Research in English Language Pedagogy (2023) 11(3): 444-468

 DOI: 10.30486/RELP.2023.1973610.1417

Original Article

Shedding Light on Ecological Critical Language Awareness Construct: A Questionnaire Development and Validation Study in the Iranian EFL Context

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Submission date: 25-11-2022 Acceptance date: 16-01-2023

Abstract

The study of ecolinguistics to date has been reserved for the field of discourse analysis. However, applying ecolinguistics in pedagogical contexts is a promising way to increase learners' critical language awareness. To realize this potential, one needs validated measures to quantify learners' critical language awareness in ecological contexts to conduct research in this field. In the absence of any instrument to measure language learners' ecological critical language awareness, the researchers of this study developed and validated a questionnaire. An exploratory sequential mixed methods design with two phases was employed. In the exploratory and qualitative phases, the researchers defined the construct and developed a questionnaire based on the underlying factors of the construct. After taking several steps to ensure its content validity, the questionnaire was administered to 200 intermediate-level EFL learners who were selected through convenience sampling. In the quantitative phase, the participants were exposed to ecolinguiscally-informed teaching materials in an English pedagogical context. The collected data were analyzed, and Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), Cronbach alpha coefficient for reliability indices, and model evaluation estimates were run to ensure the measure's reliability and validity. EFA substantiated the initial components of the six-factor tentative construct. CFA gave statistical support to the six components as well. All components enjoyed high-reliability estimates. The calculated model-fit estimates verified the CFA model as a valid measure of ecological critical language awareness. The developed measure paves the way for further empirical investigation of ways to raise learners' ecological critical language awareness in EFL contexts.

Keywords: Construct Validation, Critical Language Awareness, Ecolinguistics, Environmental Studies, Questionnaire Development

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1. Introduction

In late 2019, the young climate activist Greta Thunberg drew the whole world's attention to a heated debate about environmental issues of our time. She accentuated and brought environmental issues to the foreground of public attention, which generations of climate scientists failed to achieve (Jandrić et al., 2021). Thunberg (2019) encouraged people to face the brutal truth by saying, "I want you to act as if our house is on fire. Because it is" (p. 24). Never before had the issue of environmental crisis been in such dire straits. Thunberg highly endorsed motivating collective action and triggering social change (Sabherwal et al., 2021). She had managed to influence groups of people who had not previously seemed interested in her agenda, thus creating a movement called "The Greta effect" (Jung et al., 2020).

One thing that contributed to Thunberg's influence on public opinion was her choice of words and sentence structures, analyzed through critical discourse analysis by many researchers (e.g., Sjögren, 2020; Skilbeck, 2020; Suryaningsih, 2021). Critical discourse analysis of Thunberg's speech is a type of ecolinguistic study. According to Alexander and Stibbe (2014), ecolinguistics is "the study of the impact of language on the life-sustaining relationships among humans, other organisms, and the physical environment. It is normatively orientated toward preserving relationships which sustain life" (p. 104). Other researchers (e.g., Fill & Mühlhäusler, 2001; Goatly, 2002; Heuberger, 2008; Kaushal et al., 2021; Poole, 2006) have undergone ecological discourse analysis to critically analyze how the choice of words to deal with the environment can mask the imminent environmental problems we are facing.

The ultimate goal of ecolinguistics is to attain what Fairclough (2013) stated as critical language awareness, which denoted noticing how language was used to maintain power relations by unmasking the ecologically wrong norms of discourse (Stibbe, 2015). Thunberg's case epitomized this goal, as she had single-handedly led many movements, raising awareness through her speech and her actions about the environmental crisis, especially climate change. More recently, amid the post-pandemic era, linguists have turned to ecolinguistics once again to cope with the ethical and axiological issues of language and discourses regarding the outbreak of COVID-19 (Mohamed & Larouz, 2020; Gul et al., 2021; Zhou, 2021).

With the prevalence of ecolinguistics studies and the pursuit of bringing critical language awareness to society, the importance of implementing ecolinguistics through

language education deems necessary. The reason is that ecolinguistics is not meant to be simply carried out as an act of making academic commentary on discourses but as a means of raising ecological critical language awareness (ECLA) through pedagogical practice. As Zhao and Liu (2020) report, ecolinguistics has witnessed a cognitive turn that aims to foster and improve people's ecological awareness. However, as Chen (2016), in his quantitative meta-analysis of ecolinguistics, reveals, ecolinguistics has received growing research attention within linguistics. There are few mentions of the application of ecolinguistics within the field of language teaching. Instead of the discourse-analytical practice of ecolinguistics that seeks to unmask the unecological discourse of the already produced excerpts that are out there, why not attempt to change the way language learners see these environmental issues and use the language to talk about them in the first place? Why not incorporate these premises into teaching the language and ultimately hold the language users/learners accountable for how they use it?

Damico et al. (2020) hold literacy educators accountable for helping students identify and examine ecologically destructive and beneficial discourses about climate change and making climate justice more central in their classrooms. In a similar vein, ecolinguistics can be baked into curriculums for language learners or general knowledge courses to foster ECLA in learners. Education should endow language learners with the skills to expose hidden messages within the discourses surrounding them and resist discourses that encourage socially and ecologically damaging behavior (Stibbe, 2015).

However, the body of research in this field lacks a systematic definition of the construct of ECLA and an instrument to measure learners' ECLA reliably. Such a measure can enable researchers to design studies on the effectiveness of ecolinguistics practices and raise learners' ECLA by quantitively capturing this construct before and after learners' exposure to ecolinguiscally-driven pedagogical content. This issue is what Roccia and Iubini-Hampton (2021) raised and called for a quantitative model to assess the impact of teaching ecolinguistics on learners to facilitate standardization and homogenization across the discipline. The construct of ECLA has a high potential to expand the literature and is likely to be adopted by researchers in multiple areas of pedagogy.

Thus, to expand the field of ecolinguistics, the researchers of this study adopted an exploratory sequential mixed methods design and took several steps through qualitative and quantitative phases. The researchers first defined the construct of ecological critical language

awareness systematically, then developed and validated an ECLA instrument to assess EFL learners' awareness of ecologically informed use of language in the light of ecolinguistics. After defining the construct and developing the instrument, they administered it to the participants. Then they analyzed the collected data to examine the construct validity of the newly-developed questionnaire using Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Cronbach alpha coefficient for reliability indices.

2. Literature Review

2.1. Ecolinguistics

Interest in the study of ecolinguistics has grown enormously in recent years. Hallidayan Tradition defines ecolinguistics as "the study of the role language plays in the ecological and environmental problems of our time" (Fill, 1997, p. 451). As Halliday (1992) argued, "classism, growthism, destruction of species, pollution and the like are not just problems for the biologists and physicists. They are problems for the applied linguistic community as well" (p. 65). This ecolinguistics approach sheds light on the manipulatory sense of language concerning the environment and anthropocentric tendencies in language. The goal of this strand is mostly to expose unecological practices of linguistics through critical discourse analysis and bring about what Fariclough (2013) called critical language awareness: "If one becomes aware that a particular aspect of common sense is sustaining power inequalities at one's own expense, it ceases to be common sense, and may cease to have the capacity to sustain power inequalities" (p. 71).

A practical definition of ecolinguistic discourse analysis drawn from the works of Fill (1998), Halliday (1992), and Stibbe (2012, 2015) refer to the analysis of the destructive discourse promoting ecologically destructive behavior by projecting positive connotations on the word growth in economic growth or other positive connotations in discourses of consumerism, advertising, and the like. Besides, the way resources are grammatically considered as mass nouns such as water and soil indicates that they are unbounded. The anthropocentric speech takes agency away from trees, forests, and rivers, making it hard to express them as doing things like protecting from floods or providing food. Thus, ecolinguistics primarily aims to dig out the text and language dealing with ecological issues (Wu, 2018).

2.2. Ecological Critical Language Awareness

While ecolinguistics' primary concern has been with critical discourse analysis, Haig (2001) argues for the value of adding this linguistic element to investigating and teaching about environmental issues. Haig (2003) used the term "ecological critical language awareness pedagogy" to refer to a confluence of the four pedagogical trends of global issues teaching, content-based learning, critical language awareness, and learner autonomy (p. 201). However, his study focused more on textual analysis of the textbook from the ecological critical language awareness perspective. The current study's researchers shed light on the construct of ecological critical language awareness, which is based on works in ecolinguistics and determines whether language learners are aware of the role of the language they use in ecological issues. Since this application of the construct of ecological critical language awareness and such use of ecolinguistics in pedagogy has not been dealt with before, the literature on it is limited. What follows is an account of studies that approximate the notion of this construct.

Ecological critical language awareness is at the heart of the free online course 'The Stories We Live By' offered by Arran Stibbe. This course utilizes discourse analysis tools while adopting an ecological perspective to critically evaluate, question, and resist the narratives of economic growth, consumerism, and anthropocentric views on human existence. Stibbe (2015) highlights how language shapes the relationships between humans and the natural world by focusing on the linguistic features found throughout the texts regarding lexical choices, passive and active grammatical structures, and intertextuality.

The issue Roccia and Iubini-Hampton (2021) raised regarding the 'Stories We Live By' course is the difficulty of assessing the impact and fruitfulness of this course on raising ecological awareness. They designed a combination of qualitative techniques to thematically analyze the impact of the course, namely: semi-structured email interviews, completion forms, and website comments. However, since their study lacked a quantitative component to report on the impacts of the course, they suggested a quantitative model for impact assessment. This model, as they advanced, should entail data collection through the means of a Likert-scale questionnaire.

Another study on employing ecolinguistics in the classroom was by Luardini et al.'s (2018) action research. They applied ecolinguistics to teaching English to eighth graders. They used ecolinguistics in the sense that they taught the learners to identify the names of

plants that grow around them and to focus on the vocabulary of environmental-linguistic expressions from the surroundings. They found the students were very motivated and enthusiastic, especially when they discussed the linguistic expressions they know well, such as the ecolinguistics of animals and plants or ingredients. However, their study also lacked a quantitative component.

The researchers of this study applied an exploratory sequential mixed methods design to pave the way for the research on the construct of ecological critical language awareness and its further integration into the literature. As Creswell and Creswell (2018) define this research design, it starts with a qualitative phase and follows a quantitative phase. This design is endorsed for constructing an adequate quantitative instrument. Thus, the study was performed in two consecutive phases: qualitative and quantitative. The researchers took several steps in the phases to fulfill the research objectives.

The following research questions guided this study:

1. Is the newly-developed questionnaire a valid and reliable instrument to measure the construct of ecological critical language awareness?

2. Is the proposed construct with six domains the fittest model to define the ecological critical language awareness construct?

3. Methodology

3.1. Participants

The participants in this study consisted of two groups. First, a total number of eight professors in the field of Applied Linguistics gave their expert opinion in the instrument development phase. Second, 206 EFL learners participated in the instrument development and the quantitative phases of the study. For the instrument development phase, six intermediate English language learners (four women and two men) aged 21 to 29 who studied English in an institute in Tehran were selected. For the quantitative phase, 200 English learners were selected through convenience sampling. They were intermediate-level undergraduates and language learners at private language institutes in Tehran, whose proficiency level was determined through Oxford Placement Test. All the participants' age ranged from 18 to 30 years. One hundred and forty-six participants were female (73%), and 54 were male (27%).

3.2. Instruments

First, the researchers defined the construct following the criteria presented by Dörnyei (2010). In doing so, they carefully scrutinized and reviewed the related literature on ecolinguistics. Primarily based on the work of Stibbe (2015), who highlighted the ecolinguiscally destructive stories that we live by and the central premise of ecolinguistics, the researchers developed an item pool to elicit participants' language awareness of the ecological aspect of language. The domains of the ecological critical language awareness construct were postulated as follows: the power of language, anthropocentrism, awareness of global environmental issues, the impact of ecolinguistics, responsibility toward our actions, and responsibility toward our language. A total number of 65 items were specified as the item pool.

Next, to ensure the content validity of the questionnaire, the researchers and two experts in the field discussed and reviewed the item pool carefully. The panel discussed and accepted the postulated domains of the ecological critical language awareness construct. Then, the items were reviewed carefully to ensure comprehensibility, relevance, and readability. Finally, 57 items were selected for inclusion in the questionnaire. After that, six experts in the field of Applied Linguistics reviewed the first draft of the questionnaire. After collecting their notes and feedback on the first draft, 15 items were removed, and some items were reworded or rephrased to increase their comprehensibility and clarity. Thus, a 42-item questionnaire consisting of six domains was developed. Each domain had seven corresponding items. Last, six EFL learners were asked to participate in a think-aloud session. They had to read the questionnaire and elaborate on its clarity. They could read and understand all the items and did not face any problems grasping the ideas of the questionnaire.

The abovementioned steps resulted in 42 close-ended items with a 5-point Likert-type scale. The questionnaire covered six domains, each having seven pertaining questions. In the first draft, the researchers did not write the questionnaire items of each domain following one another. In other words, the items of the questionnaire were dispersed and arranged as follows: the power of language (questions 13, 19, 4, 6, 9, 11, and 15), anthropocentrism (questions 17, 22, 5, 26, 28, 30, and 32), awareness of global environmental issues (questions 36, 10, 29, 23, 1, 20, and 38), ecolinguistics (questions 8, 40, 24, 27, 34, 12, and 33), responsibility toward our actions (questions 41, 16, 39, 2, 21, 42, and 37), and responsibility

toward our language (questions 3, 14, 31, 35, 18, 25, and 7). This decision was made to minimize the chances of the participants' systematic answering. After performing exploratory factor analysis and determining the factor loadings of the items in each domain, the items were arranged based on their factor loadings and the domains they pertained. In the final draft of the questionnaire (see Appendix), the items were rearranged as follows: the power of language (questions 1-7), anthropocentrism (questions 8-14), awareness of global environmental issues (questions 15-21), ecolinguistics (questions 22-28), responsibility toward our actions (questions 29- 35), and responsibility toward our language (questions 36-42). The several steps followed to validate the questionnaire are explained in the Results section.

3.3. Procedure

Initially, the construct was defined in the qualitative phase of the current exploratory sequential mixed methods study. The researchers reviewed the related literature on ecolinguistics and its practices and devised a systematic definition for the construct of ecological critical language awareness. Then, items of the instrument were generated through the multiple steps mentioned in the instrumentation section. In the quantitative phase, building on the findings of the qualitative phase, the newly-developed questionnaire was administered to participants who had attended an English course offering ecolinguiscally-informed teaching materials. Finally, the data were analyzed quantitatively to examine the reliability and construct validity and revise the model if necessary. This process is what Bearden et al. (2003) mention for the construct and instrument development.

As stated earlier, ecolinguistics should not merely be concerned with analyzing discourse but with bringing ecological critical language awareness through pedagogy. The researchers administered the questionnaire to participants who were exposed to ecolinguiscally-informed teaching materials in an English pedagogical context. This step ensured that the participants were selected to match the purpose of the study, which was to employ the premises of ecolinguistics in a pedagogical context to raise their ecological critical language awareness. The participants were all intermediate-level English learners who attended a four-skill integrated course in English, either at the university or at private language institutes. All the classes were held for 90 minutes and met once a week. The instructor of all the classes was one of the researchers of the study. The researchers selected

the material for the course in a way that encompassed most of the topics of environmental issues. Other than the topics, the premises of ecolinguistics were briefly taught to the learners to make them aware of the importance of ecolinguistics and the power of language. Table 1 summarizes the materials presented in fourteen sessions.

Table 1.

Course Sessions and Topics

Sessions	Topics
Session 1	Introduction to ecolinguistics and global environmental issues
Sessions 2 & 3	Climate change and global warming
Sessions 4 & 5	Water scarcity and water pollution
Sessions 6 & 7	Deforestation and urbanization
Sessions 8 & 9	Extinction and loss of biodiversity
Sessions 10 & 11	Air pollution
Sessions 12 & 13	Overpopulation and resource depletion
Session 14	Questionnaire administration

During each session, learners received authentic listening and reading materials pertinent to the topics. The materials were taken from TED talks, online websites, and blogs. Participants were then encouraged to discuss the topics in pairs or groups and hand in a written summary of the topic the following session.

The questionnaire administration and data collection were done during the last session of the course. This process was done entirely online, on the Google Forms platform, a survey administration software included as part of the free, web-based Google Docs Editors suite offered by Google. The questionnaire link was sent to 280 English learners who attended the course detailed above. Two hundred and thirty-six copies were completed and submitted by the respondents. Upon initial inspection, 36 completed instruments were discarded due to being either incomplete or carelessly completed (questionnaires in which one response was systematically selected). Therefore, 200 instruments were left for model validation.

4. Results

Descriptive statistics, including means and standard deviations, were computed in the first step of analyzing the collected data from the questionnaires. Moreover, the normality of the distribution of responses was examined by calculating skewness and kurtosis. The results

verified the normality of the scores obtained from the newly-developed questionnaire. In addition, chi-squares were run to determine whether the differences in each item of the Likert scale in the questionnaire were meaningful. The statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS 25) program. Hypotheses were tested on alpha 0.05 (Table 2).

As Table 2 shows, in the first item of the questionnaire, 37.5% of the participants chose "strongly agree," and 27.5% chose "agree" (Mean = 3.78, SD=1.262). Besides, there was a significant difference between the number of students who expressed "strongly agree" and "agree" and the ones who chose "strongly disagree" and "disagree" in the first item (df = 4, x^2=63.150, sig=0.000 < 0.05).

In a similar vein, the significance level in all the items of the questionnaire was less than 0.05. Therefore, there was a significant difference between the number of students who selected "strongly agree" and "agree" and the ones who chose "strongly disagree" and "disagree."

Table 2.

Results of Descriptive Statistics, Percentage, and Chi-Square of the ECLA Instrument

	N	Mean	Std. Deviation	Percentage					Chi-square	df	Asymp sig
				Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree			
Q1.	200	3.78	1.262	8.0	9.0	18.0	27.5	37.5	63.150	4	0.000
Q2.	200	3.43	1.230	8.0	16.5	22.5	30.5	22.5	27.900	4	0.000
Q3.	200	2.96	1.257	16.0	21.5	25.0	26.0	11.5	15.150	4	0.000
Q4.	200	2.81	1.361	23.0	21.0	21.5	21.0	13.5	5.550	4	0.000
Q5.	200	3.26	1.112	5.5	20.5	32.0	27.0	15.0	42.850	4	0.000
Q6.	200	2.64	1.117	16.5	31.5	30.0	16.0	6.0	45.650	4	0.000
Q7.	200	2.39	1.006	17.0	44.0	26.5	8.0	4.5	101.150	4	0.000
Q8.	200	2.62	1.455	31.5	23.0	12.5	18.5	14.5	23.000a	4	0.000
Q9.	200	3.65	1.173	4.5	13.0	26.5	25.5	30.5	47.200a	4	0.000
Q10.	200	4.15	1.209	5.5	7.5	11.0	19.0	57.0	181.750	4	0.000
Q11.	200	1.80	1.125	56.5	21.0	13.0	5.0	4.5	184.750	4	0.000
Q12.	200	1.22	0.681	87.5	6.5	4.0	0.5	1.5	571.700	4	0.000
Q13.	200	2.42	1.170	24.0	35.0	24.0	9.5	7.5	52.350	4	0.000
Q14.	200	4.41	0.947	2.5	2.5	10.0	21.5	63.5	260.700	4	0.000
Q15.	200	2.08	0.868	26.5	46.5	20.5	6.0	0.5	132.100	4	0.000
Q16.	200	2.09	0.983	28.0	49.0	11.0	10.0	2.0	141.000	4	0.000
Q17.	200	3.48	1.228	6.5	18.5	20.0	30.5	24.5	31.500a	4	0.000
Q18.	200	4.31	0.994	2.0	6.0	8.5	26.0	57.5	209.450	4	0.000
Q19.	200	1.47	0.776	66.5	24.0	5.5	4.0	0	203.560	4	0.000
Q20.	200	4.52	0.874	1.5	3.5	6.0	19.5	69.5	326.100	4	0.000
Q21.	200	4.39	0.889	1.5	4.0	6.5	30.5	57.5	229.700	4	0.000
Q22.	200	3.58	1.109	6.0	10.5	24.0	39.0	20.5	66.350	4	0.000
Q23.	200	2.66	0.944	8.5	37.0	40.0	9.5	5.0	115.650	4	0.000

Q24.	200	3.65	1.367	10.0	13.5	16.5	22.0	38.0	48.250	4	0.000
Q25.	200	3.77	1.088	1.5	16.5	14.5	38.5	29.0	80.800	4	0.000
Q26.	200	3.20	1.294	8.5	29.5	16.5	25.0	20.5	26.000	4	0.000
Q27.	200	3.04	1.129	8.0	28.0	25.5	29.0	9.5	42.950	4	0.000
Q28.	200	2.18	1.177	33.5	37.0	13.5	10.0	6.0	80.950	4	0.000
Q29.	200	4.55	0.749	1.5	0.5	5.0	27.5	65.5	307.400	4	0.000
Q30.	200	1.37	0.791	76.0	17.0	3.0	2.5	1.5	408.250	4	0.000
Q31.	200	1.93	1.167	47.5	29.5	12.0	4.5	6.5	133.300	4	0.000
Q32.	200	4.26	1.072	5.0	3.0	8.5	28.0	55.5	197.050	4	0.000
Q33.	200	4.04	1.138	5.5	7.0	8.5	36.0	43.0	129.650	4	0.000
Q34.	200	4.68	0.768	2.0	1.5	2.0	15.5	79.0	449.150	4	0.000
Q35.	200	4.44	0.922	2.0	3.5	7.5	23.0	64.0	269.750	4	0.000
Q36.	200	2.40	1.061	22.0	33.0	33.0	7.0	5.0	73.600	4	0.000
Q37.	200	2.09	1.033	31.5	42.0	16.0	7.0	3.5	107.350	4	0.000
Q38.	200	3.89	1.094	2.0	9.0	27.0	22.5	39.5	88.050	4	0.000
Q39.	200	3.99	0.985	0.5	6.0	28.0	25.5	40.0	107.050	4	0.000
Q40.	200	2.99	1.336	17.5	21.5	21.5	24.0	15.5	4.700	4	0.000
Q41.	200	3.01	1.105	7.0	28.5	32.5	21.0	11.0	47.950	4	0.000
Q42	200	2.61	1.164	17.5	34.0	27.5	12.5	8.5	44.700	4	0.000

4.1. Construct Validation Framework

Construct validity refers to the relation between a theoretical construct and its operationalization or measure. Therefore, this process aims to "test the extent to which operationalizations of a construct 'behave' in a manner consistent with the theoretical expectations" (Chen et al., 2004, p. 277). Construct validation pertained to the second phase of the exploratory sequential mixed methods design used in this study, namely the quantitative phase.

The researchers followed the validation scheme proposed by Mulaik and Millsap (2000), consisting of Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and model evaluation. With a multidimensional construct, the first criterion to consider is the underlying factor structure of the items. To this end, an EFA of the 42 items developed to measure the proposed six ecological critical language awareness domains was conducted, followed by CFA. Following validation of the dimensional structure of the construct, each scale was examined for internal consistency to ensure it represented a coherent and reliable construct assessment (Chen et al., 2004).

4.1.1. Stage 1- Exploratory Factor Analysis (EFA)

Prior to factor analysis, sampling adequacy must be ensured to determine whether the available data can be used for analysis. For this purpose, the KMO index (Kaiser-Mayor-Olkin) and Bartlett test of Sphericity was used.

The value of KMO obtained was 0.664, which is higher than 0.5, indicating the adequacy of the data. Also, according to the significance level of the Bartlett test ($p<0.001$), factor analysis was appropriate to identify the model. The factor analysis model in this study was the Principal Factor Analysis (PFA) model, which sought the fewest factors that could account for the common variance (correlation) of a set of variables. The factor extraction method was the orthogonal factor method, where common factors were supposed to be critical underlying factors that significantly affected all variables. The factor rotation method was varimax, a statistical technique used at one level of factor analysis as an attempt to clarify the relationship among factors. The factor extraction criterion was the special value criterion. The criterion for determining the significant level of factor loads and considering the amount of factor loads was used to interpret the factors.

The principal component factor analysis, which shows the factor loads, was run. In this study, none of the items had a factor load of less than 0.5; thus, none were removed from the questionnaire.

Next, to determine whether there was any empirical support for the existence of separate domains for ecological critical language awareness, the Fitting Data given from the earlier clustering stage underwent Principal Components Factoring (PCF) with varimax rotation. Table 3 demonstrates PCF with varimax rotation on the 42 items of the Fitting Dataset yielded six factors with eigenvalues greater than one accounting for 43.2% of the total variance.

Table 3.

The Results of Exploratory Factor Analysis

		Exploratory factor analysis					
Item	Domain	1	2	3	4	5	6
Q13	Power of language					-0.561	
Q19	Power of language					0.338	
Q4	Power of language					0.375	
Q6	Power of language					0.721	
Q9	Power of language					0.443	
Q11	Power of language					0.342	
Q15	Power of language					0.530	
Q17	Anthropocentrism			0.410			

Q22	Anthropocentrism		0.374		
Q5	Anthropocentrism		0.399		
Q26	Anthropocentrism		0.403		
Q28	Anthropocentrism		-0.414		
Q30	Anthropocentrism		-0.416		
Q32	Anthropocentrism		0.482		
Q36	Awareness of global environmental issues	0.432			
Q10	Awareness of global environmental issues	-0.594			
Q29	Awareness of global environmental issues	-0.467			
Q23	Awareness of global environmental issues	-0.517			
Q1	Awareness of global environmental issues	-0.453			
Q20	Awareness of global environmental issues	0.594			
Q38	Awareness of global environmental issues	0.572			
Q8	Impact of ecolinguistics				0.557
Q40	Impact of ecolinguistics				0.479
Q24	Impact of ecolinguistics				0.421
Q27	Impact of ecolinguistics				-0.601
Q34	Impact of ecolinguistics				-0.737
Q12	Impact of ecolinguistics				-0.602
Q33	Impact of ecolinguistics				0.425
Q41	Responsibility toward our actions	-0.400			
Q16	Responsibility toward our actions	-0.454			
Q39	Responsibility toward our actions	0.401			
Q2	Responsibility toward our actions	0.449			
Q21	Responsibility toward our actions	0.605			
Q42	Responsibility toward our actions	0.524			
Q37	Responsibility toward our actions	0.425			
Q3	Responsibility toward our language			-0.467	
Q14	Responsibility toward our language			-0.517	
Q31	Responsibility toward our language			-0.731	
Q35	Responsibility toward our language			-0.708	
Q18	Responsibility toward our language			0.460	
Q25	Responsibility toward our language			0.304	
Q7	Responsibility toward our language			-0.425	

Factors were named according to the definition of the domains, the items they covered, and what common reality they measured, all based on the tentative construct definition.

Seven items under factor 1 represent responsibility toward our actions, which explains 16.117% of the total variance. Cronbach's alpha coefficient for this factor is 0.789.

Seven items under factor 2 represent awareness of global environmental issues and explain 7.88% of the total variance, with Cronbach's alpha coefficient of 0.820.

The seven items under factor 3, which represent anthropocentrism, explain 5.676% of the total variance. Cronbach's alpha coefficient for this factor is 0.760.

Seven items are under factor 4, representing responsibility toward our language, which explains 4.687% of the total variance. Cronbach's alpha coefficient for this factor is 0.700.

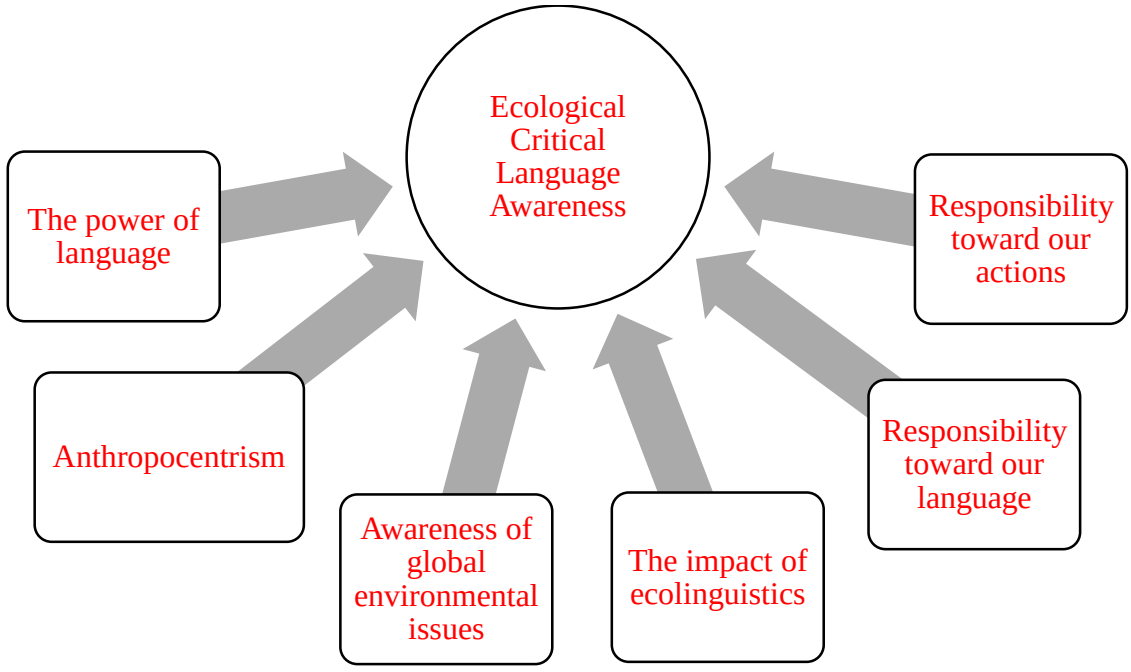
The seven items under factor five represent the power of language, which explains 4.465% of the total variance. Cronbach's alpha coefficient for this factor is 0.778.

Finally, the seven items under factor 6 represent the impact of ecolinguistics, which explains 4.398% of the total variance. Cronbach's alpha coefficient of this factor is 0.810.

The results of the EFA stage are depicted in the form of the following hypothetical measurement model (Figure 1). The next step was to verify this model through confirmatory factor analysis.

Figure 1.

Hypothetical Measurement Model of ECLA

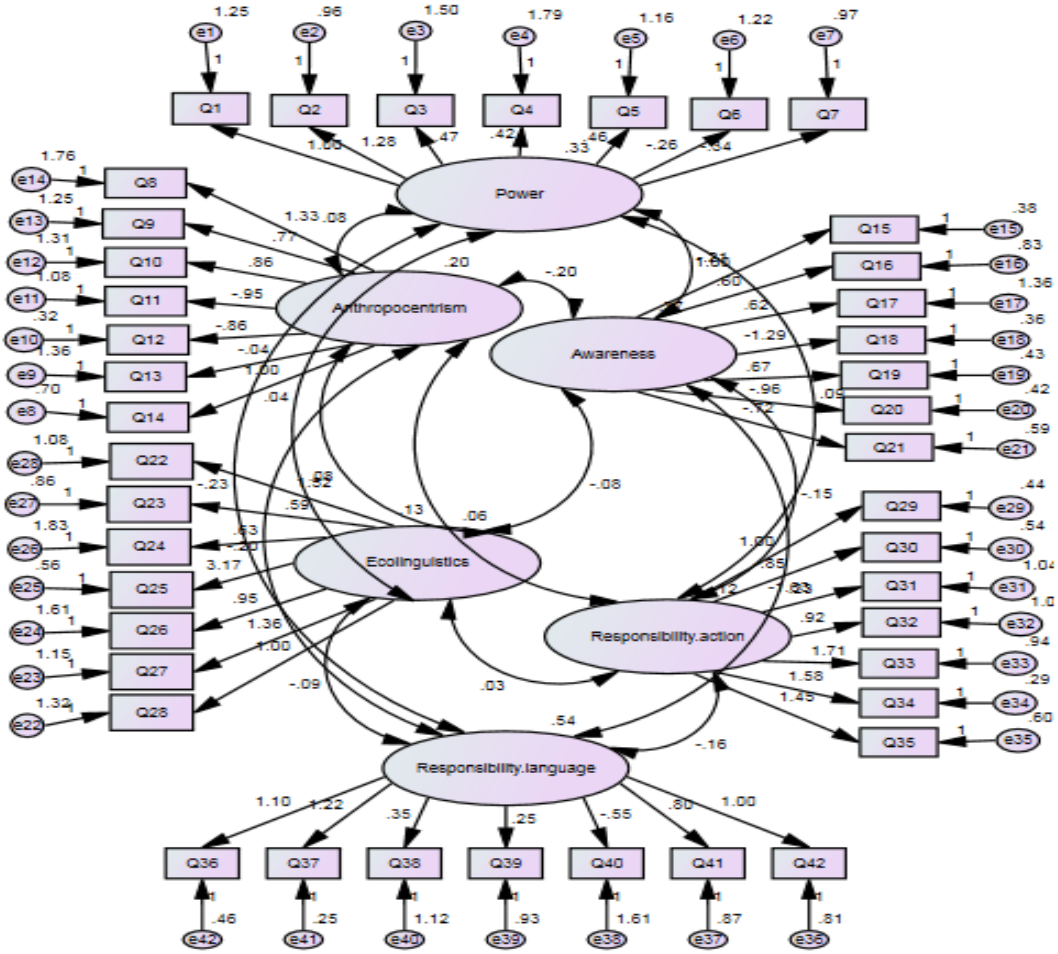


4.1.2. Stage 2- Confirmatory Factor Analysis (CFA)

Following the EFA stage and clustering, the developed model underlying the questionnaire and the fitting data were further verified in the subsequent CFA stage. The question is whether the choice of six factors was appropriate for the questionnaire. What CFA does with the data is verify that the factor structure obtained from the EFA is robust and not related to random variability in the data. This statistical method can compare and evaluate any kind of classification that the researchers applied to the data using their theoretical and experimental knowledge with the factor structure extracted from the analysis of exploratory factors. AMOS 22 software was employed for the analysis. The chi-square test measures the significance of the model at the level of 0.05. In addition to the normed chi-square statistic (chi-square divided by the degrees of freedom), the Root Mean Square Error of Approximation (RMSEA) was also used.

Figure 2.

Fitted CFA Model



CFA resulted in the 42-item extraction of 'Ecological Critical Language Awareness' (ECLA), categorized into six components (Figure 2). Next, to investigate if this categorization fits the best model for ECLA, model fit indices for the six categories were run (Table 4). As Table 4 demonstrates, ECLA with six factors was considered the best categorization because the most acceptable fit model is the one with RMESA of less than 0.1 and a significant level of (p= 0.001).

Table 4.

Model Fit Indices for Six Components

RMSEA	Chi-Square	Degree of Freedom	Probability Level
.099	2449.845	804	.000

5. Discussion

Ecological and environmental issues are more than ever becoming a dire situation. Neglecting such issues from pedagogy seems short-sighted. One of the ways to incorporate this field into pedagogical contexts is through the practice of ecolinguistics. Ecolinguistics, though a strand of linguistics, can be very promising in raising learners' ecological critical language awareness in the classroom through ecolinguistically-informed teaching materials. However, the question that remains is whether such practices yield fruitful. To systematically and quantitively research this matter, an instrument is needed to measure the learners' ECLA and provide valid and reliable data.

The researchers of the current study defined the ECLA construct in the qualitative phase. In the quantitative phase, they used a model construction framework consisting of exploratory and confirmatory analyses to examine the construct validity of a proposed six-factor construct (i.e., the power of language, anthropocentrism, awareness of global environmental issues, the impact of ecolinguistics, responsibility toward our action, and responsibility toward our language). This hypothetical construct underlying the questionnaire instrument was derived from the literature and underwent many phases of revision and refinement to ensure its content validity.

The questionnaire was administered to a sample of 200 EFL learners, and data were collected to answer the two research questions. The first research question asked whether the newly-developed questionnaire was a valid and reliable instrument to measure the construct of ecological critical language awareness. The researchers calculated EFA, CFA,

and Cronbach's alpha coefficient for reliability indices to answer this question. EFA corroborated all the initial components of the tentative ECLA construct. CFA gave statistical support to the six components as well. Cronbach's alpha coefficient indices showed that the six underlying factors of the questionnaire were reliable.

The second research question sought to determine whether the proposed construct with six domains was the fittest model to define the ECLA construct. Model-fit estimates were calculated to answer this question. The results verified the CFA model as a valid ECLA measure and the proposed construct with six domains as the fittest model to define ECLA.

The introduction of ecolinguistics into pedagogy and defining the construct of ECLA is a breakthrough in the field of English language teaching. Thus, literature relating to this particular study is scarce. However, to ensure the reliability, validity, and generalizability of this study, the researchers employed tried and true methods of construct development and validation endorsed by Chen et al. (2004), Dörnyei (2010), and Mulaik and Millsap (2000).

6. Conclusion

The present study was successful in developing and validating an instrument to measure language learners' ECLA. The necessity of such an instrument relies on the paramountcy of adding to the literature of ecolinguistics through solid quantitative measures. As raising critical language awareness of ecological issues is deemed inseparable from the practice of ecolinguistics, operationalizing the construct and quantifying it became necessary.

The findings of this research have implications for language teaching pedagogy in the light of ecolinguistics and research into this realm. Language teachers interested in incorporating the premises of ecolinguistics in an EFL pedagogical context can use the components of the ECLA construct to guide their instruction in raising the learners' awareness of ecological issues. Language teachers and researchers can use the ECLA instrument to assess the effectiveness of their methods by quantitatively and uniformly documenting the effects of their instructions, leading to a repertoire of successful teaching methods in foreign language learning contexts to instill critical language awareness of ecological issues in EFL learners.

It is proposed that relying on the related literature in the field of ecolinguistics and the many phases carried out to ensure the content validity of the ECLA measure yielded its high

reliability and validity estimates. However, since ECLA was made from scratch, much-needed research must be conducted with participants of different language levels and ethnographic backgrounds to modify the proposed construct and questionnaire.

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Appendix

The Ecological Critical Language Awareness (ECLA) Questionnaire

Component	Items	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Power of language	1. Generally speaking, I don't think the way we use language i.e., our choice of words or sentence structures can make changes in the world.	1	2	3	4	5
	2. In my opinion, language is only a means of communication.	1	2	3	4	5
	3. When I hear or read something, I only focus on its message rather than its choice of words or structures.	1	2	3	4	5
	4. I think it is true to say words with a positive connotation always convey a positive meaning.	1	2	3	4	5
	5. When I want to talk about something, I mostly focus on the words and structures I choose rather than the content of my message.	1	2	3	4	5
	6. I think if you change the words that describe an idea, the idea will change.	1	2	3	4	5
	7. I think words with a positive connotation can mask a negative concept.	1	2	3	4	5
Anthropocentrism	8. I think human beings are the most important creatures on Earth.	1	2	3	4	5
	9. I think plants and animals are worthy only because humans can make use of them.	1	2	3	4	5
	10. I think protecting humans should be our only concern in ecosystems that support all life.	1	2	3	4	5
	11. I think we should protect other species and nature in ecosystems that support all life.	1	2	3	4	5
	12. I think we should care for the environment and nature more than we do for humans.	1	2	3	4	5
	13. I think humans are the most important part of complex ecosystems.	1	2	3	4	5
	14. Natural resources are there for us to use as we wish.	1	2	3	4	5
Awareness of global environmental issues	15. I believe I have enough information about global environmental issues such as climate change, pollution, etc.	1	2	3	4	5
	16. I follow news about global environmental issues in the media.	1	2	3	4	5

Component	Items	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
	17. I often talk about global environmental issues with my friends or family.	1	2	3	4	5
	18. I don't think that I need to know about global environmental issues.	1	2	3	4	5
	19. I think the first step to solving global environmental issues is to know about them.	1	2	3	4	5
	20. I think being aware of global environmental issues is pointless because they are not serious problems.	1	2	3	4	5
	21. I don't think global environmental issues need to be highlighted and discussed.	1	2	3	4	5
Ecolinguistics	22. I don't think written texts or spoken speech can have an impact on the environment.	1	2	3	4	5
	23. I think the concept of economic growth is extremely desirable in societies.	1	2	3	4	5
	24. I don't see anything wrong with the sentence: "meat production is a process in which meat is produced."	1	2	3	4	5
	25. I believe it is true to say, "trees must be cut to provide us with basic amenities such as houses and furniture."	1	2	3	4	5
	26. I think it is right to say, "plastic bags and disposables are clean, easy-to-use, and convenient."	1	2	3	4	5
	27. I think it is correct to say, "building more residential and commercial facilities can ensure a better life for humans."	1	2	3	4	5
	28. I think the term "global warming" refers to the same concept as "climate crisis" does.	1	2	3	4	5
Responsibility toward our actions	29. I think climate change is a natural phenomenon not man-made.	1	2	3	4	5
	30. I think we are the most responsible for polluting the air by burning fossil fuels.	1	2	3	4	5
	31. I feel the most responsible for destroying the Earth.	1	2	3	4	5
	32. I think individuals cannot take any measures to solve water scarcity.	1	2	3	4	5
	33. The air gets polluted due to natural reasons, such as lack of wind.	1	2	3	4	5
	34. I think it is not our responsibility to care about the issue of deforestation.	1	2	3	4	5

Component	Items	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
	35. I don't think I can do anything to reduce plastic waste.	1	2	3	4	5
Responsibility toward our language	36. As an English language learner, I think I can have an impact on environmental issues through the use of language.	1	2	3	4	5
	37. As a prospective English language teacher, I think I can raise awareness of environmental issues through the use of language.	1	2	3	4	5
	38. As a language user, I feel that the way we use the Persian language is destructive to the environment.	1	2	3	4	5
	39. As a language learner, I feel that the way we use the English language is destructive to the environment.	1	2	3	4	5
	40. I don't think the way we use the Persian or English language has anything to do with environmental issues.	1	2	3	4	5
	41. Whenever I say or write something in Persian or English, I try to think about how it can affect the environment.	1	2	3	4	5
	42. Whenever I hear or read something in Persian or English, I try to think about how it can affect the environment.	1	2	3	4	5
Power of language	43. Generally speaking, I don't think the way we use language i.e., our choice of words or sentence structures can make changes in the world.	1	2	3	4	5
	44. In my opinion, language is only a means of communication.	1	2	3	4	5
	45. When I hear or read something, I only focus on its message rather than its choice of words or structures.	1	2	3	4	5
	46. I think it is true to say words with a positive connotation always convey a positive meaning.	1	2	3	4	5
	47. When I want to talk about something, I mostly focus on the words and structures I choose rather than the content of my message.	1	2	3	4	5
	48. I think if you change the words that describe an idea, the idea will change.	1	2	3	4	5
	49. I think words with a positive connotation can mask a negative concept.	1	2	3	4	5
Anthropocentrism	50. I think human beings are the most important creatures on Earth.	1	2	3	4	5

Component	Items	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
	51. I think plants and animals are worthy only because humans can make use of them.	1	2	3	4	5
	52. I think protecting humans should be our only concern in ecosystems that support all life.	1	2	3	4	5
	53. I think we should protect other species and nature in ecosystems that support all life.	1	2	3	4	5
	54. I think we should care for the environment and nature more than we do for humans.	1	2	3	4	5
	55. I think humans are the most important part of complex ecosystems.	1	2	3	4	5
	56. Natural resources are there for us to use as we wish.	1	2	3	4	5
Awareness of global environmental issues	57. I believe I have enough information about global environmental issues such as climate change, pollution, etc.	1	2	3	4	5
	58. I follow news about global environmental issues in the media.	1	2	3	4	5
	59. I often talk about global environmental issues with my friends or family.	1	2	3	4	5
	60. I don't think that I need to know about global environmental issues.	1	2	3	4	5
	61. I think the first step to solving global environmental issues is to know about them.	1	2	3	4	5
	62. I think being aware of global environmental issues is pointless because they are not serious problems.	1	2	3	4	5
	63. I don't think global environmental issues need to be highlighted and discussed.	1	2	3	4	5
Ecolinguistics	64. I don't think written texts or spoken speech can have an impact on the environment.	1	2	3	4	5
	65. I think the concept of economic growth is extremely desirable in societies.	1	2	3	4	5
	66. I don't see anything wrong with the sentence: "meat production is a process in which meat is produced."	1	2	3	4	5
	67. I believe it is true to say, "trees must be cut to provide us with basic amenities such as houses and furniture."	1	2	3	4	5

Component	Items	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
	68. I think it is right to say, "plastic bags and disposables are clean, easy-to-use, and convenient."	1	2	3	4	5
	69. I think it is correct to say, "building more residential and commercial facilities can ensure a better life for humans."	1	2	3	4	5
	70. I think the term "global warming" refers to the same concept as "climate crisis" does.	1	2	3	4	5
Responsibility toward our actions	71. I think climate change is a natural phenomenon not man-made.	1	2	3	4	5
	72. I think we are the most responsible for polluting the air by burning fossil fuels.	1	2	3	4	5
	73. I feel the most responsible for destroying the Earth.	1	2	3	4	5
	74. I think individuals cannot take any measures to solve water scarcity.	1	2	3	4	5
	75. The air gets polluted due to natural reasons, such as lack of wind.	1	2	3	4	5
	76. I think it is not our responsibility to care about the issue of deforestation.	1	2	3	4	5
	77. I don't think I can do anything to reduce plastic waste.	1	2	3	4	5
Responsibility toward our language	78. As an English language learner, I think I can have an impact on environmental issues through the use of language.	1	2	3	4	5
	79. As a prospective English language teacher, I think I can raise awareness of environmental issues through the use of language.	1	2	3	4	5
	80. As a language user, I feel that the way we use the Persian language is destructive to the environment.	1	2	3	4	5
	81. As a language learner, I feel that the way we use the English language is destructive to the environment.	1	2	3	4	5
	82. I don't think the way we use the Persian or English language has anything to do with environmental issues.	1	2	3	4	5
	83. Whenever I say or write something in Persian or English, I try to think about how it can affect the environment.	1	2	3	4	5
	84. Whenever I hear or read something in Persian or English, I try to think about how it can affect the environment.	1	2	3	4	5