the form of a program of explicit instruction of importance markers in English academic lectures. The program comprised fifteen 90-minute sessions (three sessions a week). The learners in the control group were informed that the purpose of using this program was to teach explicitly how importance was marked in English academic

lectures. During the program, the teacher explained to the students how importance was marked in English academic lectures and gave them follow-up examples and exercises. Both the treatment and the placebo were delivered in Persian (their mother tongue) to ensure that familiarity with English did not affect their performance in the program. The examples, exercises, and concordance lines, however, were in English. A week after the completion of the treatment and placebo, we post-tested the learners in both groups on their emotional intelligence with the TEIQue-SF questionnaire. We also asked them to fill out the open-ended one-item survey on the effect of DDL on their TEI. A week later, we held one-on-one semi-structured interviews with six volunteers.

### *Data Analysis*

Analysis of the data involved both quantitative and qualitative procedures. For quantitative data, as the results of the TEIQue-SF questionnaire violated normality, a requirement for running parametric tests ( $p = 0.001 < 0.05$ ), we ran five separate non-parametric tests, i.e., Mann-Whitney U tests, using the Statistical Package for Social Sciences (SPSS) software. One of the Mann-Whitney U tests was run for global TEI and the other four were run for the attributes of trait emotional intelligence, including emotionality, self-control, well-being, and sociability. The purpose of the five tests was to see if DDL statistically significantly affects the students' TEI and its attributes, including emotionality, self-control, well-being, and sociability.

For qualitative data, we coded the students' responses to the open-ended one-item survey and the questions in the semi-structured interview using bottom-up coding. This involved 1) transcribing the responses and removing errors and irrelevant responses, 2) reading the transcriptions several times and looking for codes, 3) grouping codes into relevant themes and categories, and 4) preparing a report of the analysis with relevant excerpts for the paper. This analytic framework helped us maintain the transferability of the results of the analysis. Additionally, we addressed the dependability of the qualitative analysis by computing inter-coder reliability with Cohen's kappa ( $\alpha = 0.88$ ). Moreover, we enhanced the confirmability of the analysis by asking a foreign scholar to code a sample of students' responses in English ( $\alpha = 0.83$ ) which in turn helped us maintain an etic perspective as well. Hence, we addressed researcher positioning by maintaining both emic and etic perspectives in the analysis. Finally, to improve credibility and appropriateness, we did member checking or participant validation by asking two learners to check the data and match them against relevant codes.

## Results and Discussion

### Quantitative Results

We ran five separate Mann-Whitney U tests to explore the impact of DDL on the students' global TEI and its attributes. Table 1 presents the mean ranks for the students' global TEI and its attributes.

**Table 1.** *The Mean Ranks for Global TEI and Its Attributes*

	Group	N	Mean Rank	Sum of Ranks
Global TEI	Control	46	48.03	2209.50
	Experimental	46	44.97	2068.50
	Total	92		
Emotionality	Control	46	49.16	2261.50
	Experimental	46	43.84	2016.50
	Total	92		
Self-control	Control	46	48.20	2217.00
	Experimental	46	44.80	2061.00
	Total	92		
Well-being	Control	46	45.13	2076.00
	Experimental	46	47.87	2202.00
	Total	92		
Sociability	Control	46	48.87	2248.00
	Experimental	46	44.13	2030.00
	Total	92		

As Table 1 shows, the mean ranks for the students' global TEI and its attributes, including emotionality, self-control, well-being, and sociability were different for the students in the control ( $M = 48.03, 49.16, 48.20, 45.13, 48.87, N = 46$ ) and experimental ( $M = 44.97, 43.84, 44.80, 47.87, 44.13, N = 46$ ) groups. As can be seen, in terms of global TEI, emotionality, self-control, and sociability, the students' mean ranks in the control group were slightly higher. On the other hand, in terms of well-being, the mean ranks of the students in the experimental group were slightly higher. In other words, in terms of global TEI, emotionality, self-control, and sociability, learners in the control group were slightly higher than learners in the experimental group, following the placebo and treatment. On the other hand, in terms of well-being, learners in the experimental group were slightly higher than learners in the control group. Table 2 shows the results of the five Mann-Whitney U tests.

**Table 2.** *The Results of the Mann-Whitney U Tests for Global TEI and Its Attributes*

	Global TEI	Emotionality	Self-control	Well-being	Sociability
Mann-Whitney U	987.500	935.500	980.000	995.000	949.000
Wilcoxon W	2068.500	2016.500	2061.000	2076.000	2030.000
Z	-.551	-.958	-.612	-.493	-.853
Asymp. Sig. (2-tailed)	.582	.338	.541	.622	.393

As can be seen in Table 2, the ‘Sig. (2-tailed)’ values of the learners’ global TEI and its attributes, including emotionality, self-control, well-being, and sociability were ‘0.582’, ‘0.338’, ‘0.541’, ‘.622’, and ‘.393’, respectively. Hence, following the treatment, the learners’ global TEI and its attributes, including emotionality, self-control, well-being, and sociability did not differ statistically significantly. That is, DDL did not statistically significantly affect the students’ global TEI and its attributes. This is not in keeping with the results of prior research from a technological perspective. Previous studies have indicated that computer-mediated activities reinforce positive emotions including enjoyment, and self-confidence (Abdolrezapour, 2017; Chen & Flowerdew, 2018; Cobb & Boulton, 2015; Guan, 2013). Abdolrezapour (2017), for example, found that computer-mediated emotional activities, which were used to train learners to express their emotions, raised their EI. What is important to note here is that the learners in the present study only used DDL through concordancing without receiving any instruction on TEI. Besides, the technology Abdolrezapour (2017) used in her study was interactive and multi-modal. Concordancers, on the other hand, lack such features and are only interactive in the sense that the learner interacts with the corpus/concordancer.

### ***Qualitative Results***

Analyzing the control group students’ responses to the open-ended one-item survey did not lead to any noteworthy themes. On the other hand, analyzing experimental group students’ responses to the open-ended one-item survey and semi-structured interview pointed to three themes: self-confidence, stress management, and emotional perception. It seems that engagement in DDL developed learners’ academic lecture comprehension and presentation skills, thus empowering them to effectively present their classroom lecturing assignments which provided them with opportunities to be seen as an active member of the community. First and foremost, many learners in the experimental group reported that they experienced

an increase in their self-confidence over the fifteen sessions of instruction through DDL. For instance, in the below excerpts, the learners held that the intriguing nature of DDL (Excerpts 1 and 2) and progress in the understanding of lectures (S10) were the major reasons for an increase in their self-confidence and self-esteem:

- (1) *S3: Since this course was easy and I was interested in learning importance markers, using DDL made the course enjoyable and raised my self-confidence.*
- (2) *S13: Undoubtedly, my emotional intelligence was affected. Participation in this course created a sense of self-confidence and motivation that would linger.*
- (3) *S10: DDL helped me recognize important points in understanding lectures and this enhanced my lecture comprehension and presentation skills. Now, I feel confident enough to participate in classroom presentations.*

Self-confidence was the most common positive emotion experienced by the learners in the experimental group. Furthermore, motivation and enjoyment were regarded as other positive emotions experienced by the learners. It can be concluded that DDL caused the learners to develop positive emotions that are related to their well-being, as one of the main facets of TEI. That is, exposure to DDL in the form of concordancing increased their enjoyment and motivation by improving their comprehension of lectures. This, in turn, enhanced their self-confidence. This is in keeping with the results of Barabadi and Khajavi (2017) and Guan (2013) who claimed that DDL can boost the learners' self-confidence and interest in English by enabling them to take responsibility for their learning. It also supports Cobb and Bolton's (2015) argument that using concordancing can be enjoyable for learners. In addition, the results partially resonate with those of the previous studies (e.g., Li & Xu, 2019; Resnik & Dewaele, 2020; Shao et al., 2013) in that they indicated an augmentation in TEI causes learners to experience more positive emotions including enjoyment and self-confidence that can explain why the learners in the experimental group had slightly higher levels of well-being.

Another theme was stress management in giving lectures (4) and comprehending them (5). In this sense, learners noted how exposure to importance markers through DDL benefitted them by enabling them to give lectures and understand them in a stress-free manner:

- (4) *S18: This course helped me collaborate and interact with my classmates. I was very anxious in university classes, especially when giving lectures, discussing, and giving opinions. Fortunately, participation in this course made me aware of my weak points in lecturing. The expressions that I learned in this course helped me improve my lecturing and presentations, so my stress was relieved. I took the first step to turn my weaknesses into strengths. This experience helped me be a successful lecturer in other courses and this helped promote my relationship with my professors. I was even suggested to join the university student council because of being active and a good lecturer. It was the best thing that happened to me and made me change, progress, and achieve my goals.*
- (5) *S11: It helped me overcome my stress in comprehending lectures since I was given a bunch of easy examples that made everything clear to me, and gave me confidence to understand better.*

It seems that exposure to concordance lines and exploring authentic exemplars through DDL helped them regulate their stress. Subsequently, stress management led to self-confidence. It seems that students who were weak in English lecturing suffered from a sense of isolation and loneliness. Thus, participation in DDL positively contributed to developing their lecturing, resulting in getting the support of their professors and their classmates and being recognized as effective lecturers. This advocates Chen and Zhang's (2020) finding that learners who are better at managing their emotions have better performance in listening. This also gives support to Dewaele et al.'s (2008) observation that students with higher levels of TEI experience less foreign language anxiety. Furthermore, this is in line with the results of Li and Xu (2019) and Shao et al. (2013) who found that a rise in TEI leads to a decrease in the learners' foreign language anxiety.

With respect to emotional perception, most of the learners in the experimental group mentioned that DDL raised their awareness of their emotions (6) and made them reflect on their feelings (7 and 8) while learning:

- (6) *S9: DDL made me have a deeper understanding of my emotions in this instructional course. It had an impressive influence on my learning process.*
- (7) *S1: Participation in this course made me reflect on my emotions about my lecturing ability, identify my goals in life, for example, how to improve my*

*lecturing ability in English and use this experience to improve other language skills and think about the ways to achieve them.*

(8) *S16: This course encouraged me to think more about my emotions and personality. I tried to know myself better.*

The common thread in the above quotes is perceiving one's emotions and contemplating them. Emotional perception is characterized as an element of emotionality. It appears that engagement in DDL and using cognitive strategies including predicting, observing, noticing, thinking, reasoning, analyzing, interpreting, reflecting, exploring, making deductive and inductive inferences, focusing, guessing, comparing, differentiating, theorizing, hypothesizing, and verifying (Gilquin & Granger, 2010) raised learners' awareness of their learning trajectory and emotions. This in turn might lead to the development of their TEI.

## Conclusion

The present study aimed to explore if DDL statistically significantly affected the students' TEI and its attributes, including emotionality, self-control, well-being, and sociability. The results of the quantitative analyses indicated that DDL did not statistically significantly affect the students' global TEI and its attributes. Yet, in terms of global TEI, emotionality, self-control, and sociability, learners in the control group were slightly higher than learners in the experimental group. However, in terms of well-being, learners in the experimental group were slightly higher than learners in the control group. Additionally, the results of the qualitative analyses indicated that DDL boosted the students' self-confidence, stress management, and emotional perception. That is, DDL could help learners with lower self-esteem raise their emotional perception, manage their stress, and enhance their self-confidence. What is important to note here is that although the results of quantitative analyses indicated no statistically significant effects for DDL, qualitative analyses pointed to an increase in the learners' emotional intelligence by enhancing their self-confidence, stress management, and emotional perception.

The present study was limited in a number of aspects. First, the study took place over a short period of time. Hence, future researchers are encouraged to adopt a longitudinal design and study the topic over an extended period of time. Second, in terms of using qualitative measures, this study was restricted to an open-ended one-item survey and semi-structured interviews. Therefore, in order to explore the perceived changes in the learners' TEI and its

attributes in more depth, it would be beneficial to use reflective journals before, during, and after the program. Third, this study only used verbal-report instruments to investigate potential changes in the learners' TEI and its attributes. To provide a better picture of changes in the learners' TEI, it would be useful to use non-participant classroom observation as well. Finally, as the scope of this research was limited to DDL and concordancing only, further research is required to shed light on the link between the multi-faceted construct of TEI and other technology-mediated instructional activities.

The findings of the present study may have some pedagogical implications at microscopic levels. The results of this study raise teachers' awareness of the importance of TEI and its perceived effects on the learners' language learning and identify the pivotal role of TEI training in reinforcing positive emotions. Additionally, as DDL seems to raise the learners' TEI and help them regulate their negative feelings (e.g., anxiety and stress) and boost their positive emotions (e.g., self-confidence, enjoyment, and motivation), it is important to use it as a language learning activity.

### **Declaration of Conflicting Interests**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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