

Embedding Sustainability Literacy with Language Teaching in Higher Education

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ABSTRACT

This study generated sustainability literacy variables that can be used as sustainability themes in language teaching. It contributed to the identification of variables related to sustainability literacy in language teaching within higher education. Prior studies have addressed sustainability literacy through curriculum development, environmental education, and the adoption of technology. Sustainability literacy ensures that higher education academics possess knowledge of sustainability and adopt and implement sustainable practices and attitudes. However, previous studies have neglected the role of environmental, economic, and social variables in disseminating sustainability literacy through language teaching. Language teaching has not adequately addressed sustainability themes in language skill courses, including listening, speaking, reading, and writing. A quantitative research design was employed, and data were collected from Scopus by applying inclusion criteria, such as journal articles as the document type, English language, and open access. Furthermore, a bibliometric analysis was employed to collect keywords, which were analysed using VOSviewer to identify the frequency and occurrence of variables and patterns. Results showed that 106 documents met the criteria ranging from 2008 to 2024. It indicated that there were eight groups of sustainability themes related to sustainability literacy. Of the eight groups, sustainability literacy variables selected for the language teaching consisted of climate change, energy efficiency, renewable energy, economic growth, digital economy, financial knowledge, global citizenship, and knowledge sharing. The variables provided implications both in theory and practice.

Keywords: *Higher Education; Language Teaching; Sustainability Literacy; VOS Viewer.*

INTRODUCTION

National and international university rankings motivate higher education institutions (HEIs) to make improvements in the sustainability aspect. The higher a university's ranking, the more open it is. Integrated reports are a form of openness at a university. The report includes financial, academic, and other important information.

This integrated report can increase the value of a university to its stakeholders, including students, government and graduate users Pujiningsih & Utami, (2022). One ranking that HEs adopt is UI Green Metrics.

Sustainability performance in Indonesian Higher Education Institutions (IHEs) is evaluated using UI Green Metrics, which is based on six key measurements: infrastructure, energy and climate change, waste, water, transportation, education, and research. Twelve IHEs have been successfully ranked in the top one hundred. The HEs sustainability performances can be seen publicly and annually. For instance, Universitas Indonesia, in its sustainability report, claims that the university has successfully reduced its energy consumption by 5% within five years through policies such as using LED lights on campus, controlling electricity use for non-academic purposes, and implementing an online system to monitor energy consumption Universitas Indonesia, (2019). IPB University integrates sustainability assessments through the number of zero-emission vehicles, carbon footprints, and renewable energy sources Centre for Transdisciplinary and Sustainability Sciences, (2021). However, these assessments have not indicated sustainable performance in the education and teaching sector, particularly in curriculum development. IHEs often neglect guidelines or practices on how sustainability themes are integrated into classrooms, projects, and training in specific subjects and courses across all fields.

IHEs still have shortcomings in articulating student learning through their curriculum. The openness of disclosing educational information in the form of curriculum and syllabus remains at only 42% Frymaruwah et al., (2022). In particular, HEs have not integrated curriculum evaluation indicators, as sustainability principles have not been incorporated into lecture materials and activities. HEs fail to build SL at the bottom level, where awareness, knowledge, and attitudes towards social, economic, and environmental sustainability Sari et al., (2020).

Sustainability Literacy (SL) is a central concept that enables individuals to effectively perform sustainable practices in social, economic, and environmental aspects Diamond & Irwin, (2013); Kuusalu et al., (2024). The concept motivates individuals to enhance strategies and take concrete actions for coping with problems, including climate change impacts and socio-economic inequality. Addressing sustainability literacy can facilitate individuals' experiences, discussions, criticisms, and reflections on sustainable issues Winter & Cotton, (2012). However, sustainability literacy (SL) is complex to articulate in educational institutions, particularly in higher education (HE), even though Indonesian HEs have already addressed sustainability through the three pillars of HE: teaching, research, and community development Centre for Transdisciplinary and Sustainability Sciences, (2021). Integrating SL into teaching is not fully implemented due to a lack of sustainable curriculum adaptation, students' participation in sustainability, budgets, and formal agency to monitor sustainability performance in HE Viera Trevisan et al., (2024). To address this issue, prior studies have attempted to incorporate sustainability learning (SL) into the teaching process by offering sustainability-related courses, conducting sustainability tests, and providing training

Aikowe & Mazancova, (2023). Thus, this study emphasizes the variables that support the integration of SL and teaching.

Recent studies have highlighted the development of SL in the HE teaching process to gain a better understanding of how literacy toward sustainability practices is built among academics Chou, (2017); Owusu et al., (2017); Wall et al., (2017). Cavalcanti-Bandos et al. (2021) argue that teaching methods through outreach programs and environmentally related projects developed students' skills and increased the bonds between higher education (HE) communities and society. The projects offer long-term benefits for improving the quality of life in society and enriching curriculum design. Zhang and Tavitiyaman (2022) suggested employing various teaching methods, including job training, traditional lectures, industrial visits, and contests, to provide students with more opportunities for diverse interactions with both academicians and professionals. Such methods serve as a means to popularise sustainability in higher education. In particular, the environmentally concerned teaching method, which involves various learning activities, can motivate students to experience a vibrant learning process and encourage critical thinking on environmental impacts Adler et al., (2016); Aikowe & Mazancova, (2023); Hermann & Bossle, (2020); Wilson & Pretorius, (2017). Nevertheless, the aforementioned studies have integrated SL into the teaching process, focusing on courses related to environmental science, business and management, and natural sciences Argento et al., (2020); Kinzer, (2021). Hence, Briens et al. (2023) emphasised that there is a need to embed SL in interdisciplinary courses to have a greater impact on higher education (HE).

Prior studies suggest that one field that poses challenges to embedding sustainability literacy in its teaching process is the language course de la Fuente, (2021); Molina, (2022). Micalay-Hurtado & Poole (2022) promoted the integration of Eco linguistics and critical language awareness by encouraging university students to critique environmental issues and propose solutions through social media platforms. Students are motivated to express their thoughts and feelings in poetry, exploring the connection between people and the environment. Reichenberg (2020) suggested that a sustainability concept be introduced through a reflective teaching and learning approach, emphasising coaching and dialogue. Educational institutions play a vital role in disseminating the concept of sustainability and literacy in their curriculum, particularly through teaching methods Cavalcanti-Bandos et al., (2021). Turpin (2021) argued that sustainability literacy is not articulated effectively in writing, reading, and speaking classrooms due to limited exposure to textual content regarding sustainability themes. Teachers need to promote sustainability textbooks in language skill classrooms and motivate students to engage in sustainable practices or practically adopt sustainable attitudes. However, prior studies have not emphasised which sustainability themes are embedded in language skill teachings. In addition, those studies have not offered a syllabus which articulates sustainability. Hence, this study highlights the need to select sustainability literacy variables that can be applied as sustainability themes in the context of language teaching, specifically in listening, reading, writing, and speaking classrooms in higher education.

Some studies have addressed SL with language teaching in various approaches; however, they lack proposing SL themes derived from a database. Thus, this study provides a bibliometric analysis. A bibliometric analysis was employed to summarise, synthesise, and determine the current SL trends Frizon & Eugénio, (2022); Johri et al., (2024). Such an analysis visualises the relationships and maps the variables, enabling the grouping of variables based on the generated keywords Ng et al., (2023); Viera Trevisan et al., (2024). Hence, this study has two questions: What are SL themes that can be used for embedding SL in IHEs? Moreover, a syllabus in language teaching, such as reading, writing, listening, and speaking, is designed to embed sustainability themes. This research aims to provide SL themes with qualitative information for Indonesian higher education institutions (HEIs) and design a syllabus for embedding SL themes into language teaching. Theoretically, the study contributes to the determination of sustainability themes based on SL themes generated from the database. Practically, this study provides a language teaching syllabus for four skills: reading, speaking, listening, and writing. The organisation of this study includes an introduction that provides the background of the study, followed by sections on sustainability literacy and language teaching, and a method section that outlines data collection and data analysis. The last concerns the results, discussion, and conclusion.

Sustainability Literacy

SL is described as the set of skills, attitudes, competencies, dispositions, and values essential for not only enduring but also prospering in the challenging conditions of the world while actively working to minimize the rate of decline as much as development Winter & Cotton, (2012). Sustainability literacy serves as a comprehensive concept that encapsulates the perspectives and knowledge empowering students to grasp the interdependent connections between the environmental, social, and economic facets of sustainable development Winter & Cotton, 2012). The concept is complex, as it encompasses a wide range of knowledge, skills, and attitudes. It includes an understanding of the interconnectedness of natural and human systems, the ability to think critically about environmental issues, and the capacity to take action to promote sustainability. Establishing SL requires a foundation composed of community participation, critical thinking in information technology, psychological skills, digitalization adaptability, and entrepreneurship competence Ansari & Stibbe, (2009); Gomez Gomez, (2024); Huda, (2024). It is important to consider ecosystems in their complexity, unpredictability, and uncertainty. With this understanding, individuals and groups can begin to develop the skills and knowledge necessary to analyse, predict, and adapt to climate change. Ultimately, a sense of community and social justice is crucial for fostering a more sustainable future.

While 'literacy' typically refers to proficiency assessment in reading and writing, its relevance in the sustainability discourse lies in its metaphorical application, suggesting the capacity to comprehend or 'read' and influence or 'write' society Chen & Wang, (2022). This underscores the idea that sustainability literacy entails the skill to reflect on oneself and society critically and to reframe both, thereby enhancing social aspects while safeguarding or improving the natural systems that sustain life Ansari & Stibbe, (2009).

However, incorporating SL with language teaching can pose challenges as it frequently necessitates collaboration across various fields of study de la Fuente, (2021). Zhang & Tavitiyaman (2022) suggested that universities and higher education institutions can reassess their existing courses on sustainability issues to enhance relevant applications in the professional setting. Thus, this study argues that there is an urgent need to develop a syllabus that facilitates the seamless integration of sustainability themes, including economic, social, and environmental aspects, into language skills.

In comparison to other academic disciplines, the exploration of sustainability within language teaching has remained relatively limited thus far Ganji et al., (2020). Teachers play a crucial role not only in imparting language skills but also in guiding students to apply these skills towards building a sustainable future in our rapidly changing world Brandisauskiene et al., (2020); Hofman-Bergholm, (2018). However, the integration of SL with language teaching poses challenges, often necessitating collaboration across various disciplines Briens et al., (2023); de la Fuente, (2021). In higher education, it plays a pivotal role in advancing sustainable development goals that extend beyond the school setting Öhman & Sund, (2021).

Language Teaching

Language teaching has always been dynamic and demands that the teacher find an effective way to transfer knowledge. Al-Khasawneh (2022) highlighted the emergence of language teaching as a distinct profession in the twentieth century, continually exploring novel challenges and evaluating the efficacy of diverse teaching methods and approaches to address them. Gaining proficiency in any language involves mastering the four key language skills (listening, speaking, reading, and writing) along with their associated components, including vocabulary, grammar, and pronunciation Bin-Hady & Al-Tamimi, (2021). This integration of four language skills with sustainability literacy is pivotal, as it equips students not only with linguistic competence but also with the critical thinking skills, cross-cultural understanding, and engagement with communities necessary to address global sustainability challenges such as in economic, social, and environment Caldana et al., (2023); Cavalcanti-Bandos et al., (2021).

The first perceptive language skill for embedding SL refers to listening. This skill is a complex activity that demands awareness, attention, and memory to comprehend spoken language through the recognition of speech sounds, understanding of words, and grasp of sentence structure Phan & Nguyen, (2023). Listening stands out as a uniquely personal activity, with individuals employing their distinct processes and interpretations Mehar Singh, (2019). Moreover, it is recognised as a passive language skill that develops over time through repeated exposure and practice, often without the need for explicit instruction on learning methods Chou, (2017). Despite being a passive skill, listening is often cited as the most challenging and frustrating language skill for language learners, with many feelings less successful in it compared to other skills Rahimirad & Moini, (2015). Nushi and Orouji (2020) have estimated that second language learners dedicate approximately 45% to 50% of their time to listening when communicating in the target language. In recent years, the evolution of technology and mobile learning has provided valuable support for language learners to master their listening skills. One of the widely

available media to enhance students' listening ability is the podcast. The prior study suggests that language learning podcasts offer opportunities for learners to improve their listening skills in a versatile manner, allowing them to engage without visual distractions and even while multitasking, such as driving or cooking Sporn et al., (2020). Thus, podcasts prove to be effective educational aids due to the active, engaging, and creative nature of listening Chen & Wang, (2022).

After listening, the first productive skill refers to speaking. Considering that higher education (HE) is increasingly adopting active learning, students need to actively engage in the learning process rather than merely passively listening. Students' complex speaking abilities are frequently called upon by this increasing involvement, especially in group activities that are commonly part of assessed assignments or classroom discussions. Speaking tasks are often assigned to enhance students' spoken fluency in various settings. Idrissova (2015) suggests that students' capacity to speak confidently in a foreign language is enhanced by structured speaking activities, such as role-playing and creating real-life situations. According to these results, speaking exercises in every class session significantly improve students' speaking abilities and help them become more skilled and at ease communicators. These teaching strategies emphasise the importance of active practice and participation in achieving language proficiency.

In addition to speaking skills, lecturers and researchers in the field of English for Academic Purposes (EAP) emphasize the critical importance of reading comprehension as a foundational skill for both native and non-native English speakers in higher education Grabe & Stoller, (2020). Hyland & Jiang (2021) reveal that many undergraduates struggle to meet the extensive reading demands of university-level studies. Students are expected to navigate various reading tasks, including managing textbooks, employing strategic reading techniques, and grappling with a substantial volume of academic materials. Moreover, they are challenged to go beyond mere comprehension and engage in more complex processes, such as extracting information, integrating knowledge from texts, and analyzing and evaluating content for writing or critical purposes García-Ostbye & Martínez-Sáez, (2023). In essence, reading proficiency extends beyond basic understanding to encompass the ability to synthesize, evaluate, and apply information effectively in academic contexts.

The second productive skill is associated with writing. Writing is a complex process that requires linguistic capabilities to effectively express and convey messages through a well-structured pattern, such as an essay. It encompasses both lower-order skills, such as forming letters, and higher-order cognitive skills, like cohesion and coherence, rendering it challenging to teach Farooq et al., (2020). Common mistakes encountered by language learners include punctuation errors and grammar issues such as run-on sentences, fragments, and subject-verb agreement errors. While learning grammar in writing may seem tedious, it significantly enhances the quality of writing and improves the clarity with which meaning is conveyed. Students encountered challenges, specifically in articulating their thoughts in writing using advanced and suitable vocabulary, as well as articulating ideas systematically Collins et al., (2018). To address these challenges, enhancing students' writing skills requires integrating digital technology through mobile

applications AlSaied & Akhtar, (2021). However, prior to writing proficiency, students are expected to possess a fair or reasonable level of reading and listening proficiency.

Prior studies have highlighted that teaching four language skills in higher education (HEs) can be enhanced through the use of technology, extended exercises outside the classroom, and the development of critical thinking García-Ostbye & Martínez-Sáez, (2023); Hyland & Jiang, (2021); Sporn et al., (2020). However, language teaching in various courses and disciplines does not focus on particular SL themes but rather exposes more textual content related to specific subjects. Integrating SL in language teaching requires preparation in the form of selecting suitable SL themes and creating a syllabus.

METHOD

The research design of this study employed a descriptive and quantitative approach. The quantitative approach was employed, as this study requires a quantitative analysis to determine SL keywords and cluster them into thematic groups based on the number of occurrences, as per Johri et al. (2024). Hermann and Bossle (2020) suggested that this approach is suitable for studies where databases are considered data sources. The database automatically generates hundreds of documents based on searched keywords related to the topic and provides major trends and themes Al-Khasawneh, (2022).

The data source in this study was Scopus. It was considered the largest database of journal articles and the widest coverage of indexing Viera Trevisan et al., (2024). This study has not involved more than one database because employing multiple databases would result in duplicated documents; additionally, the increase in databases is associated with an increase in irrelevant documents Johri et al., (2024). In addition, Scopus offers larger databases for multidisciplinary studies, spanning social sciences to humanities, including applied linguistics and education.

In the data collection process, to address the first research question, this study highlighted four key steps. First, it applied a Boolean search, inserting some important initial keywords into the database search engine. Boolean means using search combinations of several keywords and connecting them with conjunctions of 'OR' and 'AND' Hermann & Bossle, (2020). Thus, in this study, the searched key terms were "sustainability literacy" or "environmental literacy" and "higher education institutions" or "institute" or "university". Second, after some documents were generated from the Boolean search, the selected documents were based on specific inclusion criteria. The inclusion criteria are journal articles written in English and published in open-access formats. Third, all the selected documents were downloaded from the database in a RIS format and saved in the referencing manager. Fourth, duplicate documents were removed. Thus, the documents, after being cleaned from their duplicates, become the final data that are ready for analysis.

In the data analysis, a bibliometric analysis was used to map SL themes. Ng et al. (2023) stated that bibliometric analysis can reveal significant existing and emerging

themes on a particular topic. The SL themes are based on selected keywords. Generally, there are three steps to conduct the analysis. First, the final documents in RIS format were processed using VOSviewer software. This software identifies frequent keywords in literature across journal articles and represents thematic clusters or groups Viera Trevisan et al., (2024). Second, the generated keywords were removed when they indicated vagueness, unclear abbreviations, and conjunctions. Third, the software finalised the keywords and displayed the groupings in the form of a mapping or list of keywords, along with the number of occurrences. Then, the final keywords were selected as SL themes to address the second question; these themes are integrated into language teaching for the four skills: reading, writing, listening, and speaking. The integration is articulated through a syllabus. The syllabus represents the sustainability themes, competencies, teaching methods, and objectives.

FINDINGS AND DISCUSSION

This study poses two research questions. To address the first question, Table 1 presents SL themes that can be used for embedding sustainability literacy in IHEs, as well as occurrences and groups. The final keywords of SL, along with the number of occurrences and groups, are derived from VOSviewer. These keywords are listed in order of the group, from the highest to the lowest number of occurrences. Meanwhile, to address the second research question, the syllabus is designed for each language skill. Each syllabus consists of a general description, objectives, teaching method, embedded competencies where SL themes are used as themes, evaluation, number of meetings, and some remarks. The SL themes selected in the reading skills syllabus are in line with those in the writing skills syllabus, while the selection for SL themes in listening skills aligns with those in speaking skills.

Table 1. The SL themes

No	Keywords	Occurrences	Group
1	digital transformation	34	1
2	digital literacy	33	1
3	information literacy	26	1
4	digital learning	13	1
5	digital competence	16	1
6	education 4.0	7	1
7	digital technology	10	1
8	media literacy	7	1
9	digital competencies	5	1
10	technology adoption	5	1
11	entrepreneurship education	18	2
12	entrepreneurial intention	10	2
13	problem-based learning	9	2
14	climate change education	9	2
15	responsible management education	6	2
16	sustainability science	5	2
17	economic growth	11	3
18	digital economy	10	3
19	education policy	6	3
20	economic development	5	3

21	social capital	6	3
22	financial knowledge	5	3
23	education for sustainable development	65	4
24	collaborative learning	7	4
25	resilience	6	4
26	sustainability competencies	5	4
27	systems thinking	6	4
28	digital pedagogy	6	4
29	transformative learning	10	4
30	work-integrated learning	6	4
31	digital society	6	4
32	climate change	30	5
33	environmental attitudes	6	5
34	environmental awareness	8	5
35	energy efficiency	6	5
36	renewable energy	7	5
37	environmental knowledge	6	5
38	environmental behavior	6	5
39	environmental education	37	6
40	indigenous knowledge	6	6
41	environmental literacy	10	6
42	environmental management	5	6
43	educational policy	5	6
44	environmental sustainability	7	6
45	global citizenship	6	7
46	information technology	9	7
47	knowledge management	9	7
48	global citizenship education	6	7
49	higher education for sustainable development	5	7
50	curriculum development	5	7
51	knowledge sharing	5	7
52	social sustainability	7	7
53	community engagement	6	7
54	educational innovation	25	8
55	technology-enhanced learning	10	8
56	learning environment	7	8
57	information and communication technology	6	8
58	artificial intelligence	27	8
59	educational technology	22	8
60	swot analysis	5	8

Cluster from Bibliometric Analysis

The keyword string in Scopus yielded 108 articles, published between 2008 and 2024. The articles generate 60 keywords clustered into eight groups. Group 1 encompasses digital information, digital literacy, information literacy, digital learning, digital competence, Education 4.0, digital technology, media literacy, digital competencies, and technology adoption. The SL themes in Group 1 are related to the adaptability and accessibility of digitalisation Huda, (2024). Group 2 is concerned with developing entrepreneurship for sustainable HE education Gomez Gomez, (2024). The second group consists of six variables: entrepreneurship education, entrepreneurial intention, problem-based learning, climate change education, responsible management education, and sustainability science. Group 3 comprises six variables, while Group 4 consists of nine variables. Group 5 is more focused on environmental issues, which are

climate change, environmental attitudes, environmental awareness, energy efficiency, renewable energy, environmental knowledge, and environmental behaviour. Group 6 links the environment with policy and management. Group 7, regarding competencies and skills for SL, consists of 9 variables: global citizenship, information technology, knowledge management, global citizenship education, higher education for sustainable development, curriculum development, knowledge sharing, social sustainability, and community engagement. Group 8 addresses the relationship between technology and the environment in the SL context, encompassing educational innovation, technology-enhanced learning, learning environment, information and communication technology, artificial intelligence, educational technology, and a SWOT analysis.

Theoretical implication: Embedding SL to language teaching

Generally, SL can be developed if an institution has the abilities and accessibility necessary for digitalisation Huda, (2024). The institutions need to ensure that their members are flexible, adaptive, competent, and literate in the features of digitalisation and current technologies that support the dissemination of sustainability issues within the institutions. Digital accessibility not only demands well-developed technology and effective technology adoption but also competencies and literacy in digitalisation.

Particularly, SL can be embedded in language teaching through a passage or textbook related to a sustainability theme Turpin, (2021). The themes can promote SL by integrating social, economic and environmental issues with reading, writing, listening, and speaking syllabi. Through these themes, students are taught to critically evaluate and promote solutions to social, economic, and environmental sustainability issues Micalay-Hurtado & Poole, (2022). The passage with the sustainability theme is necessary to include definitions and practices that reflect sustainability knowledge, behaviour, attitudes, and more daily-based examples. In addition to the textbooks and passages, projects involving multi-interactions among industries and societies must ensure that students develop environmental attitudes, awareness, and behaviour towards renewable energy and energy efficiency Zhang & Tavitiyaman, (2022). The projects lead the teaching process to include problem-based learning, collaborative learning, and work-integrated learning in the language skill classrooms classrooms Adler et al., (2016); Hermann & Bossle, (2020); Wilson & Pretorius, (2017). Thus, increasing the SL in HEs can be articulated in the reading, speaking, writing, and listening syllabus.

The reading, speaking, writing, and listening syllabus is designed for the first semester. The course name for each skill can be specifically adjusted based on the curriculum in higher education institutions (HEIs). The syllabus covers the course description, objectives, themes for each meeting, the number of meetings, and evaluation criteria. The SL themes are not only employed as sustainability themes but also as embedded competencies, teaching methods, and projects Caldana et al., (2023).

Reading syllabus

Table 2. The reading syllabus adapted for the first semester students.

Course name	Reading
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Description	The course covers teaching strategies that include scanning, previewing, skimming, identifying topics and details, making inferences, and selecting keywords.		
Objectives	<ul style="list-style-type: none">Students employ reading strategies to collect required information, which includes identifying pros and cons, descriptive details, comparative and contrastive information, and causal-effect relationships.Students can identify descriptive, comparative, contrastive, causal-effect information, and pros and cons based on determined topics.		
Teaching method	Collaborative learning, transformative learning, work-integrated learning		
Embedded competencies	Digital transformation, digital literacy, digital competence, media literacy		
Evaluation	Midterm: the 20-MCQ as the post test for three times (40%) Final term Project: e-magazine (50%) Class participation (10%)		
Meeting	Reading Strategies	SL themes	Remarks
1-2	Extensive reading, scanning, previewing	(32) Climate change	1. Lecturers can switch the themes among meetings 2. Evaluation is taken from a 20 MCQ as a post test for three meetings. The three meetings can be selected according to the class options.
3	Making inferences	(52) social sustainability	
4	Understanding paragraphs	(21) economic development	
5	Identifying the patterns	(6) education 4.0	
6	Reading longer Passages	(25) resilience	
7	Skimming	(58) artificial intelligence	
Midterm: Report on the three meeting-post tests			
8-9	Reading for specific purposes and descriptive paragraph	(37) environmental behaviour	1. Lecturers explain the project of final term
10	Reading for comparison-contrast paragraph pattern	(22) financial knowledge	2. E-magazine that covers 4 topics given from meeting 8-14. 3. The magazine has a minimum of 10 pages. 4. The contents concern descriptive, comparative, contrastive, causal-effect information, and pros and cons based on determined topics
11	Reading for cause-effect paragraph pattern	(35) energy efficiency	
12	Reading for descriptive essay	(34) environmental awareness	
13	Reading for comparison essay	(45) global citizenship (22) Financial knowledge	
14	Reading for a cause-effect essay	(35) energy efficiency	
Final term project: e-magazine posted in IG covering descriptive, comparative, contrastive, causal-effect information, and pros and cons based on determined topics			

Listening syllabus

Table 4. The listening syllabus presented for the first semester students

Course name	Listening		
Description	The course offers students exposures to spoken texts and teaches students how to determine keywords, specific information from such short-spoken texts as monologue, conversation, podcast, interviews, videos.		
Objectives	<ul style="list-style-type: none"> Students can identify keywords, specific information from such short-spoken texts as monologue, conversation, podcast, interviews, videos. Students can identify language expressions that convey specific information and keywords. 		
Teaching method Embedded competencies	Collaborative learning, transformative learning, work-integrated learning media literacy		
Evaluation	Midterm: the 20-MCQ as the post test for four times (40%) Quiz: 20% Class participation (10%) Sit in Final term 30%		
Meeting	Listening Strategies	Themes	Remarks
1-2	Listening for keywords from short conversation/	(37) environmental behaviour	1. lecturers can switch the topic among meetings.
3	Monologue	(34) environmental awareness	2. evaluation is taken from a 20 MCQ as a post test for four meetings. The four meetings can be selected according to the class options.
4	Listening for predicting content from short	(21) economic development	
5	conversation/ Monologue	(22) social sustainability	
6	Listening for specific information	(46) information technology	
7		(58) artificial intelligence	
Midterm: Report on the three meeting-post tests			
8	Listening for Tone and Intonation	(44) environmental sustainability	Quiz: sit-in Quiz in Meeting 11 or 12.
9		(45) global citizenship	
10	Active listening from podcasts, interviews, short videos	(33) environmental attitudes	
11		(36) renewable energy	
12		(39) environmental education	
13		(35) energy efficiency	
14		(49) higher education for sustainable development	
Final term: Sit-in exam			

Speaking syllabus

Table 5. The speaking syllabus presented for the first semester students.

Course name	Speaking
Description	The course teaches students to give their opinions, share habits and routines, interview, retell stories and news.
Objectives	Students can use language functions for giving their opinions, sharing habits and routines, interviewing, retelling stories, and news.
Teaching method	Collaborative learning, transformative learning, work-integrated learning
Embedded competencies	Digital transformation, digital literacy, digital competence, media literacy
Evaluation	Midterm: Evaluation of every two-week performances (40%) Final term Project: Video (50%) Class participation (10%)

Meeting	Speaking Focus	Themes	Remarks
1-2	Routines	(37) environmental behaviour	Evaluations are taken from every two-week performance e.g. Meeting 2,4,5 or 3,5,7
3	Habits	(34) environmental awareness	
4	Object Description	(21) economic development	
5	People description	(22) social sustainability	
6	Permission and Ask for help	(46) information technology	
7	Giving directions	(58) artificial intelligence	
Midterm			
8	Giving opinions	(44) environmental sustainability	1. Lecturers explain the final term project 2. All speaking practices must be guided to the final project
9		(45) global citizenship	
10	Retelling news	(33) environmental attitudes	
11		(36) renewable energy	
12	Retelling stories	(39) environmental education	
13		(35) energy efficiency	
14	Reporting news	(49) higher education for sustainable development	
Final term project	A video posted on IG covering <ol style="list-style-type: none">1. Monologue about the aforementioned topic reflecting how the students articulate the topics in their daily lives. The monologue form can represent one of the following: giving opinions, retelling stories, reporting news, OR2. Interview about the selected topic The video shall have a running text.		

CONCLUSION

Sustainability in Higher Education (HEs) is often developed in the absence of teaching integration, leading to a less integrated curriculum that introduces sustainability issues, particularly in language teaching. The SL themes generated from the database and processed through VOSviewer are highly needed. Such keyword is presented as sustainability themes in the form of projects, texts, competencies, and teaching methods. This study presents eight groups of SLs, which include social, economic, and environmental variables. The groups include adaptability and accessibility of digitalisation, entrepreneurship for sustainable higher education, environmental issues, the linkages between the environment and policy, competencies and skills, and the relationship between technology and the environment. The SL themes presented in this study serve as the basis for designing a four-language skill teaching approach, encompassing reading, writing, listening, and speaking. The sustainability themes in the reading syllabus are aligned with those in the writing syllabus. Meanwhile, the sustainability themes introduced in the listening syllabus align with the themes presented in the speaking syllabus. The proposed syllabus fills the gap in the curriculum, where sustainability has not been fully emphasised in Higher Education (HEs). The syllabus promoting the SL themes makes a practical contribution to language teaching in higher education institutions (HEIs) and enhances the level of sustainability in the curriculum. The contribution includes (1) students gaining more awareness towards social, economic, and environmental issues and behaviour; (2) teachers implementing an integrated syllabus for two skills, reading and writing, listening and speaking.

This study has some limitations. First, the SL themes from the database lack validation. Future studies can offer the validation to select the variables. Second, the industrial background from HEs has not presented data indicating the percentage of courses in language that integrate sustainability issues. It presents an opportunity for further discussion on statistical data to reveal sustainability courses in higher education institutions (HEIs). Third, the syllabus requires monitoring and evaluation during its implementation, which leads to a further comparison between language teaching with and without SL themes.

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