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Meaningful Synergy in E-learning: Integrating Environmental Awareness and Project-Based Learning in EFL

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ABSTRACT

The study investigates EFL e-learning project-based education and environmental awareness. Despite limited participation and technology concerns, e-learning is evolving. This study supports "green awareness" in higher education institutions, promotes environmental responsibility and global citizenship. Our study combines meaningful learning, project-based pedagogy, and online EFL instruction with active engagement. According to this study, project-based education and environmental awareness can boost EFL e-learning learners' involvement. These 300 university-level EFL students are being studied holistically with ADDIE. This comprises need analysis, design, material development, classroom implementation, and impact assessment. According to research, incorporating "green business" into online sessions increases student participation. A poll found that intervention promotes environmental consciousness. According to interviews, environmental awareness and sustainability motivate students to create environmentally responsible solutions. Despite limitations in depth and sample size, well-designed interventions increase online learning engagement. The findings contribute to more effective online education methods, instructional design, and student involvement investigations.

1. Introduction

E-learning has transformed education, altering how knowledge is acquired and shared. Technology discoveries and educational paradigm shifts have accelerated this revolution as illuminated by Jones (2003) and Rashty (2003). As e-learning spreads into higher education, it has torn down classroom barriers and introduced new learning methods as stated by Feeney (2001). This transition has been marked by the rise of online education, which was already rising before the COVID-19 pandemic. Due to the global financial crisis, online education is in the spotlight, highlighting its pros and cons. Firmansyah et al. (2021) noted that online learning's flexibility and accessibility help students manage their time and access learning resources. However, these benefits came with challenges, such as minimal instructor engagement, a flood of assignments, changeable timetables, inadequate infrastructure, limited internet connectivity, and little practical training. Meanwhile, Ja'ashan (2020) has illuminated the challenges of integrating e-learning into EFL training. These studies found academic, technological, and administrative issues. Despite these challenges, EFL students are favorable about e-learning and aware of its benefits. The issues of poor internet connectivity, restricted

engagement, diminishing motivation, diminished involvement, and difficulty in comprehension in online learning environments are reinforced by Zboun and Farrah (2021). Despite these obstacles, students have valued online programs' convenience and accessibility.

In this ever-changing educational setting, "environmental awareness" encourages active engagement and ecological responsibility. This integration is more significant since it promotes global citizenship and environmental responsibility. Increasing research show that enhancing students' environmental knowledge in educational settings can transform them. This trend is growing. Several research show that 'environmental awareness' is crucial to the development of environmentally conscious students, as explained by Dittmer and Riemer (2021), Thor and Karlsudd (2020), and Braun et al. (2018). This combination of studies shows that 'green consciousness' through education can cause lasting behavioral changes. As the educational landscape changes, it's more crucial than ever to explore relevant learning methods. Technology may increase kids' language, cultural, and cognitive skills, according to extensive study. According to Agra et al. (2019) "meaningful learning," popularized by David Ausubel and a pillar of pedagogical excellence, emphasizes integrating new material into cognitive structures for long-term comprehension and application. The transition from the 4Cs framework to the comprehensive 10Cs framework empowers meaningful learning through the use of ICTs, preparing learners for a technologically driven world, as affirmed by Makrakis (2017) and Makrakis (2020).

The conceptual framework of this study centers on the intersection of meaningful learning, project-based pedagogy, and online EFL instruction. Active engagement plays a crucial role in meaningful learning, particularly within the context of second language learners. This principle fits perfectly with project-based learning (PjBL), a pedagogical scaffold that empowers students, strengthens language skills, and fosters critical thinking by solving real-world problems. PjBL promotes positive learning environments and environmentally sensitive behaviour, as indicated by Viswambaran and Shafeek (2019), Sudjimat et al. (2021), Fettahlıoğlu and Aydoğdu (2020), as well as Bramwell-Lalor et al. (2020). This multimodal approach views language acquisition as a conduit for intellectual development rather than a separate task. As research into improving English as a Foreign Language (EFL) instruction in e-learning environments through meaningful project-based teaching grows, it becomes increasingly vital to carefully navigate the delicate interaction of these three components.

Thus, this research entails the following question: How does synergizing project-based teaching and environmental awareness impact learners' engagement promote environmental consciousness in EFL learning settings? This research intends to show that project-based learning and environmental awareness improve EFL students' language skill, engagement, and critical thinking. Environmental consciousness in EFL e-learning promotes global citizenship and ecological responsibility, preparing students for a changing world. Project-based learning and sustainability awareness drive pedagogical innovation and can shape instructional design and curriculum development across disciplines and educational contexts, creating innovative, engaging, and socially significant learning experiences.

2. Method

The objective of this study is to unravel the potential synergistic effects of the project-based teaching and environmental awareness on university-level EFL learners, with a focus on learner engagement, language proficiency, and environmental awareness by deploying the renowned ADDIE model, a systematic approach to instructional design and development, mentioned by Dick et al. (2004). Drawing on a cohort of 300 university-level EFL learners, the research method embraces a holistic approach, encompassing need-analysis, designing

teaching-learning activities, developing materials, classroom implementation, and rigorous impact assessment, as mentioned by Branch (2009). The detailed procedures of the five key phases of the ADDIE model are explained in Table 1.

Table 1. The ADDIE Model of The Research

Phase	Activity
ANALYZE	The study begins with a thorough need-analysis. It entails examining EFL learners' e-learning readiness, goals, and challenges through observations and interviews during synchronous sessions via Zoom meetings.
DESIGN	This phase involves designing project-based teaching activities that meet needs and objectives based on the need-analysis. It comprises choosing learning outcomes, teaching methodologies, and assessment methods for synchronous and asynchronous sessions.
DEVELOP	Instructional materials and resources are developed to support the project-based teaching activities of English Business Presentation (EBP) Course. Materials are tailored to suit the e-learning environment and cater to the diverse needs of the learners.
IMPLEMENT	The online classes introduce the specified teaching-learning activities using technical infrastructure and pedagogical methodologies. Implementation is monitored and learner feedback through interviews via Zoom meetings are sought for improvement.
EVALUATE	The last phase evaluates online project-based EFL teaching activities in detail. Interviews and post-surveys via Google Form are conducted, and data is carefully analyzed qualitatively to determine if the research objectives are met and if project-based teaching and green awareness initiatives have systematically increased learner engagement and environmental awareness.

3. Result and Discussion

During the ‘Analysis’ phase, the pre-observation result showed that the students involved in this study displayed a low level of engagement, as seen by their lack of active involvement during online face-to-face sessions (not reacting to the instructors’ questions or triggers); this went on for a few meetings until the mid-semester test. The findings of this study reveal a lack of sufficient usage of online learning support. Therefore, an intervention was needed to achieve more meaningful learning sessions. Subsequently, this ADDIE-based study examines the essential 'design' part of instructional design shaping the entire learning experience. The researchers mapped sessions after the mid-test assessment, creating activities for the intervention, prepared materials and tools needed, and created a comprehensive evaluation instrument. Table 2 illustrates the mapping for after-mid sessions.

Table 2. Sessions Mapping Design

Session	Purpose and Activities	Tools Used
8 & 9	▪ Trigger students' opinions and active involvement ▪ Equip students with knowledge through videos on local environmental damages ▪ Divide students into groups, assign triggering questions, and prompt online research ▪ Utilize internet browsers, scientific paper search tools, and mind mapping platforms (e.g., Padlet)	Video player, Internet browsers, Scientific paper search tools, Mind mapping tools (e.g., Padlet)
10 & 11	▪ Plan "green business" ventures incorporating research findings ▪ Engage in brainstorming and ideation for environmentally sustainable business ideas ▪ Create business pitch-decks outlining proposed ventures	Brainstorming tools, Presentation tools (e.g., PowerPoint, Canva)
12 & 13	▪ Present developed business plans and handle Q&A from peers ▪ Distribute survey forms and conduct interviews for feedback ▪ Align presentations with research and sustainable practices	Presentation tools (e.g., PowerPoint, Canva), Microsoft Forms

After designing the sessions, the researcher prepared the evaluation tools using online survey forms, observation and interview guidelines. In the 'Develop' phase, project-based teaching activities were turned into e-learning resources for the English for Business course. The training materials were carefully crafted to fit the project-based approach and environmental awareness, drawing upon the specified objectives. The products were designed to promote student participation, critical thinking, and virtual collaboration; this is based on the idea that effective instructional materials should combine pedagogical goals with digital learning landscapes to provide accessibility and navigation, as affirmed by Marwan (2015). Multimedia, graphics, and relevant visual aids were used to create an immersive and dynamic learning environment to improve student comprehension and engagement, stated by Nicolau et al. (2019).

During the 'Implement' phase, the English for Business course's virtual classrooms featured carefully crafted project-based teaching activities and instructional resources. These materials were integrated into the e-learning environment with a focus on technological compatibility, efficient delivery, and pedagogical efficacy. The project-based learning involved students in planning and presenting "green business" ideas while evaluating their environmental research. Students learned about real-world environmental issues using video content in sessions 8 and 9, also their independent research. In sessions 10 and 11, students worked in groups to create business pitch-decks using brainstorming and presentation software. This improved their collaboration and allowed them to apply their findings to real-world situations, enhancing experiential learning. In sessions 12 and 13, students presented

their green business using PowerPoint or Canva. This phase fostered engagement and involvement as students asked questions and gave comments. Lastly, Microsoft Forms helped collect survey data to evaluate project-based education and environmental awareness integration, along with class observation and interview results. Figure 1 shows samples of students' brainstorming activities using online tools and some of students' presentations.

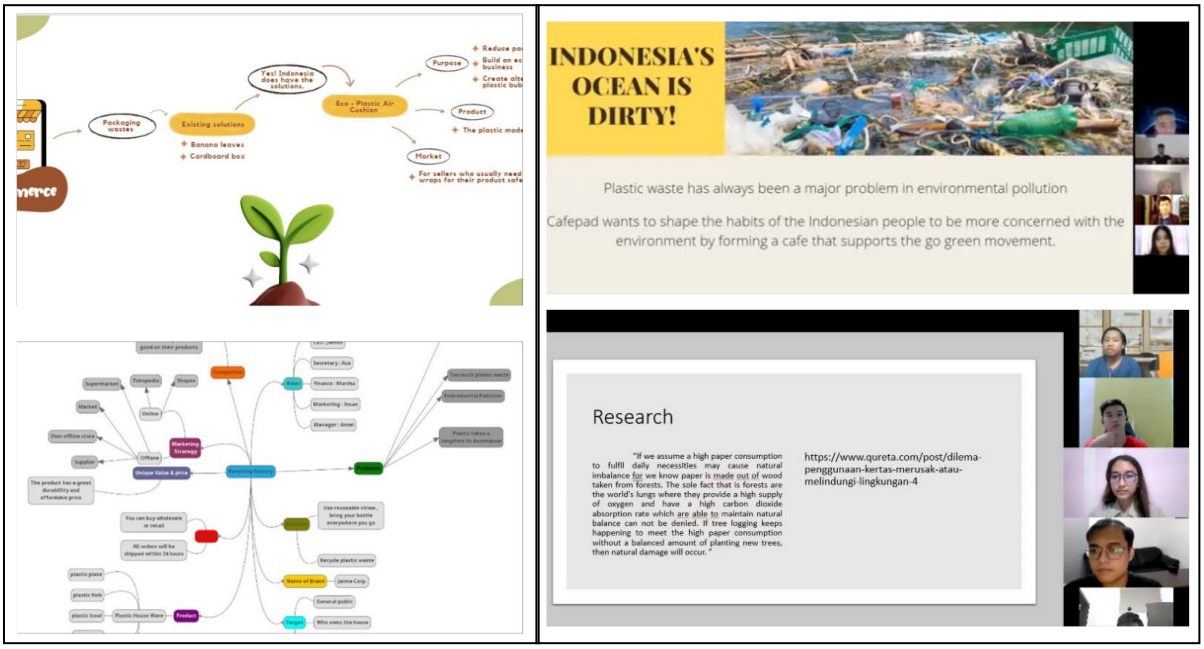


Figure 1. Students' Activity Sample

A complete evaluation determined the success of project-based learning activities with environmental awareness. Mixed methods were used to obtain qualitative and quantitative data to comprehend the results. The evaluation reviewed whether the 'Design' and 'Development' goals were met, particularly in boosting learner engagement and environmental awareness. Qualitative data from session observations and interviews examined learner engagement and activity efficacy. Student participation, discussion quality, and passion during 'green business' ideation and presentation were monitored. To evaluate students' project participation and learning, individual interviews were conducted. Quantitative data to measure before and after the intervention was obtained through a survey.

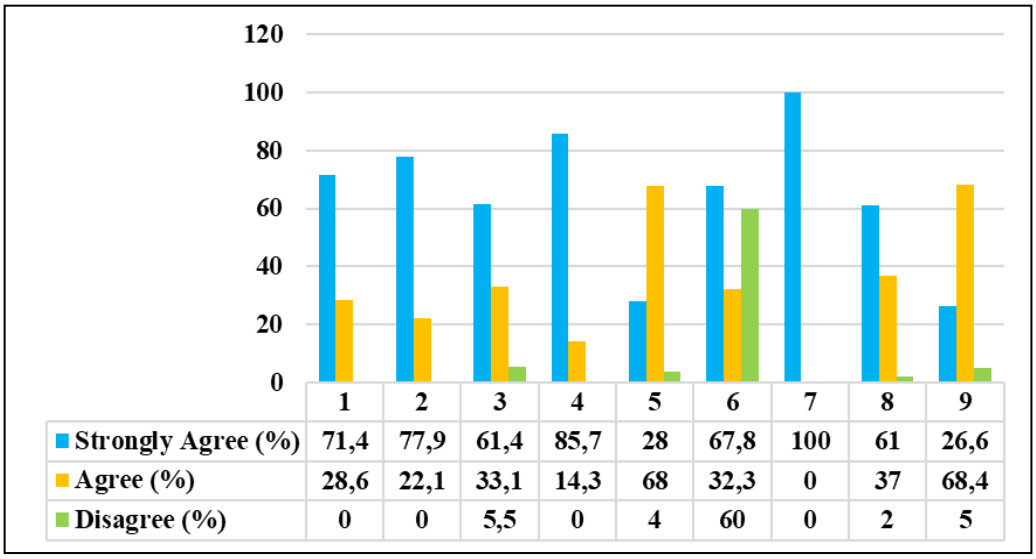
3.1 Observation Results

The incorporation of the 'green business' topic as an intervention has resulted in a significant improvement in student involvement and active participation during virtual meetings. The researchers sought to generate interest and offer students a relevant context by introducing the idea of 'green business'. The data collected from our observations indicates a notable change in the dynamics of virtual meetings, as students demonstrate increased levels of interest and active engagement. The conducted sessions resulted in increased levels of engagement, insightful inputs, and a noticeable enthusiasm to delve into interconnected ideas. Our research findings support the notion that integrating meaningful and interesting subjects can enhance involvement and engagement in online learning environment, as described by Tsai et al. (2020).

3.2 Survey Results

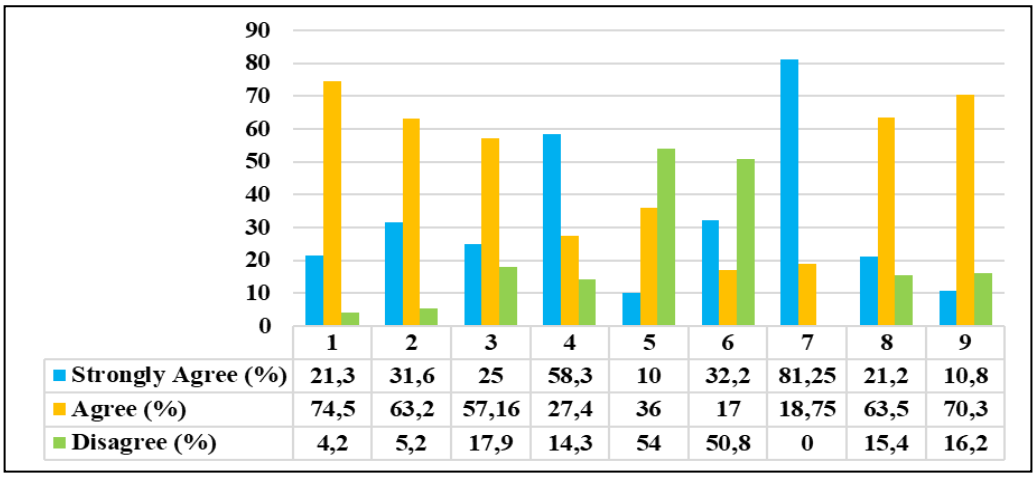
The data presented illustrates the variations in students' levels of agreement with specific assertions prior to and following the intervention. The data is systematically categorized based on class (class 1 to class 9) and is presented in the form of percentages, reflecting

the level of agreement or disagreement among pupils in relation to specific claims. Figure 2 displays the results of before intervention, while Figure 3 illustrates the results of after intervention.



	1	2	3	4	5	6	7	8	9
Strongly Agree (%)	71,4	77,9	61,4	85,7	28	67,8	100	61	26,6
Agree (%)	28,6	22,1	33,1	14,3	68	32,3	0	37	68,4
Disagree (%)	0	0	5,5	0	4	60	0	2	5

Figure 2. Students' Responses Before Intervention



	1	2	3	4	5	6	7	8	9
Strongly Agree (%)	21,3	31,6	25	58,3	10	32,2	81,25	21,2	10,8
Agree (%)	74,5	63,2	57,16	27,4	36	17	18,75	63,5	70,3
Disagree (%)	4,2	5,2	17,9	14,3	54	50,8	0	15,4	16,2

Figure 3. Students' Responses After Intervention

Prior to the implementation of the intervention, the data indicated that within Class 1, 21.3% of participants strongly agreed, 74.5% agreed, and 4.2% disagreed with the provided statements. In Class 2, a significant proportion of 31.6% strongly agreed, while a majority of 63.2% agreed, and a small percentage of 5.2% expressed disagreement. The aforementioned pattern persisted in other courses, with varying levels of agreement and disagreement. Following the implementation of the intervention, it was observed that in Class 1, there was a significant rise in the proportion of students who expressed strong agreement (71.4%), whereas the percentage of students who expressed agreement declined (28.6%). There was a unanimous consensus among the students. Likewise, within the context of Class 2, there was a notable increase of strong agreement (77.9%), accompanied by a drop in agreement (22.1%), while no instances of disagreement were observed.

The aforementioned trend persisted in other courses, with diverse fluctuations in the proportions of agreement and dissent. In general, the intervention appears to yield a favorable impact on the levels of agreement among students. The overall number of students who

expressed a strong agreement exhibited a notable rise across the majority of courses. Although there may be instances of deviation (such as in Class 6, where a notable rise in disagreement was observed following the intervention), the overall pattern indicates a positive shift in students' attitudes towards the assertions. The data demonstrates the capacity of the intervention to effectively impact students' viewpoints and perceptions in many academic disciplines.

3.3 Interview Results

The data employed in this study consists of responses obtained via interviews. Among a randomly selected group of 30 interviewees, it was found that 20 individuals had prior knowledge of environmental problems as well as familiarity with the idea of sustainability. The members of this group demonstrated a strong understanding of topics such as climate change, global warming, ecological degradation, and concerns for future generations. The research project assigned to the students significantly contributed to enhancing their understanding of the impact of industries on environmental degradation and the insufficient efforts made to promote sustainability. A considerable number of students gained new perspectives on the negative effects of the current environmental policies. The students' involvement in green business research has encouraged them to be aspiring entrepreneurs and to develop creative solutions to various environmental issues while also ensuring profitability in their business pursuits.

This study attempted a comprehensive examination of the efficacy of an intervention centred on the topic of 'green business' within the context of online education. The initial phase of analysis revealed a lack of active participation among students during online sessions, which was corroborated by their minimal involvement in face-to-face interactions. These findings are consistent with prior research highlighting the challenges of online learning environments by Tarrayo et al. (2023), Kebritchi et al. (2017), Halim et al. (2021), and Coman (2020). Recognizing the need for a significant change, the study moved on to the 'Design' phase, meticulously mapping sessions to incorporate the intervention, which consisted of incorporating 'green business' elements into instructional design. The subsequent 'Develop' phase enabled the transformation of project-based teaching activities into e-learning resources, ensuring the project's objectives were met. During the 'Implement' phase, these resources were incorporated into virtual classrooms to promote student collaboration, critical thinking, and experiential learning. The culmination of the study's findings demonstrates the positive outcomes achieved through the intervention, which manifested in increased participation and engagement during online meetings, ultimately demonstrating the potential of project-based learning combined with environmental consciousness to enhance the online learning experience.

4. Conclusion

The incorporation of 'green business' as an intervention has proved to be instrumental in increasing student engagement and participation in virtual meetings. The intervention altered the dynamics of virtual interactions, as students displayed greater enthusiasm, engagement, and active participation. The results of a survey depicted the change in students' agreement levels, demonstrating the intervention's positive impact across all classes. The findings not only demonstrate the importance of meaningful subject integration, but also the potential of well-designed interventions to increase student engagement and participation in an online learning environment. These results are consistent with the broader literature on the challenges of online learning and highlight the need for innovative approaches to encourage active student participation and meaningful interactions. In addition, the qualitative information gleaned from interview responses demonstrated the transformative impact of the

research endeavours. Significant numbers of students demonstrated a heightened awareness of environmental issues and sustainability concepts, demonstrating a better comprehension of the relationship between industries and environmental degradation. The intervention encouraged students to approach their roles as prospective entrepreneurs and leaders by emphasizing the development of eco-friendly, profit-maximizing solutions. This study demonstrates, through meticulous design, development, and implementation, the capacity of instructional interventions to produce positive changes in students' engagement, participation, and comprehension in an online learning environment. The findings contribute to a greater understanding of how well-designed interventions can transform the learning experience and increase student engagement in virtual education settings.

The research findings have substantial implications for both educational practice and future research endeavours. The efficacy of the intervention in augmenting student engagement and participation during virtual meetings highlights the capacity of purposefully incorporating pertinent and significant subjects into instructional design. This implies that educators should contemplate making adjustments to the curriculum that give precedence to experiential learning and integrate real-world circumstances in order to enhance the virtual learning experience. Nevertheless, it is crucial to recognize the constraints inherent in this research, including its narrow scope on a certain subject matter and the restricted size of the sample. Although the intervention had favourable results, its efficacy may change across various academic disciplines or when implemented with bigger and more heterogeneous student cohorts. Furthermore, the study predominantly relied on data obtained through self-reported surveys and qualitative observations, indicating the need for care when attempting to apply the findings to a broader population. Future studies might investigate the intervention's impact's long-term sustainability, assess its application across disciplines, and make use of larger and more varied sample sizes. Further investigation into the interaction between different components of instructional design and their influence on student engagement would contribute to a more comprehensive comprehension of effective approaches in online learning.

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