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From Texts to Technology: Employing Content-Based Instruction Approach to Enhance Reading Proficiency and Environmental Consciousness in ESL Engineering Students

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Abstract - Engineering is one of India's most preferred genres in higher education. Technical English language courses are offered to Engineering students in the first and second semesters. The primary objectives of these courses are to prepare learners to handle technical subjects, most of the time discoursed using the English language and to use the language skills appropriately in authentic contexts. Reading is one of the important skills focused on during these courses. This work concentrates on the impact of content related to environmental consciousness as materials for reading instruction on tertiary-level engineering learners in the English as a Second Language (ESL) context. Further, the samples were investigated using a one-group-pretest-post-test design. The t-test for two means was used to statistically analyse the data collected during the survey and the results of the pretest and post-test. As a part of the study, a survey on the impact of Content-based Instruction (CBI) was conducted, and the survey reflected the effectiveness of the content on the environment in developing reading competence as well as a medium in realising the importance of environmental consciousness. The survey was performed using a semi-structured interview, and four learner variables were identified, namely- Prior Knowledge, Interest in Environmental Issues, Learning Style, Personal Beliefs and Values This paper presents the pedagogical implications of using content related to the environment and the impact of these materials on learners. This content has been used to improve reading comprehension skills and create awareness of the responsibilities of budding engineers towards the environment.

Keywords - Content-Based Instruction, Environmental Consciousness, Reading Comprehension, Reading Instruction, Panglossian Attitude, Sustainability Education, Learner Variables.

1. Introduction

EARNING English is one of the important things that open the doors to success in the present world. Naturally, English has been in the aura of our day-to-day lifestyle (Oakhill, J et al., 2015). Presently, people use English to communicate with others in various countries worldwide. As a language, English became a vital medium of communication. More than a medium of communication, it also remains a medium to assimilate wide knowledge, learn new things, assist persons in the workstation, generate an apprehending of the culture, create the prescience of the world fraternity, and spread consciousness among the

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people (Elleman, & Oslund, 2019; Morris, 2010). Furthermore, language skills have become a key element of quality education since they enhance communication, generate apprehensibility of content, and advance knowledge acquisition (Shivani et al., 2024). English can lead to correlation and cooperation among the masses in several cultures and backgrounds across the nations. Also, it has aided learners to comprehend themselves and others to a greater extent (Alneyadi et al., 2023).

In the present scenario, the environment is a widely discussed subject all over the world (Morris, 2010). As the world is experiencing many unusual and unprecedented changes in the natural environment, the importance of environmental consciousness started to burgeon among people throughout the world. Schools and colleges started to include environmental science and nature studies in their curriculum to develop environmental consciousness among the students. Learning and comprehending texts on environment and nature would lead to the learners' discernment and establishment of environmental consciousness. It highlights the importance of providing learners the knowledge and capabilities needed for environmental responsibility alongside the association between wellbeing of the humans and the natural environment (Nagamalla et al., 2024). The students are required to be encouraged and motivated in reading activities, especially about nature and the environment, to exercise their reading skills, enhance their reading comprehension, and exhibit environmental consciousness. Sichomphoo (1999) states that reading skill and their subskills are essential and play an intense role in developing communicative competence compared to other skills for learners of English as a Second Language (ESL) and use it everywhere in their day-to-day life communication; this is the skill beneficial for self-learning tasks. Grabe & Stroller (1997) emphasize that reading remains possibly the major vital skill for second language learning in a scholastic context. Jakpim (1992) claims that students who remain competent in reading English would profit extremely from reading (Tsai & Shang, 2010). According to Pett (1982), it is to be noted that reading is a crucial skill, and among other language skills, it is the one that learners perpetually withhold.

Teachers and learners adopt different methods of teaching and learning language skills respectively. In the process, reading and comprehending a variety of texts inspire and motivate students to acquire the language. The CBI approach is one of the most widespread and favoured methodologies. This methodology is simple, uncomplicated, and advantageous to learners concerning reading comprehension. Moreover, this teaching technique remains a greater natural procedure for enhancing language capability. English language proficiency promotes the skills and abilities of engineering students, and a supportive and positive learning atmosphere, amalgamated with a thoughtfully structured curriculum, could remarkably enhance their English language competency (Shinge & Kotabagi, 2021). Introducing English texts on nature and environment to the students for reading comprehension will certainly refine and revamp their consciousness towards the environment. The researchers introduced texts in English on nature and environment to the tertiary level engineering students at SSN College of Engineering, Tamil Nadu, in India, to develop environmental consciousness using the CBI approach.

Description of Chief Expressions

There remain various terminologies to be explained in this work that manifest as follows:

1) Reading skills embody specific tendencies and unique abilities that enable students to engage with written content as coherent language using the modality of reading, to read texts carefully and articulately, and to effectively articulate the underlying concepts related to the texts.

2) Learners denote tertiary-level engineering students at SSN College of Engineering, Tamil Nadu, India.

3) Reading Accomplishment refers to the learners' capability to comprehend the subject and study vocabulary, grammar syntax, idioms, and interpretation to help learners understand better and display the reading outcome.

4) Content-based instruction (CBI) is a methodology of learning a language via meaningful content; even though this methodology has existed since the 1980s in the academic discipline, it has been gaining popularity in recent times (Kemp, 2023). The learners learn content from a subject matter or set of topics, and tutors design language activities for the learners centred upon the theme of the

content. CBI indicates an approach that remains employed for learning English via diversified data to assist learners in comprehending better.

5) Reading Comprehension means the capability that the learners remain qualified to read precisely and efficiently; to attain the maximal knowledge and data out of the text possessing minimal misunderstanding.

6) Panglossian attitude proffers that anything novel remains good. It refers to the fact that all things will take place effectively in the best possible way regardless of what is happening. A person with a Panglossian attitude stays optimistic believing that all aspects of his/her behaviour possess adaptive values.

2. Objectives

Intent of the Study

Throughout this study, the researchers focused on:

- examining learners' accomplishments in reading and exhibiting environmental consciousness tutored by CBI approaches.
- examining learners' perspectives towards employing the CBI approach for practising English reading skills and giving importance to nature.

Research Questions

- In what way does the CBI approach assist learners to enhance their accomplishment in reading comprehension and expose their environmental consciousness?
- What remain students' perspectives on employing the CBI approach for practising English reading skills and understanding nature and the natural environment?

Scope of the Study

This work included fifty tertiary-level engineering learners at SSN College of Engineering, Tamil Nadu, India, during the academic year 2020-21. These learners have been chosen as the research's sample group. A comprehension of five lecture sessions, 50 minutes per lecture session for learning had been the timespan when the study was executed.

Relevance and Repercussions of the Study

The researchers reckon that the comprehension skill and environmental consciousness of learners would possess a crucial enhancement via reading comprehension activities administering the CBI approach. The study would also assist the learners to attain an inspired, pleasant, positive, and Panglossian perspective in reading English content.

3. Literature Review

Content-based language instruction supports ESL learners to attain optimized learning and teaching results as they not only attain English abilities to communicate but also employ it as a tool to understand the subject matter (Amutha, 2017). The CBI approach remains challenging and demanding to both tutors and learners in an EFL classroom; however, it remains stimulating and rewarding in the process of learning the English language (Mahesh & Suneetha, 2020).

The CBI approach develops linguistic skills in ESL engineering students, and they can acquire more benefits from it (Iffat, 2020). Krashen (1985) states that through the CBI approach, learners obtain not only a substantial amount of English language but also learn remarkable amounts of subject matter that could produce effective and positive outcomes.

The CBI approach along with the problem-based learning approach enhances professional communication skills in English while simultaneously promoting the advancement of content knowledge, critical and lateral thinking, problem-solving, teamwork and participation, and self-directed learning skills in engineering students (Jasti & Pavani, 2020). Furthermore, the project-based learning approach optimizes eco-literacy abilities of engineering students who encounter several environmental issues in their field (Sulistianingsih & Dalu, 2021). Such learning approaches and strategies are necessary for contemporary engineering students since they need to give technological and innovative solutions and resourceful services for resolving societal and ecological issues and making life easier (Shinge et al., 2024).

The CBI approach helps ESL tertiary-level

students allay the comprehension challenges when reading content-based texts (Samah & Jusoff, 2008). Satilmis et al., (2015) present how content-based instruction in teaching natural sciences to ESL learners helps them to learn the language as well as understand concepts of natural sciences effectively and interestingly.

The CBI approach effectively facilitates engineering students to develop considerable levels of reading comprehension in science texts and develop compensatory strategies to assist in enhancing their attitude and inspiration towards reading (Morales, 2010). CBI enhances learners' language learning skills comprehension and vocabulary abilities in ESP (Al Amrani, 2019).

Thus, employing reading strategies in the CBI domain facilitates tertiary ESL learners to deliberately accept the reading material and not only to apprehend it appropriately but also to acknowledge the significance of reading for their professional and personal development (Feruza & Mizell, 2021).

4. Methodology

Participants

The population of this study was 50 tertiary-level engineering students who enrolled at SSN College of Engineering, Tamil Nadu, in India. Fifty learners have been haphazardly selected out of the populace as samples using a random sampling method.

Investigation Framework

The Pre-test, intervention, and post-test models have been adopted for this study. The students were administered a pre-test to evaluate the level of the sample in reading and comprehension of texts. Following the pre-test and considering the levels of the students, the researchers developed modules based on CBI lesson plans. As discussed in the literature review section, content-based instruction (CBI) is an approach to language teaching that integrates language learning with the learning of subject matter content. In CBI, language skills are developed through the exploration and study of meaningful content from various academic or real-world topics, such as science, history, or literature. This method emphasizes the acquisition of language skills in context, allowing learners to engage with authentic materials and develop both language proficiency and content knowledge simultaneously. In the current study, CBI lesson plans have been developed to immerse in content related to environmental consciousness. The objective here is to integrate reading skills acquisition with subject matter related to creating environmental consciousness in the learners. The learners were administered the post-test following the intervention. During the intervention, modules developed based on the CBI approach were familiarized to the students and their performances were analyzed, correlated, and assessed. The post-test revealed the degree of their comprehension and advancement in reading comprehension. As a segment of the study goals, the learners responded to the questionnaire to determine their perspective on the CBI approach that reinforces the impact of the content based on environmental consciousness on the learners.

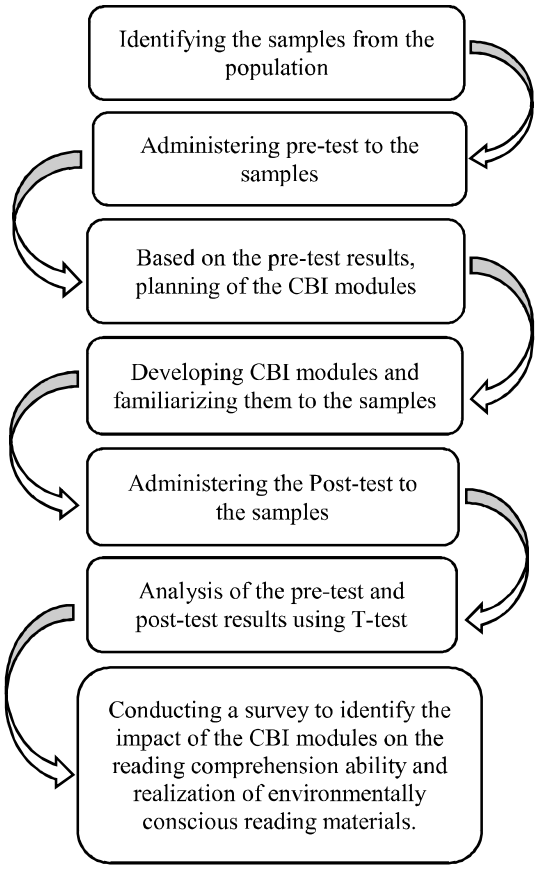

Fig. 1 : Investigation Framework

5. Data Collection Instruments

In this study, instruments, which have been psychologically and prudently prepared, comprise CBI modules with reading activities with content

focusing on global environmental issues. This study has been modelled considering a pre-test, followed by the pre-test, intervention, and a post-test to test the level of improvement after the pre-test and intervention. The performance of the students in the pre and post-tests are shown in Table 1. To understand the impact of the intervention, a questionnaire was administered at the end of the study. The ideas considered for the questionnaire and the response have been shown in Table 2.

CBI-based Modules

CBI was planned for ten sessions (regular classroom sessions of 50 minutes each). Researchers chose three texts (poem, excerpt from fiction, and excerpt from non-fiction) on nature and the natural environment that were pertinent and suitable for this research for the students to learn. The contents given to the students were Abdul Kalam's poem Rock Walls, excerpts from Amitav Ghosh's novel The Hungry Tide, and excerpts from Jawaharlal Nehru's An Autobiography. These texts covered subjects on nature and environmentalism. The activities for every lesson plan have been formulated with contents, which encourage learners to partake and learn via various knowledge sources. The researchers created five lesson plans for the research.

Pre and Post-Tests

One-group-pretest-post-test design has been adopted in this study. In this design, a single group of participants is measured twice in the course of the study. The first measure is before they receive some intervention or treatment (the pretest), and the second is after they have received the intervention (the posttest). The objective of administering a pretest is to establish a baseline measurement of the outcome variable(s) before any treatment or intervention is applied, while the posttest measures the outcome variable(s) after the treatment has been administered. Reading comprehension with objective-type questions has been considered as an instrument employed for examining learners and for noticing the distinction, advancement, and accomplishment degree in reading and exhibiting environmental consciousness post and past employing the reading exercises curriculum developed for this study. The researchers formulated and enhanced the reading test by obtaining concepts from the selected texts. The researchers designed a 10-question reading test having 4 multiple-choice choices that contained just a correct answer for each question. The researchers made sure to scrutinize the veracity and exactness of the language and inspected its rationality to make sure the content complemented the objective. After assessing the reading of environmentally conscious texts through pre and post-tests, the students were qualitatively assessed through a semi-structured interview in terms of their consciousness development. The following section discusses the responses of the students during the semi-structured interview and four learner variables were identified.

Students considered for the study provided a range of responses during these semi-structured interviews, which included their Prior Knowledge, Interest in Environmental Issues, Learning Style, Personal Beliefs and Values regarding environmental consciousness created by the texts. Some students expressed heightened environmental consciousness as a result of reading texts on the subject, while others demonstrated significant changes.

Based on the interpretations of the responses, this is an efficient method to enhance environmental consciousness among engineering students. This

Table 1 :
Responses During The Semi-structured Interview on Environmental Consciousness After the Reading Task

S. No	Variables	Responses
1	Prior Knowledge	Students with prior knowledge or exposure to environmental issues and importance of the consciousness have had more informed responses during the interviews compared to those with limited prior knowledge.
2	Interest in Environmental Issues	Students who have an interest in environmental issues were more engaged with the reading material and demonstrated increased environmental consciousness.
3	Learning Style	It is a fact that different students have different learning styles, which could impact how they engage with the reading material and subsequently influence their environmental consciousness. For example, visual learners might respond differently than auditory learners.
4	Personal Beliefs and Values	Individual students' personal beliefs and values regarding environmental consciousness influenced their responses. Those who have already had strong environmental values have been more empathic towards the reading material and demonstrated increased environmental consciousness.

includes incorporating more interactive and experiential learning activities, providing diverse reading materials that cater to different learning styles, and promoting critical thinking about current environmental issues across the globe.

Questionnaire

The questionnaire has been the instrument utilized for scrutinizing the learners' perspective towards employing the CBI approach. This comprised ten questions. These questions have been designed as per Likert's checklist type having a scale of one to five. The questionnaire's five rating scales accordant with learners' perspectives were: 1 signifies Absolutely Disagree, 2 signifies Disagree, 3 signifies Uncertain, 4 signifies Agree, and 5 signifies Absolutely Agree. The norms for elucidation of degree by midpoint were: 1.00 – 1.49 indicates Absolutely Disagree, 1.50 – 2.49 indicates Disagree, 2.50 – 3.49 indicates Uncertain, 3.50 – 4.49 indicates Agree, and 4.50 – 5.00 indicates Absolutely Agree.

6. Data Collection

A comprehensive fifty tertiary-level engineering learners have been chosen by a simple random sampling approach. These learners have been informed that they might partake in a study regarding reading English. These learners participated in a pre-test formerly learning through three CBI approach modules for identifying their degree of reading. These modules were administered in three phases. Initially, in the pre-reading phase, the learners discern arduous words and terms and answer two to four questions. During the while-reading phase, the learners read texts created concept maps, noticed the key concept, and provided data. Finally, in the post-reading phase, the learners discerned data, correlated their answers, and displayed their activity. After the three-phased intervention, the learners were made to participate in a post-test to analyse their comprehension ability.

7. Data Analysis

The gathered data (pre, and post-tests) have been statistically analysed considering arithmetic mean (x), standard deviation (S.D), and t-test. Intending to analyze learning via the CBI approach, the researchers employed the arithmetic mean, standard deviation, and t-test to correlate the scores of the pre-test and the post-test. The mean (x) was employed for analyzing the perspectives of learners.

8. Findings

Table 2 demonstrates the outcome of the correlation between the pre-and post-test scores employing the dependent t-test.

Table 2 :
Outcome of the Accomplishment Test

Tests	N	Min	*Max*	X	SD	T
Pre-test	50	15	22	21.66	7.20	24.
Post-test	50	27	37	30.28	5.80	79

Significance level at 0.05

Table 2 exhibits that the pre-test's minimal score is 15 and the maximal score is 27. The post-test's minimal score is 22 and the maximal score is 37. The pre-test's mean score is 21.66 and the standard deviation is 7.20. Subsequently, the students were tutored by employing the CBI approach, and they received higher scores. The post-test's mean score is 30.28 and the standard deviation is 5.80. The pre and post-test scores analysed based on the correlation exhibit that the students learned employing the CBI approach (experimental group) have outperformed the control group at 0.05 level of significance. It exhibits that the data acknowledges the hypothesis of the present study. It denotes that the CBI approach can assist the learners in reading and comprehending the reading text and developing and exhibiting environmental consciousness. Accordingly, the purpose of this study was victorious.

The ensuing Table 3 showcases the outcomes of the students from the questionnaire.

Table 3 :
The Outcomes of the Questionnaire

	Item	***X***	**Interprets**
1	I learnt vocabulary and appropriate grammar use out of the three modules.	4.58	Absolutely Agree
2	All three modules assist me in acquiring knowledge of environmental consciousness.	4.72	Absolutely Agree
3	I prefer to be examined on reading comprehension.	4.12	Agree
4	I feel contended undertaking reading tests in English on nature.	4.23	Agree

	Item	*X*	Interprets
5	I employ headings to assist me in identifying a subject.	4.09	Agree
6	Mind mapping assists me in comprehending the content better.	4.32	Agree
7	I understood the use of context clues in predicting the meaning of unfamiliar vocabulary.	4.28	Agree
8	Reading skills remain essential in learning English and gaining an understanding of environmental consciousness.	4.67	Absolutely Agree
9	Reading skills and possessing environmental consciousness are essential to my future.	4.48	Agree
10	The knowledge gained from the three texts applies to actual life.	4.28	Agree
	Average	4.38	

The above table signifies that the mean score (X) is 4.38. The elucidation is Agree. This indicates that the data supported the hypothesis of the current study, suggesting that the Content-Based Instruction (CBI) approach has fostered a favourable outlook on English reading and an enhanced awareness of environmental consciousness.

9. Discussion

CBI is a language methodology that amalgamates language learning with the learning of specific subject content; it is one of the methods in language learning that aims to teach language inside a meaningful context (Saifurahman & Zahid, 2019). The application of the CBI approach helped the 50 tertiary-level engineering students who enrolled at SSN College of Engineering, Tamil Nadu, in India. The students enhanced their reading skills and environmental consciousness, and the outcome of this research appears to corroborate (Şener & Çokçalışkan, 2016) that the CBI approach designed on the theme-based syllabus would make the students enjoy learning English very much and be conscious of environmental problems, comprehend the ecology and its issues associated with humans, and contemplate regarding the preventive measures to be followed associated with ecological problems boosting their environmental consciousness. The findings of this study unveiled that the materials functioned productively, the learners' reading capability post the experiment has been remarkably greater than before the experiment, and the learners' convictions towards the three-unit English exercises have been at an excellent degree. This study shows that the CBI approach certainly assists students in achieving their learning process (Khruawan & Dennis, 2017). Stroller (2008) states that it is to be noted that CBI remains a comprehensive terminology that emphasizes instructional approaches, which create a double, although not essentially equal, responsibility to language and content-learning intentions. The outcome of this present study created a positive perspective and stance towards English reading and environmental consciousness to the students since they have read different contents, learned varied vocabulary, learned the syntax and grammar via the contents, understood the importance of nature, preserve and conserve natural resources, and to appreciate environmental consciousness that is very important in this contemporary world. A similar outcome has evolved in the study of Riegerová, (2011), that employing environmental education in English lessons is a substantially vital issue nowadays and teachers must integrate this into their teaching as it is not only a crucial part of the new curriculum but also everyone should admit that environmental situation is urgent; hence, it is teachers' obligation to take responsibility to enlighten students about it, and teachers must encourage students' potentialities to create independent and reasonable choices where the environment is engaged.

Conclusion

The primary aims of the current study were to assess the progress of learners in reading and to gauge their environmental awareness when instructed using the Content-Based Instruction (CBI) approach. Additionally, the study sought to understand the learners' perceptions of this approach. The research sample consisted of fifty tertiary-level engineering students from SSN College of Engineering in Tamil Nadu, India, selected through a simple random sampling method.

Three content-based instruction lesson plans, a reading test, and a questionnaire were employed as

research instruments to conduct the study. To achieve the first objective, the sample group underwent a pre-test, followed by instruction through three content-based instruction lesson plans, focusing on texts related to nature and environmental consciousness. Subsequently, the learners completed a post-test. The analysis of the data revealed that all learners demonstrated higher scores in the post-test compared to the pre-test.

For the second objective, learners' positive attitudes toward reading in English, their understanding of nature, and their demonstration of environmental consciousness were assessed through a questionnaire while employing the CBI approach. The data analysis demonstrated that the CBI approach fostered a positive outlook toward English reading and the display of environmental consciousness.

In conclusion, the findings of this study indicate that the CBI approach effectively contributed to the improvement of reading comprehension among the fifty engineering learners at SSN College of Engineering and cultivated a positive perspective toward environmental consciousness.

Recommendations

Recommendation for further study:

- In future research, it is recommended to include all college students who are enrolled in an English course as participants.
- Comparable research should be carried out with students at other educational levels.
- Future research must employ various contents based on students' backgrounds and allures.

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