Ecocomposition Integration into ESP Course For Bachelors at a Technical University[1]

Yuliana Lavrysh[2], Iryna Lytovchenko[3], & Valentyna Lukianenko[4], National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Kyiv, Ukraine

Abstract

Engineers are among those who are increasingly aware of the necessity to transform our society from being consumer-oriented to being preserver-oriented. To support the transformation, scholars and educators worldwide highlight the importance of sustainability and sustainable education within higher education. This research draws on ecocomposition pedagogy as a component of sustainable education. Ecocomposition integrates ecological literacy, language issues and writing skills development that allows integrating it into English for Specific Purposes course. Focusing on the integration and implementation of an ecocomposition course into ESP classes for engineers in Ukraine, this paper highlights the importance and significance of the course that is both experiential and that introduces diverse perspectives. We created the short course on ecocomposition and conducted quantitative and qualitative studies to verify the efficiency of ecocomposition for foreign language learning. Key pedagogical strategies, practical suggestions, and students' responses are discussed in the article. The results revealed that ecocomposition might serve as a productive tool to analyze text discourse, to enrich students' vocabulary with field-related terminology, to familiarize with composition types and registers, to enhance writing skills and to provide a personal developmental move toward sustainable lifestyle. However, some barriers exist among teachers and students because this approach is complicated, innovative, and requires certain training and comprehension. The paper provides guidance on designing and integrating an ecocomposition course into ESP course for engineers.

Resumen

Los ingenieros se encuentran entre aquellos que son cada vez más conscientes de la necesidad de transformar nuestra sociedad de ser orientada al consumidor a orientada al conservador. Para apoyar esta transformación, los académicos y educadores de todo el mundo destacan la importancia de la sostenibilidad y la educación sostenible en la educación superior. Esta investigación se basa en la pedagogía de la ecocomposición como componente de la educación sostenible. La ecocomposición integra alfabetización ecológica, enseñanza de la lengua y desarrollo de habilidades de escritura que permiten integrarlo en un curso de inglés con fines propósitos específicos (ESP). Centrándose en la integración e implementación del curso de ecocomposición en las clases ESP para ingenieros, este documento destaca la importancia y el significado de un curso experimental que introduce diversas perspectivas. Creamos un curso corto sobre ecocomposición y realizamos investigación cuantitativa y cualitativa para verificar la eficiencia de la ecocomposición para el aprendizaje de idiomas extranjeros. Las estrategias pedagógicas clave, las sugerencias prácticas y las respuestas de los estudiantes se analizan en el artículo. Los resultados revelaron que la ecocomposición podría servir como una herramienta productiva para analizar el discurso de los textos, enriquecer el vocabulario de los estudiantes con la terminología relacionada con el campo, familiarizarse con los tipos y registros de composición, mejorar las habilidades de escritura y promover el desarrollo personal hacia un estilo de vida sostenible. Sin embargo, existen algunas barreras entre los maestros y los estudiantes porque este enfoque es complicado, innovador y requiere cierta capacitación y comprensión. El documento proporciona orientación sobre el diseño e integración del curso de ecocomposición en ESP para ingenieros.

Introduction

The upcoming challenge of the 21st century is the provision of future generations with sustainable living conditions. Thus, the introduction of sustainability issues, principles and values into education is a current concern. The contemporary world, locally and globally, faces major problems such as pollution, poverty, climate change, and violation of basic human rights, which cannot be left unsolved. It is widely recognized that these problems are beyond the scope of a particular academic discipline and their solution requires multiple ways of knowing and acting.

A current approach to sustainability issues suggests solutions which are not only technical, economic or political, but educational as well. The educational solution is the development of environmental ethics that contribute to the integration of nature and mind through changing the processes of cognition and perception. It is generally assumed that the role of technical universities is significant for sustainable

[1] This is a refereed article. Received: 11 June, 2019. Accepted: 27 October, 2019.
[2] yulavrysh@gmail.com
[3] irinalyt@ukr.net
[4] vv.lukian@gmail.com

development since engineers have always been responsible for the improvement in the quality of living conditions. Moreover, engineers contribute to innovations which reinforce sustainable development.

However, technological advances and consequent changes in society might lead to neglect of universal human concerns such as acceptance of cultural diversity, tolerance, ecological thinking, literacy, and responsibility that are defined as constituents of four key dimensions of sustainable development: economic, social, cultural and environmental. (United Nations Educational Scientific and Cultural Organization, 2015). These concepts cannot be included into a curriculum as a separate subject, although there are some elective courses which provide an opportunity to increase students' understanding of moral and ethical values in terms of sustainability: for example, the basics of law and economy, philosophy, national history and language. But the foreign language courses are attended by all students. This implies that the most efficient activities on sustainability issues might be provided through Foreign Language course.

The aim of the paper is to report on the practical implementation of the experimental ecocomposition course into the process of English for Specific Purposes teaching for undergraduates at a Ukrainian technical university. Furthermore, the research will define how this approach contributes to students' writing skills and environmental literacy.

The study was designed with four questions in mind:

1. How should sustainability issues be introduced into the ESP course?
2. Would students' writing skills benefit from the ecocomposition course?
3. How does ecocomposition foster environmental literacy development?
4. What are students' responses and reflection on the introduction of sustainability issues into the learning process?

Therefore, by employing ecocomposition we intend to transform a traditional ESP class into a platform where students could investigate and discuss sustainability theories and develop their language skills.

Literature Review

The paper identifies the key issues and looks into the current teachers' experience associated with the implementation of Education for Sustainable Development (ESD) principles into the higher education system particularly through an approach such as ecocomposition.

The main focus of recent research has been on the relationship of sustainable development and personal ethical assumptions, as a paradigm of holistic, systemic and ecological ways of thinking and learning (Sterling et al, 2015; Pan et al, 2012, Bailey et al, 2009; Huckle, 2008).

The significance of Education for Sustainable Development has been proclaimed and supported by United Nations Educational Scientific and Cultural Organization (2010) by transmitting the crucial message that in order to create sustainable future, society should experience transformations in four main domains: environmental, social, economic, and cultural. Consequently, the key processes which describe the current state of education are transformations and sustainability. In a UNESCO report on ESD, there are five main learning pillars which educators have to take into consideration while developing ESD courses or curriculum:

Learning to know	developing skills necessary for processing, transforming and constructing for making sustainability a mode of life
Learning to live together	mutual understanding and respect of traditions, cultural and religious beliefs.
Learning to do	processes and practices that lead to the combination of knowledge with practical experience and actions
Learning to transform oneself and society	transformation of unsustainable values and behaviors and facilitation of changes in society towards sustainability
Learning to give and share	promotion of solidarity and caring attitudes to meet human needs and civic engagement

Table 1: Twenty-first century learning pillars

These pillars can be introduced and implemented through engineering or humanity courses or extracurricular activities at a technical university. For example, engineering field-related courses provide knowledge about sustainable engineering, eco-friendly materials and alternative sources of energy

(learning to know and to do). Respect of traditions and culture are taught in classes of philosophy and history of technologies. We are trying to instill in students transformations and sharing through an ESP course by reading literature, watching and discussing TED talks on sustainability and presenting interdisciplinary projects at student conferences or startup competitions. However, to provide successful application of learning pillars, we need to design educational tools and strategies. But, first of all, teachers should include the pillars in learning objectives while designing syllabuses and lessons plans.

American Universities have awarded a number of grants in Ecology, Environmental Engineering and other ecologically based "hard studies". Meanwhile, the recent social and ecological crisis in Ukraine requires more holistic and contextual views on sustainability which can be provided by humanities. Consequently, the researchers from the Centre for Sustainable engineering at Carnegie Mellon University (Davidson et al, 2010); have identified the key challenges for ESD incorporation into engineering curricula:

- consider sustainability in all engineering decisions;
- account for humanistic issues (ethical, social and cultural responsibility is important for sustainable-engineering decisions);
- keep up-to-date;
- focus on the process rather than the endpoint;
- encourage diversity within the profession.

Many universities still teach students through two main academic domains: "sciences" and "humanities". In the medium of English language by means of ecocomposition and ecocriticism, it is possible to bridge the gap by linking the discourse to ecology which is significant for all engineering specialties. The aspect of teaching sustainability through English classes was discussed in the research of a Polish educator Zygmunt (2016) who concluded that language education enhances sustainability development by providing students with the opportunity to communicate, discuss and negotiate. Only mutual understanding and solution of environmental problems can be beneficial. His ideas are supported by Pipere et al (2015) who state, "Mutual understanding, tolerance and respect can give guidance to a successful construction of the social environment and its protection" (p. 7).

The connection of ESP and EDS is discussed in Bowden's (2010) research. The author analyzes the impact of the organic nature of the English language on solutions of some social critical issues in sustainability: "… a continual negotiation of global English, demanding that we listen to and learn from each other in order to be able to communicate across cultural and spatial boundaries" (p. 18). The power of English Language Learning at university is reflected in the article by Ruta Petkutė (2012) who outlines: "The potential of English language learning at university level should not be limited to developing key language skills but rather fully exploited by integrating the ESD principles" (p. 70). ESP teachers should influence students' behavioral transformations and develop a wide range of skills regardless of difference of subject.

The most powerful and promising resource to achieve these goals is a modern approach to composition studies — ecocomposition, which is a field of relationships between a writer and the environment through culture, discourse, ideology, and language (Weisser & Dobrin, 2002). At the same time, the idea of combining nature and writing is not new as it is highlighted in Buell and Heise's (2011) research "Contemplation of nature has been a dominant or at least residual concern for literary scholars and intellectual historians ever since these fields came into being" (p. 2).

Ecocomposition is derived from ecocriticism, although it focuses on production of one's own written product rather than the interpretation of somebody's written discourse. The researchers of ecocomposition (Bruce, 2011; Martin, 2008; Weisser & Dobrin, 2002) claim that the ecocriticism is connected with text interpretation and is a reproductive activity, whereas ecocomposition is associated with writing, which is a productive activity. But both these activities bring nature into language education. In our opinion, ecocomposition is an excellent tool to bridge the gap between professional subjects and language education. Weisser and Dobrin (2002) in their research *Natural discourse toward ecocomposition* state "Ecocomposition is a study of the relationships between the environment and discourse (speaking, writing and thinking)" (p. 15).

It is worth noting that learning English at technological universities is often carried out through ESP courses which are limited to a profession-related functional language. Whereas an interdisciplinary approach, which is used for writing ecocompositions, enables students to find connections across disciplines in order to see a problem from different points and fosters the development of critical thinking.

Ecocomposition practice should be in an active mode and engage topics and discussions beyond classroom environment about places, environment, and personal experience (Weisser & Dobrin, 2002). The

authenticity of communicative tasks, and their practical orientation make ecocomposition meaningful to students. This is of primary importance in teaching ESP to adult learners as only these types of language learning activities can strengthen the connection between the classroom and the real world and fully involve students in the learning process (Lavrysh & Lytovchenko, 2019).

Owens (2001) identifies two main strategies of ecocomposition pedagogy. The first one is "critical consciousness": writing which is aimed at the formation of environmental awareness of all processes engaged in sustainable development. This educational strategy employs the texts of environmental context as a foundation and nature, or sustainability issues are subjects for writing.

The second strategy is a "discursive ecology" which studies the relationships of acting and forms of discourse. This strategy implies that students perceive the writing process as an ecological process within a system of interaction. As Owens (2001) points out: "The ecological discourse pedagogy is situated within the notion that words, language, and writing are themselves parts of ecosystems and that when writers write they affect and are affected by environment" (p. 145).

The first strategy, "critical consciousness" writing, is more understandable and conventional to implement. It does not differ from traditional strategies of writing teaching: the analysis of texts and functional language structures precedes the writing itself. While performing this task students learn to think holistically. However, we have to underline that ecocomposition writing through the second strategy, "discursive ecology", highlights the production of written discourse and primarily teaches writing content based on one's own ideas, analyzing information rather than just interpreting somebody else's ideas and somebody else's discourse without adding personal ideas. As Owens (2001) says: "…..ecocomposition must be about more than simply bringing texts about nature to the writing classroom; it must be about the act of producing writing" (p. 117). This strategy demonstrates the relationship between writing and the environment and does not separate students from the real world in which language and discourse arise.

In relation to ecocompositions, it should be mentioned that a teacher should provide the information, explanations, and resources, but not just teach grammar, or composition rules, or translate a text. We have created an ecocomposition course that comprises the basic knowledge and skills necessary for performing ecological writing, and ecocomposition theory helped us understand how to involve students in critical writing. Real world writing assignments such as conceptual writing (proposals of an eco-innovation implementation into a manufacturing process), explain-a-problem writing, open-ended design writing (improvement of a device by resources consumption reduction), how stuff works, are considered as the main teaching strategy. However, we should not perceive the prefix "eco-" as just "environmental" since ecocomposition is not simply about nature or recycling; it is an umbrella term for four interrelated factors: economic, social, cultural and environmental. It suggests a holistic view of human in nature and emphasizes the connection of human and nonhuman life in the medium of nature and technology; there should not be a split between nature and humans, nature and culture, natural and manmade. Ecocomposition is regarded as an active and a participatory educational strategy because students can understand their role and opportunities while writing (Bowden, 2010).

Regarding Education for Sustainable Development (ESD) in Ukraine, we should admit that it is mainly aimed at the formation of knowledge about the environment and resources for sustainable development but not at its essence which is a more complex phenomenon. Educators have to teach how to act sustainably during life on the transformational pathway from new values formation to better life quality. Therefore, it is a challenge for educators of humanities to develop sustainable mentality and responsibility which should be the background for a sustainable future. In our opinion, the specific goals of ESD in Ukraine are:

- to clarify the concept and values of sustainable development in order to raise community awareness of the issue;
- to analyze, suggest and improve the educational tools and techniques in order to integrate the sustainability concept and values into the process of training;
- to strengthen the process of the cooperative, integrated learning through all course subjects.

With the intent of achieving these goals, the reorientation of curricula and subject contents of higher education towards sustainable development is an urgent requirement of modern Ukrainian society. Due to sustainable development diversity, it is obvious that the issue should be introduced through the inclusion of different subjects into integrated study modules. Furthermore, not only professional degree subjects should be revised, but also the subjects of social and humanitarian fields of study since they represent the socio-cultural domain of sustainability.

Methodology

In order to find answers to the research questions, we chose the mixed methods framework (Creswell, 2014) as a complex approach to our practice–based investigation. We consider our research as mixed due to some characteristics identified by researchers Tashakkori and Teddlie (2010). Among these, it includes the collection and analysis of both quantitative (close-ended) and qualitative (open-ended) data after which the two forms of data are incorporated into the research design through merging, comparing and connecting the data. Then it is followed by confirmation and explanation of qualitative data with quantitative results, providing an understanding of results by merging the perspectives of individuals. We constructed our research in accordance with the mixed methods design suggested by Creswell (2014): explanatory sequential mixed methods. Our research was conducted according to this scheme: quantitative data collection and analysis followed up with qualitative data collection and analysis resulting in interpretation. Multiple methods are used to examine aspects of writing skills enhancement (quantitative data collection) and environmental literacy development (qualitative data collection).

According to Kemmis and McTaggart's (1988) research classification, we also might claim that our research was a participatory action research as the participants in our study underwent the same procedure (ecocomposition course) in close collaboration with us. Therefore, such participatory research resulted in a collaborative, flexible and reflective process. The possibility of incorporating students allows revising and changing initial research questions and developing a better understanding of students' needs and interests.

Theoretical framework

With a view towards shifting our traditional teaching approaches and strategies toward ESD pedagogy that promotes the simultaneous development of hard and soft skills, we based our research on two theories. These are writing skills development (hard skills) according to the Cognitive Model of composition developed by Linda Flower and John R. Hayes (1981) and environmental literacy development (soft skills) suggested by Stables (1998).

Regarding the content analysis and patterns interpretation, we took as a base the Cognitive Model of composition. Flower and Hayes (1981) suggested three cognitive aspects of the composition analysis: knowledge of the context, task environment (field-related discipline integration, functional language application, peer cooperation, motivation), and the writing process itself. This model provides the opportunity to enhance the understanding of the text, not in a linear way from the introduction to conclusion, but holistically from all points while writing to reassess goals, to clarify the problem and reshape the plane of the text. But we decided to add some aspects to the model, such as critical analysis of the problem and suggestions of possible solutions prior to the writing process.

Moreover, while studying ecocomposition, students are taught to write a range of composition styles so that they can develop different kinds of thinking and writing skills. The most common composition types are narrative, descriptive, expository, and persuasive, however ecocomposition types are expanded to include critical and reflective types. Apart from these types, we also identified some features specific to ecocomposition, which students are taught about: sustainability discourse, local-based issue, metaphors of place and nature (as indicators of the way students think) and communicative achievement by means of a right choice of a language register: appraisive, prescriptive or optative (Walker, 2010). These register categories were suggested by Walker (2010) as necessary for ecocomposition because they signal the kind of the information and allow focusing on the appropriateness of the essay. In order to produce an effective composition, a writer should clearly know what he/she wants to declare and how to get feedback from a reader. Appraisive category means conditions or description of a value or a state; prescriptive implies what the state or problem can be including imperatives or assessment statements; optative is a description of a desirable state or what it ought to be (Walker, 2010).

As engineers have to confront continuously increasing and more critical and complex environmental issues every passing year, the understanding of the physical world and its rules direct them in the way of finding solutions for sustainable development. Therefore, a course of ecocomposition should be focused not only on writing skills development but also on implementation of interdisciplinary connections of such disciplines as ecology, chemistry, IT technologies, biology and bio-technology, physics, economics, culture, ethics, etc.

However, we have to mention that overuse of environmental topics in English classes without prior investigating of students' opinion, experience and culture caused students' resentment and loss of interest in the topic. To overcome or prevent such negative outcomes we decided to employ the experience and strategies suggested by Bishop et al (2000) and Stables (1998). The scholars advocate the development of environmental literacy, instead of environmental awareness, through the formation of three

competencies step by step: the functional, the cultural and the critical. Environmental awareness itself implies knowledge of some facts without their critical analysis, without acting or behavioral changes as consequences.

The functional level deals with basic knowledge about the non-human world and is regarded as fundamental. It includes the exploration of the immediate physical environment and formation of a personal scientific attitude towards the fact or circumstance. This functionality is about factual learning, exploration, and explanation of specific problems. This kind of literacy is checked easily by employing diagnostic tests as in such a way that it is easier to check scientific knowledge, than the functional step itself implies. The understanding of physical world nature is a basic ability in order to take efficient actions.

The next level, cultural, is connected with the understanding of the cultural values of a society. It implies the exploration and interpretation of what people consider vital or significant in terms of ecology and sustainable development. The main focus is on interaction and impact of people, culture and beliefs on the environment and taking nature as a part of a culture. For example, it may refer to the cultural heritage of the country. For example, the culturally literate student knows the meaning and value of a landscape presentation in Ukrainian literature, as it plays a key role for the comprehension of author's intention. It is important to understand the valuation of Ukrainian natural cultural icons such as national parks, Carpathians forests or guilder roseas, a plant that is associated with Ukrainian freedom and independence. If people associate nature with national culture, they will value and preserve it as the heritage not just as a forest.

The last level, critical literacy development, is the most comprehensive and requires student training and readiness to present their critical opinion while debating and acting. Students have to analyze the existing local ecosystems or environmental issues, study their causes and consequences. It involves the combination of cultural, social and personal standpoints as well as matching of skills, knowledge, and discoveries. The main activities include critical analysis of a problem, texts, movies, events with societal and environmental context and formulation of solutions, ideas and arguments in favor of sustainable future. As Stables (1998) suggests "Critical environmental literacy involves the ability to explore questions such as 'What does [a place or an issue] mean to me?'; 'What does it mean to us, or to others?'; 'What are the consequences of carrying on in this way [in relation to this place or this issue]?'; 'Should we act differently, and if so how?'; 'How do we translate our values into effective action—and 'Are our values themselves ready for change as a result of what we now know or feel?'" (p. 14).

We accepted the idea of environmental literacy development as a theoretical framework for our experimental course as, in our opinion, these steps foster both educational and behavioral changes and suggest a more holistic approach to the development of a sustainable thinking through writing course aimed at the formation of an environmentally literate person. In addition, teachers have more possibilities for language learning since students are familiarized with the discourse analysis of eco literature and the ability to determine the changes of the word meaning from the context (general or field-related).

Participants

The experimental course was conducted at the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". We chose five groups of first-year students from Mechanical Engineering Department. The number of students in a group varied from 12 to 18. There were 60 participating students. First-year students are taught English for Engineering that implies studying a professionally oriented vocabulary and functional language. However, they are not so involved in their professional subjects as students of senior courses, and newcomers need an adaptation period to a new educational and social environment. They often miss their homes, feel insecure, and they are afraid of complicated university tasks. Since basic science knowledge and general English language skills are enough to produce ecocomposition, we consider that the psychological and educational preconditions for our experiment correspond to first-year students' needs and abilities. The authors of the paper participated in the experiment as instructors, course developers and assessors of the outcomes.

The participants were informed about the nature of the study and they agreed to participate. The interviews were recorded and transcribed. The recordings were erased and the transcriptions identify the participants only by a pseudonym. The participants were our own students, so issues of power relations between teacher and students might have affected the results. However, students' participation was voluntary and in case of refusal, they could ask to be exempted from the experiment and that was absolutely acceptable. In such case, students would be transferred into other groups without any consequences or loss of benefits. During the experiment, students had some questions and challenges but none of them refused to participate or changed the group. Students signed the consent forms that included statements about understanding of the experiment content, voluntary participation and absence

of penalty in case of refusal, students' right to ask questions and change their mind about their participation during the experiment. In our department, we have a Board on Methodological Issues and we reported there before, during and after the experiment on the research methods, data collection techniques and outcomes assessment. We had an outside observer (a colleague from other department) who monitored our experiment and reported for the Board.

In Ukraine the university often places most of the responsibility of adhering to research "guidelines on the researchers who interpret, apply, and balance the norms indifferent ways in light of their own values, priorities, exigencies, and experiences in the divergent research contexts where they work " (Triliva et al, 2013, p. 10).

Instruments for data collection

A quantity aspect included pre-experiment structured close-ended questionnaire with students to collect initial information about sustainability and environmental issues awareness. The questionnaire was divided into two sections: sustainability concern (environmental literacy)and writing skills level.

Sustainability concern:

1. Have you ever taken part in recycling? (Yes/No)
2. Have you ever taken part in green consumerism? (Yes/No)
3. Have you ever read books relevant to environmental problems? (Yes/No) Name them if yes.
4. Is the statement true or false: sustainability is only about environmental issues (True/ False)
5. I fully understand the term "sustainability" (Yes/No)
6. Can you come up with ideas or insights on a topic of sustainability? (Yes/No)
7. Do you, as a future engineer, see any opportunities to help your hometown to become more sustainable? (Yes/No) If yes, please note the opportunities.

Writing skills level:

8. Do you enjoy writing? (Yes/No)
9. Do you think of yourself as a writer? (Yes/No)
10. Is writing simple for you? (Yes/No)
11. Do you notice problems or "stuck points" in your writing and figure out what the causes are? (Yes/No). If yes, point out them:
    - choice of communicative achievement language expositions;
    - genre and register correspondence;
    - orthography and syntactic rules;
    - organization of a composition;
    - text coherence;
    - choice of relevant sources of information and its processing.

Another instrument of quantitative aspect was the application of statistical methods to verify the validity of writing skills changes on the initial and final stages of the experiment. We used formula of knowledge acquisition quality control suggested by Bespalko (2006) C = Q / N, where C= coefficient of the quality level, Q – the total number of scores for all criteria that a student could get (sustainability of content, interdisciplinary source materials, organization and cohesion, language accuracy, communicative achievement), N–the maximum number of scores according to the relevant criteria. On the basis of Caroll's (1989) model of school learning, Bespalko (2006) developed the technology of criteria-oriented learning (COL), the main idea of which is that all students are able to learn the necessary training material. To do this, they must be given specific learning criteria (training standards). Later, COL technology was upgraded and called the technology of complete knowledge acquisition scale (CKAS). The key point of CKAS technology is the precise identification and formulation of the standard (criterion) of complete acquisition level (in accordance with the requirements of the curricular and the universal standard). The basis is scientifically substantiated educational goals. The level of complete acquisition is the current quality indicator that changes during the lesson and in the learning process, when a student overcomes all levels of acquisition. The level of acquisition is developed quite smoothly in the learning process from the student's complete ignorance of the source information to his skills of creative usage of given information when a student is able to generate new ideas. The CKAS technology includes some stages: identifying of exact standards of the topic acquisition level (learning outcomes); evaluating diagnostic test performance; distributing educational material into separate units (2-3 classes); eliciting of teaching methods; evaluating final test performance. The advantages of this technology are: it is natural (has a zero point), it is objective, additive (allows the calculation of an average grade) and covers the entire spectrum of possible human experience from a student to a Doctor of Science.

The criteria of knowledge acquisition for our research were developed based on Common European Framework of Reference (CEFR) writing skills assessment (levels B1-B2 because students are supposed to acquire these levesl on entering the university in Ukraine) with some additional points intrinsic to ecocomposition. Before the course, students wrote a short composition (180 words) on the topic of sustainability. It was assessed according to ecocomposition criteria rubric developed by the authors. In general, we paid attention to the following key points:

- personal aspects describing experience, native town, culture, nature or environment demonstrating one's own viewpoint
- types of texts: well-structured and developed descriptions;
- complexity of discourse: clear connected text with well-established conventions of the genre and register.

The grades for the final assessment and consideration were distributed according to the following scheme (30 max): 28-30–excellent; 25-27–very good; 21-24–good; 17-20–satisfactory; 13-16–poor. The criteria were: the relevance to sustainability local based content, use of interdisciplinary source materials (incorporation of language and specialism related disciplines), organization and cohesion, language accuracy, communicative achievement (Table 2).

Grade	Environmental literacy content	Interdisciplinary source materials	Organization and coherence	Language accuracy	Communicative achievement	Length
excellent	All content is well-focused and relevant to sustainability, Target reader is fully informed well-supported arguments; wide scope of a problem vision.	Sources thoroughly incorporated; seamless substantiated integration of sources from specialism-oriented disciplines.	Text is well organized and coherent, using a variety of cohesive devices, main ideas are easily recognizable, thorough introduction and conclusion; follows conventions of the field.	Uses a range of sustainability vocabulary, appropriately. Uses a range of simple and complex grammatical forms with control and flexibility. Very few language errors; vocabulary, style and register.	Register is appropriate to the topic and intended audience; closely follows the main discourse conventions of the field, appraisive and persuasive registers prevail.	170-180 words
very good	Minor irrelevances and/or omissions may be present. Target reader is on the whole informed.	Relatively good incorporation of sources with only minor inconsistencies.	Minor incompleteness in the text introduction and conclusion well connected to body; good adherence to conventions of the field.	No major difficulties in appropriate language use; follows the main discourse conventions of the field.	Minor irrelevances with register, mainly follows the main discourse conventions of the field, appraisive and optative registers present.	159-169 words; 181-191 words
good	relevant to topic; possibly little limited in scope, some problems with substantiating arguments.	Adequate integration of sources, although some minor errors in evidence.	text is generally well organized and coherent, using a variety of linking words and cohesive devices introduction and conclusion not well connected to the main body.	a range of vocabulary with occasional inappropriate use of less common lexis. Uses a range of simple and some complex grammatical forms with a good degree of control.	Some problems with register; but rarely impeding comprehension, appraisive and prescriptive registers prevail.	148-158 words; 190-200 words
satisfactory	Irrelevances to topic; target reader is minimally informed; quite unfocussed and quite limited in scope.	Not consistent integration of sources.	Text is connected and coherent, using basic linking words and a limited number of cohesive devices.	Sustainability vocabulary is generally appropriately used, occasionally overusing certain lexis, simple grammatical forms with a good degree of control.	Problems with register impeding comprehension, appraisive and prescriptive registers present.	133-143 words; 201-211 words
poor	Clear difficulty in focusing and dealing with the topic; Target reader is not informed narrow scope; no clear evidence of substantiation.	Clear difficulty in incorporating sources	Text does not form a clear whole; introduction and conclusion separate from the main body; apparent difficulty in following the conventions of the field.	Several problems with using appropriate vocabulary, grammatical errors affect comprehension.	Registers are not demonstrated.	fewer than 132 words; more than 212 words

Table 2: Rubric for writing skills assessment

The qualitative component to assess the level of environmental literacy was performed during the compositions content assessment during which we assessed both writing skills and knowledge of subject and environmental problems, acceptance of cultural variability and critical thinking skills for finding solutions. However, we were interested in measuring behavioral changes too. So we did a final questionnaire and held open-ended interviews with students on the final stage of the experiment to find out the quality of behavioral changes which appeared in students' minds. The questionnaire consisted of 10 questions

ranked on a five-point Likert scale (strongly disagree-1 to strongly agree-5). The questions were positive. In order to verify the results of the questionnaire on behavioral changes, the interview was conducted individually, face-to-face with students. They were asked reflexive open-ended questions about the course, questionnaire results, challenges they encountered and the process of writing a composition.

Procedure

We created an experimental course on ecocomposition for engineers and defined the main course objectives:

- to provide students with skills and knowledge how to become profound in writing and how to deliver arguments and opinions to peers in a clear and convincing manner;
- to develop critical reading skills for prior information evaluation;
- to equip students with knowledge about sustainability and ecocomposition with purposefully chosen and suggested reading and exercising ecocompositional writing methods;
- to develop the environmental literacy and design environmentally sound practices which students can apply beyond the academic context.

The course consisted of three sessions (three classes each) to implement our short course on ecocomposition for first-year students. They have one English class (90 min) every week, 72 classes during one academic year. Each section required a paper writing, the first and the second papers are narrative, descriptive or explanatory essays and the last session is about persuasive or critical writing through the description of possible solutions or ideas to a problem.

The first session was devoted to the knowledge of the context (Cognitive Model for composition): an introduction of environmental literature, a reading of the nature-oriented texts, a discussion and analysis of discourse, means of expression, text structure, etc. As Owens (2001) states about the first stage of eco-writing teaching the main goal is "…to describe this place so that your readers can form a detailed and relatively accurate picture in their heads of what it is (or was) like, and of its influence on you. " (p. 185) The objective of the first step is to develop students' ability to approach texts critically and evaluate them regarding the effective handling of the sustainability problem. The first session focused on the functional competency of environmental literacy formation which deals with factual information. Students described local ecosystems, representatives of local flora or fauna, and environmental problems.

The next session was about the task environment understanding. We introduced to students the terms "sustainability", "sustainable development" and its four domains: environmental, economic, social and cultural. Students were divided into pairs, interviewed each other, and wrote a short description of a group mate's hometown, cultural traditions, historical or natural heritage with emphasis on environment, based on what they had known from prior peer interviews. This encourages students to position themselves geographically and socially to understand each other better. Regarding basics of writing, students were taught the structure of a descriptive narrative, some means of expression and basic syntax rules for efficient sentence formulation, choosing appropriate register (appraisive, prescriptive or optative). The obligatory condition was to express personal attitude toward the described feature and describe measures and reasons to conserve it for future sustainable region development.

The last class, students prepared and presented their projects, suggestions or solutions with follow-up peer assessment according to ecocomposition writing assessment rubrics and criteria because we consider peer assessment to be a powerful and objective educational tool for students' error correction and performance level evaluation (Lavrysh, 2016).

As an alternative variant for ecocomposition for those students who could not think of any relevant home problems, we suggested a strategy "Ecological Footprint Calculation. "This activity leads to discussions and real-life actions. The footprint calculation is a tool for natural resources consumption level assessment against their availability. The calculation can address not only human consumption, but also that of the community, or a whole university. Particularly, this strategy allows measuring human impact on the environment in a visible and immediate way. The footprint is calculated in hectares for a person, an average size of a footprint is about ten while if we calculate it in accordance with real resources availability, it should be not more than two hectares. In order to calculate a personal ecological footprint, during the first class of the third session we suggest students fill out the table to calculate their personal footprint. Students calculate their points and see the size of their footprint (two hectares is considered as a norm). Students can cut out their scaled footprints and bring them to class, then compare and discuss the information they have found out and brainstorm how to reduce their footprints. An interesting extension of the activity is comparing the footprint of people today and people from the past. Students calculated the footprints of enterprises of their region and a home-writing assignment was to think of and describe possible solutions to make a footprint smaller. While working on the topic and the l paper,

students think over a question: What can engineers do to decrease the size of the whole nation's footprint? The footprint calculation activity demonstrates some benefits: it develops ecological and social literacy, makes human impact visible and involves ecological responsibility and it leads to discussions about a lifestyle choice, environmental policy and future directions for the sustainable society, especially for engineers who can use renewable materials to design or develop sustainable technologies.

Thus, we can state that taking into account the model of environmental literacy development, our sessions are distributed according to the model stages: the first session deals with the functional level (problem and context awareness). The second session is connected with cultural aspects, tolerant acceptance of them, and acquisition of an understanding of the causes and consequences of a problem. The final session is about the critical perception of the problem and finding a solution.

Results

To demonstrate the results of the experiment, firstly we would like to display the results of the initial pre-experiment close-ended questionnaire. Speaking about the first part: sustainability concern, we found out that students associate "sustainability" only with environmental problems as 93% (n=55) answered True for the third question and 10% (n=6) answered that they understood the term "sustainability". Only 7% (n=4) read some literature on environmental problems, however 100% supported and participated in recycling and other ecological activities. Almost all students (95%; n=57) wrote about home environmental problems but only 50% (n=30) suggested some solutions.

The results of the writing skills level questionnaire depicted serious problems with these skills acquisition: 97% of students (n=58) did not enjoy writing since it was the most difficult activity for them because 60% (n=35) experienced difficulties with grammar and compositionorganization,100% (n=60) did not know anything about genres and registers, however60% (n=35)enumerated some sources for information and explained how they verified the relevance.

In order to verify the changes and writing skills enhancement we collected data shown in Table 2 before (pre) and after (post) the course implementation. The maximum score that students could get for writing an ecocomposition was 30 points. To determine the coefficient of learning, we used the formula suggested by Bespalko (2006).

Groups	**Coefficient of learning at the pre-experimental stage (rubric grades)**	**Coefficient of learning at the post-experimental stage (rubric grades)**	**Increment**
Group 1	0.54 (63% poor, 27% satisfactory, 10% good)	0.9 (6% poor, 15% satisfactory, 35% good, 25% very good, 19% excellent)	0.36
Group 2	0.45 (71% poor, 22% satisfactory, 7% good)	0.85 (8% poor, 15% satisfactory, 42% good, 25% very good, 10% excellent)	0 4
Group 3	0.50 (66% poor, 25% satisfactory, 7% good)	0.92 (4% poor, 12% satisfactory, 40% good, 32% very good, 12% excellent)	0.41
Group 4	0 48 (68% poor, 27% satisfactory, 5% good)	0.89 (6% poor, 19% satisfactory, 35% good, 28% very good, 12% excellent)	0.41
Group 5	0.46 (69% poor, 27% satisfactory, 4% good)	0.86 (8% poor, 18% satisfactory, 40% good, 25% very good, 9% excellent)	0.4

Table 3: Comparison of writing assessment results

The digital indicators in five groups stated approximately the same level of formation of written skills at the pre-experimental stage -approximately 0.5, that is less than 0.7. It is an insufficient level. According to Bespalko (2006), 0.7 is considered to be the minimum sufficient level of learning. It is evident that after the course implementation the results became higher and significantly exceeded the minimum sufficient level of learning that can be seen from the Table 3. The points between 0 and 0.7 reflect the process of the initial organization (acquisition) of experience by students. This process ends when students reach C=0.7, when it can be considered that the process of guided learning has completed and

the process of self-learning has begun; i.e., the student has mastered the subject so much at this level of acquisition that in the course of the subsequent educational and practical activities students will be able to see mistakes and correct them, improving the quality of mastering the subject. When C<0.7, due to the student's inability to see and correct mistakes, there is no improvement in activity, and the student demonstrates systematic errors. The desire to give students the greatest possible amount of knowledge might cause its insufficient acquisition and C<0.7.

The results of the final questionnaire on behavioral changes were relatively high and the mean score was approximately 4.20 (maximum 5) as Table 4 shows.

	Statement	Score
1	I wish to take care of our living environment	4.50
2	I would like to take the initiative to follow up the principles and values of sustainable development	4.10
3	I am able to identify environmental problems and find solutions to them	3.90
4	I can reflect on my personal behavior and lifestyle affecting the environment	3.56
5	I am able to persuade my family and friends to undertake sustainable actions	4.17
6	It is my professional duty to act sustainably and eco-friendly during my engineering career	4.50
7	It is my responsibility to solve environmental problems caused personally.	4.65
8	It is my responsibility to communication with local authorities and people on sustainability issues and inform them about the key values, causes and effects	3.45
9	I believe that the practicing of sustainable behavior can prevent environmental problems	4 00
10	I respect other nationalities' customs, culture and nature heritage	4.45

Table 4: Score for the behavioral element

Discussion

As a pedagogical approach, ecocomposition demonstrates the potential to develop functional, cultural, and critical competencies for the environmental literacy formation as well as benefits to writing skills development. After conducting our course, we felt that English classes on ecocompositions at technical universities can offer a valuable background to raise students' sustainability awareness and responsibility as well as extend their language knowledge and skills. Our research suggests that the introduction of the sustainability theme impacts the language learning process so that it goes beyond the conventional language issues related to a reading-writing model. By learning a language in the context of sustainability and interdisciplinarity, students understand the relationship between ecology, culture, their own communities, families, personal abilities and opportunities to bring about changes.

In order to discuss our outcomes, we would like to present them as answers to the research questions stated above. The first questions were about the sustainability issues and ESP course. We decided to introduce this topic through the first stage of the experiment when students read eco-literature and discussed themes raised and ways of their description. Students did not differentiate between environment protection and sustainability in the beginning; however, familiarizing themselves with the eco-literature and strategies of ecocriticism, they understood the ideas and values of sustainability as confirmed by the results of the final interview, the questionnaire on behavioral changes, the content of compositions or projects itself and during the class discussions. Sustainability issues might also be introduced in senior courses in which students concentrate on learning field-related functional language, but this is usually limited by the field. It deals with only environmental or economical components of sustainability and requirements for students professional background, whereas the introduction on the first courses allows us to demonstrate sustainability issues in a holistic way. Thus, we consider introduction using eco-literature is an efficient way to inform about sustainability in terms of a language course. There are some observation tips we would like to share to make the process more efficient: sustainability problems raised in literature sources should be understandable to students and correspond to their educational background; the problems should be similar to those ones students can observe in their personal communities or hometowns; texts should not be focused only on the environment protection, but show all components of sustainability.

Regarding the second research question on writing skills enhancement, as we can see from Table 2 and our personal analysis of compositions, the level of composition quality also increased, but not according to all criteria. For example, organization, and language accuracy did not change much because students

had a high level of language acquisition and initial compositions did not have many grammar or organization mistakes. In addition, the main goal of our course was not to teach grammar but to enhance writing skills to broaden knowledge about register, genres, types of composition etc.

The application of the Cognitive Model of composition (Flower & Hayes, 1981) helps students organize the process of writing as a thinking process when the content can be planned and re-planned; objectives can be changed at any point of time; words, statements, register can be replaced according to the new vision of the text or an idea. This approach corresponds to stages developed by scientists (Flower & Hayes, 1981): plan, translate ideas into text, and review. In such a way, we tried to demonstrate the alternative to the traditional model of composition writing: pre-write/ write/ re-write. The key point is that students can change the content or goals as they change their mind and come up with a new idea during the writing process. Students shared their opinion during the interview and stated that on the first stage of the course they understood the idea and planned the content of their future writings, stated and developed goals, then they explored the content, chose the type of composition and language means, changed initial goals, subject or content and, finally, wrote the composition. We witnessed the process of students writing as they changed goals while writing and rewrote paragraphs to correspond to changes. Some students created mind-maps of ideas to produce logical and coherent text. These processes cannot be measured but student interviews and our personal observations allow us to share these shifts in students' writing process.

In the second productive session of our course, after familiarizing themselves with eco literature and basics of ecocomposition, students were asked to write about their home places. Analyzing the students' essays, we discovered that the majority of students (86%) approached ecological issues and composed argumentative reflective works where they showed the factual knowledge of the problem causes, personal attitude and suggested specific field-related changes. The compositions were reflective as students described their personal experience, what they learned and what has changed since that time. This kind of essay is typical for ecocompositions because it helps students analyze their behavior. The most challenging point was to transfer students from a simple description of their experience to critical reflection of the events and themselves. We helped students with questions like: what have you learned from that event? Was the outcome positive or negative? What would you have changed? Why did you make that choice? Was it right? etc.

The last stage was about the description of projects or presentations of problem solutions. For this kind of writing, students were trained to write a composition using persuasive strategies which are also typical for ecocomposition as it is created to influence attitude. According to our rubrics of writing skills assessment, students who used persuasive strategies were highly assessed for communicative achievement. The evidence for such grades was: clear and concise statement, the logical structure of the composition with a well-developed argument, students demonstrated right order of importance of evidence, used meaningful transitions and varied sentence structure. In the framework of the Cognitive Model of composition, while reviewing every paragraph of composition. students continuously worked on the precise word choice using powerful action verbs and strong adjectives in combination with technical language. For instance, students used such words as "facilitate" (in 15 compositions), "empower" (10 compositions), "verify" (10 compositions), "deduce (6 compositions). Previously we did not notice these verbs in student compositions and students themselves confessed that they used these words for the first time.

It was interesting to observe how students connected to nature and culture and turned their descriptive essays into reflective and critical compositions using appraisive and prescriptive language register. By means of this phenomena, we can explore the writer's attitude, affect or judgment on some set of social norms, rules of behavior, legality or illegality. While analyzing compositions we encountered appraisive terms that demonstrated students' evaluation of different features: lawfulness of authorities or people (corrupt, dishonest, abuse), the competence of people engaged in the problem (skilled, smart, knowledgeable, stupid, incompetent, powerful), personal; attitude (disappointed, ashamed, to respect, to cheat, deceive). Regarding grammar issues, students used graduation structures: slightly, quite, rather, somewhat, completely, etc. The application of these language resources implies that students do not only describe the problem (as they used to do previously) but demonstrate a critical understanding of the situation, personal engagement and attitude that impacts the level of writing skills as well as fosters behavioral changes.

The results of the third research questions about the environmental literacy content, interdisciplinary connections and communicative achievement also evidence some positive changes. The explanation lies in the essence of an ecocomposition—to teach students to interact with sustainability discourse, to process information from different sources critically, to achieve communicative targets and to foster environmental literacy (Weisser & Dobrin, 2002). It proves that ecocomposition implementation offers more

space for students in their future research, academic writing, critical thinking, and interdisciplinary practices but not limited by teaching grammar rules, finding topic sentences and paragraphing. It may also bridge the gap between students' personal lives, concerns, and their fields of study.

Taking into account the holistic approach to sustainability issues, that itis easier to introduce in the first courses, we tried to discuss also problems of a cultural character. Thus, students noticed that if people preserve some traditions or respect cultural values, the environmental problems are minor and can be solved in a more productive way. For example, some students described rather frequent situations for Ukraine of turning park zones into building sites. Students found out that most of such cases were initiated by people who did not live in that area, did not have family-rooted connections with the place and did not understand the cultural value of the place for locals. The reaction of local people also depended on their level of self-esteem and responsibility for the place they lived in. Students described local people's attempts and struggle for the preservation their hometowns and came to the conclusion that the more people respect themselves; their ancestors and environment and the more people feel responsibility towards future generations, the more successful their struggles would be. Thus, these outcomes substantiate the transformational nature of sustainability pedagogy (Burns, 2013).

Other thought-provoking ideas were connected with attitude changes toward a specific place that happens with time. For example, one composition, written in the third stage of a project description, was about the lake where a student spent much time fishing, swimming, and relaxing during his childhood. The student wrote that when he was a child it was just a place for the entertainment. But with passing time and memories this place became a "place of power" and the understanding of this transformation stimulated him to take care of the place, to find solutions how to clear the site and water and to communicate to people about the necessity to preserve the lake by selling photos and artworks connected with the place. A student and his friends organized an art exhibition and attracted attention to the lake preservation measures.

These examples clearly evidence the ability of students for critical and reflective interconnections of the environment, culture and, what is crucial, themselves as a part of that environment. We consider such changes as behavioral, enhanced by the level of ecological literacy formation by means of ecocomposition. Moreover, students could see the connection between nature and discourse that is a key point of ecocomposition. As they said during the interview: "While I was describing the meaning and the beauty of the forest, I evoke the feeling of pride that I live in close connection with such great natural heritage and it is my responsibility to protect it" (appraisive register in the composition about deforestation of the Carpathians); "The consequences of the situation the we imagined and wrote about were shocking and it was very important to explain to people, who do not understand the nature of chemical reactions, the holistic picture of the future in case of neglecting the situation. We wish people paid more attention to long term consequences instead of immediate benefit" (appraisive and optative register application for the writing about fertilizer usage). In such a way, students understand the role of their writing and its possibilities to promote sustainability and educate readers. Therefore, our results confirm the research conducted by Martin (2008) who states that "…the relationship between ecocomposition and student involvement in issues of local importance would help broaden the understanding of student authorship and agency and would allow students the opportunity to more fully live with the world by witnessing the ways in which their compositions can do creative work in the world" (p. 85).

In light of Weisser and Dobrin's (2002) attention to interdisciplinarity in ecocomposition, we witnessed the benefit students gained when using a wide range of professional engineering terms for the description of cleaning devices, causes of chemical pollution, description of geolocation, building constructions, properties of materials etc. We noticed that, while working on compositions, students searched for the information with a wide range of the content history, culture, sustainable engineering, sociology and environmental science. It proves the fact of significant vocabulary enrichment and improvement of reading skills and skills of critical information processing.

We have witnessed the improvement of students' environmental and personal behavioral changes according to results of the questionnaire (Table 3) and interviews. We compared some answers of the initial questionnaire, where students did not know about sustainability, and the final one. But the greatest source for comparison were initial students' compositions where students demonstrated their ignorance of environmental literacy and low level of writing skills and communicative achievements. Students got high scores for statements 1, 6, 7, and 10 which indicates that students take the responsibility and a sense of mission for their own lifestyle and behavior as an ordinary person as well as an engineer. The low score was for statement 4 which means that students should be better trained and more motivated to apply reflexive skills. We think it is a questions of a human factor. It is always easier to blame someone that to confess to personal wrong decisions or actions and take responsibility for that. It was crucial for

the results of our research that statements about sustainability issue got a high score. It is an evidence of students' transformations in terms of sustainability awareness. However, the lowest score for statement 8 proves that students are not ready to take initiative for communication and cooperation with authorities or community. As students explained during the interview, they did not trust the authorities and did not want to waste time and efforts to cooperate with them. Considering the issue of communication in general, students admitted that communication itself does not solve the problem, but it should be a call for action.

The answers to the fourth question were obtained during the final interview where we asked students about challenges they experienced during the course. The majority of students (n=48) pointed out sources of communication achievement: language exposition choice and choice of register and its exponents. However, they admitted that reading literature and peer group discussions during the classes helped them a lot. Among other helpful activities students noted the footprint strategy (n=21) to assess the human impact on nature and assignments about a place description (n=15) to adapt and to overcome the feeling of loneliness and shyness.

Considering teaching sustainability through English for Specific Purposes provides teachers with greater opportunities and variety of methodological and content tools (reflective practice, cross interdisciplinary learning, creative thinking)that encourage and motivate students to study the language and discuss real issues, develop real professional skills and even provide real changes. However, teaching students eco-compositions is a process with a lot of challenges for students and teachers as well. In order to ensure the connection realization, teachers need some autonomy while selecting, developing and adapting activities and content relevant to students needs and context. It is not an easy task to transform ESP curriculum to reflect a sustainability world view, but through typical ESP technologies such as collaborative task-based learning and application of authentic resources, we are able to combine education for sustainability and ESP. To overcome challenges students reported, we paid attention to the creation of a positive learning environment and a friendly learning community where students could learn from one another and share their ideas. This strategy was implemented during the second session while interviewing group mates. Due to the strategy, students were more confident and motivated because they felt support not only from a teacher but from their peers as well.

To overcome the problems with low writing skills, we suggested the sequence of exercises that helped students to move from easier assignments to ones that were more complicated by sequencing of assignments and difficulty levels to build on the learners' capability to study and master skills learned previously, by moving from local to global topics, from implicit to explicit, by applying complex researching skills and moving through all the levels of knowledge acquisition. As a result, we could see short personal papers turned into research papers due to the integration and processing of different information sources and the application of varied ways of thinking and expressing thoughts. Therefore, for a successful implementation of the course, we suggest following the actions scheme:

1. Preparation stage:
    - decide on the type of introduced conception which reflects a learning outcome (e.g. sustainable technology);
    - highlight the sustainability issue;
    - choose the examples texts for reading and analyzing;
    - develop the criteria for assessment;
    - think of interdisciplinary connections.
2. Introduction stage:
    - introduce the topic for a composition;
    - create athematic concept map with students;
    - discuss the sustainability issues which should be outlined in a composition;
    - explain the structure of a composition;
    - point out the functional language features;
    - introduce and discuss the assessment criteria with students.
3. Post-writing stage:
    - announce general results;
    - outline major mistakes;
    - discuss the ways of their correction;
    - discuss ideas and suggestions described in papers.

Therefore, we consider that the ecocomposition course for first-year engineering students facilitated the development of critical skills, the formation of logical and reasoned judgments, the ability to find efficient solutions by questioning assumptions and it equipped them with the life skills of cooperation and communication.

Conclusions

We strongly believe that language education should not be limited by teaching grammar and vocabulary. It should deal with more complex and academic challenging issues to develop minds and skills of collaboration, enable diversity in learning capabilities, support the academic socialization and promote personal development. Thus, the integration of ecocomposition gives the possibility to connect real-life experience, values and believes of the students within their own culture. We have outlined some beneficial outcomes of the described and suggested approach:

- the personalized character of tasks facilitates students involvement and motivation; they know the subject of discussions and feel engaged;
- writing is presented as an activity which can impact the environment students live in;
- appreciating tolerant and respectful attitude toward each other and environment;
- acquiring knowledge about sustainability as a generic and holistic phenomena.

By means of connecting ecocomposition as EDS technology and English language as the key tool for international communication, we help students gain a clearer understanding of local culture and problems applying the concept of global thinking and local acting. In such a conducive educational atmosphere, students are able to learn about sustainability issues, develop debating skills, interact with learning resources, and evolve argument-based thoughts and ideas.

References

Bespalko, V. (2006). Parametru i kriterii diagnostichnoy tseli. [Parameters and criteria of diagnostic purpose]. *School technologies*, *3*, 118-128.

Bishop, K., Reid, A., Stables, A., Lencastre, M., Stoer, S., & Soetaert, R. (2000). Developing environmental awareness through literature and media education: Curriculum development in the context of teachers' practice. *Canadian Journal of Environmental Education, 5*(1), 268-286. https://cjee.lakeheadu.ca/article/view/313

Bowden, R. (2010). Teaching English for sustainability. *Journal of NELTA, 15*(1-2), 16-21. https://doi.org/10.3126/nelta.v15i1-2.4605

Bruce, H. (2011). Green(ing) English: Voices howling in the wilderness? *English Journal*, *100*(3), 12-26.

Buell, L., Heise, U., & Thornber, K. (2011). Literature and environment. *Annual Review of Environment and Resource, 36*, 417-440. http://doi.org/10.1146/annurev-environ-111109-144855

Burns, H. (2013). Meaningful sustainability learning: A study of sustainability. *International Journal of Teaching and Learning in Higher Education, 25*(2), 166-175. https://files.eric.ed.gov/fulltext/EJ1016542.pdf

Carroll, J. B. (1989).The Carroll model: A 25-year retrospective and prospective view. *Educational Researcher*, *18*(1), 26-31. https://doi.org/10.3102/0013189X018001026

Cotton, D., Bailey, I., Warren, M., & Bissell, S. (2009). Revolutions and second-best solutions: Education for sustainable development in higher education. *Studies in Higher Education,34*(7),719-733. http://www.tandfonline.com/doi/abs/10.1080/03075070802641552#

Creswell, J. W. (2014). *Research design: Qualitative, quantitative and mixed methods approaches*. Sage.

Davidson, C. I., Hendrickson, C. T., Matthews, H. S., Bridges, M. W., Allen, D. T., Murphy, C. F., Allenby, B. R., Crittenden, J. C., & Austin, S. (2010). Preparing future engineers for challenges of the 21st century: Sustainable engineering. *Journal of Cleaner Production,18*(7), 698–701. https://doi.org/10.1016/j.jclepro.2009.12.021

Flower, L. & Hayes, J. R. (1981). A cognitive process theory of writing. *College Composition and Communication,32*(4), 365-387. http://www.jstor.org/stable/356600

Hembrough, T. (2019). A case study: Focusing on sustainability themes and ecocomposition through student blogs in a professional and technical writing course. *International Journal of Instruction, 12*(1), 895-914. https://doi.org/10.29333/iji.2019.12158a

Huckle, J. (2008). An analysis of new labour's policy on education for sustainable development (ESD) with particular reference to socially critical approaches. *Environmental Education Research*, 14(1), 65-75. http://dx.doi.org/10.1080/13504620701843392

Kemmis, S. & McTaggart, R. (1988). *The action research planner* (3rd ed). Deakin University Press

Lavrysh, Y. (2016). Peer and self-assessment at ESP classes: Case study. *Advanced Education, 6,* 60-68. https://doi.org/10.20535/2410-8286.85351

Lavrysh, Y. & Lytovchenko, I. (2019). The case of education for sustainable development approaches implementation at English language classes at the technical university in Ukraine. *Pedagogy, 5*, 736-749.

Martin, L. T. (2008). *Bringing ecocomposition to a multimodal composition course: Critical literacy and place at work in English 250* [Master's Thesis, University of Iowa). Retrospective Theses and Dissertations. https://doi.org/10.31274/rtd-180813-16413

Owens, D. (2001). *Composition and sustainability: Teaching for a threatened generation*. National Council of Teachers of English. https://eric.ed.gov/?id=ED458601

Pan, W., Murray, P., Cotton, D. & Garmston, H. (2012). Integrating research-informed teaching into sustainable construction education. *Journal for Education in the Built Environment, 7*(1),94-117. http://dx.doi.org/10.11120/jebe.2012.07010094

Petkutė, R., (2012). Integrating the concept of sustainable development into English language curriculum of environmental engineering sciences. *Coactivity: Philosophy, educology / Santalka: Filologija, edukologija, 20,* 65-74.

Pipere, A., Veisson, M., & Salīte I., (2015). Developing research in teacher education for sustainability. *Journal of Teacher Education for Sustainability, 17*(2), 5-43. https://doi.org/10.1515/jtes-2015-0009

Stables, A. (1998). Environmental literacy: Functional, cultural, critical. The case of the SCAA guidelines. Environmental Education Research, 4(2),155-164. https://doi.org/10.1080/1350462980040203

Sterling, S., Warwick, P., & Wyness, L. (2015). Understanding approaches to ESD research on teaching and learning in Higher Education. In M. Barth, G. Michelsen, M. Reickmann, & I. Thomas (Eds.) *Routledge Handbook of Higher Education for Sustainable Development* (pp. 89-100). Routledge. https://doi.org/10.4324/9781315852249

Triliva, S., Kontopodis, M., Dafermakis, M., & Varvantakis, C. (Eds.) (2013). *Cross-cultural/ trans-national field research ethics guide for social sciences.* DIGIT-M-ED. https://digitmed.files.wordpress.com/2013/05/digitmed-d9_1.pdf

United Nations Educational Scientific and Cultural Organization (2010). *Teaching and learning for a sustainable future: A multimedia teacher education programme*. http://www.unesco.org/education/tlsf/mods/theme_gs/mod0a.html?panel=0#top

United Nations Educational Scientific and Cultural Organization (2015).*Rethinking education: Towards a global common good?* https://unesdoc.unesco.org/ark:/48223/pf0000232555

Walker, P. (2010). (Un)earthing a vocabulary of values: discourse analysis for ecocomposition. *Composition Studies. 38*(1), 69-87. https://compositionstudiesjournal.files.wordpress.com/2019/02/38n1.pdf

Weisser, C. R. & Dobrin, S. I. (2001). *Ecocomposition: Theoretical and pedagogical approaches*. SUNY Press.

Zygmunt, T. (2016). Language education for sustainable development. *Discourse and Communication for Sustainable Education,7*(1),112-124. https://doi. org/10. 1515/dcse-2016-0008