



Research Article Advances in Public Health, Community and Tropical Medicine EDIVF-153
(ISSN: 2691-8803)
Special Issue: Educational Development in Various Fields

Green Digital Pedagogy in EFL Teaching: AI, Sustainability, and Language Learning in High Schools in Elbasan, Albania

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Received Date: August 17, 2026; **Accepted Date:** September 16, 2026; **Published Date:** September 28, 2026;

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Abstract

In this study, we investigate how green digital pedagogy can be implemented in English as a Foreign Language in high school in Elbasan, Albania. It is about artificial intelligence, technology, and sustainability-oriented language teaching as an integrated tool to enhance the environment learning and environmental awareness.

The research is based on an empirical case study with 240 students in high school in Elbasan. It reviews AI-driven feedback, online quizzes, cooperative learning platforms, digital storytelling and eco-green project-based activities. It aims to assess the impact on students' motivation, language development and knowledge of sustainable development.

EFL classrooms can teach more than language education. They can also assist students with digital literacy, environmental awareness, critical thinking and responsible citizenship. In the case study, students wrote short essays on green schools, prepared digital presentations on environmental challenges in Elbasan, completed online vocabulary quizzes on sustainability, and used AI tools to receive formative feedback on writing tasks. These activities encouraged students to use English to communicate in their everyday lives and to raise local and global ecological issues.

The results suggest green digital pedagogy may improve classroom engagement, vocabulary development and writing skills, and increase participation in speaking and collaborative activities. The study also cites issues of unequal access to

devices, different levels of digital competence, ethical use of AI, and the need for clear assessment rubrics.

The paper argues that AI, digital tools and sustainability topics can be used to make EFL learning more interactive, inclusive, and future-oriented.

Keywords: Green digital pedagogy, EFL teaching, artificial intelligence and sustainability.

Introduction

In recent years, the education system has been challenged by two phenomena: the rapid growth in digital technology and the urgent need for sustainable development. The two are linked with English as a foreign language (EFL) teaching because we need to teach our students not just an international language in schools but also how to be part of global discussions about science, innovation, environmental responsibility, digital citizenship and social change [1], [2]. In this context, EFL learning needs to move from grammar, vocabulary, and textbook-based communication to opportunities where students think critically and learn meaning, work together and use English in a social way. In this paper, we focus on green digital pedagogy in high school EFL teaching in Elbasan, Albania. Green digital pedagogy is considered in this study to be a whole system of teaching with digital tools, artificial intelligence, online collaboration, formative feedback and sustainability-oriented language work. The green approach is green because it promotes environmental sensitivity and reduces paper-based classroom practices; digital because it provides technology to

enable communication and revision, assessment and project learning; pedagogical because the technology is not an isolated tool, but part of a learning process as part of a plan. So digital learning at school is so important in Albanian secondary education as students are so much more exposed to digital media, online communication and AI-enabled tools outside the classroom and schools need to teach digital skills (thinking and creativity and citizenship), critical thinking and empathy and to be responsible citizens. The European Digital Education Action Plan 2021-2027 highlights the need for good quality, inclusive and accessible digital education and digital skills and competences for all students as well. The research report also covers a case of 240 students from the 10th and 11th grades in high schools in Elbasan. Students engaged in EFL activities that connected English learning with sustainability issues such as green schools, recycling, pollution in Elbasan, sustainable transport, energy conservation and responsible use. They wrote short essays and worked on online vocabulary quizzes, made digital presentations, worked in groups and used AI tools to get formative feedback on writing requirements. English was a medium of interaction, reflection and problem solving. This study is significant because it is a way to connect three aspects of education: language development, digital innovation and sustainability education. First, we want to see if AI-based feedback and digital platforms can support motivation, vocabulary acquisition, writing skills, confidence and autonomy for learners. Second, it explores how sustainability-based content can make EFL lessons relevant to students' local environment by linking English to student-centered learning and local context. Third, it mentions practical and ethical issues: lack of access to the right devices and varying levels of digital competence, responsible use of AI and the need for defined assessment rubrics. In this way, green digital pedagogy can turn EFL classrooms into learning grounds where students not only learn English but use English to engage, discuss and respond to real-life ecological and social challenges.

The study has four explicit objectives: (1) to examine how AI-supported feedback and digital tools are associated with students' motivation and EFL development; (2) to explore how sustainability-oriented content supports vocabulary, writing, speaking, and environmental awareness; (3) to examine students' perceptions of AI-supported formative feedback and responsible AI use; and (4) to identify practical challenges related to access, digital competence, assessment, and classroom implementation. These objectives guide the research questions and the interpretation of the case-study findings.

Literature review

Digital pedagogy and EFL learning.

Digital pedagogy in language education has evolved from being a tool to being a key ingredient in an education process which is developing input and interaction, practice and feedback to students. Digital tools in EFL classrooms allow for communication, differentiated learning, collaborative writing, multimedia production, vocabulary practice and access to the true English language materials. Online quizzes, shared

documents, learning platforms, videos and digital storytelling tools and presentation software can help students to make learning more interactive and student-centered. But digital pedagogy is more than technology in education. As a resource it can only be pedagogically relevant if it is relevant to students' learning goals, provides meaningful communication and gets them thinking at higher levels. For this reason, digital tools should be implemented into lesson design, assessment criteria and classroom interaction. In Elbasan high schools, digital pedagogy is more relevant when it is connected with issues like environmental protection, waste management, green spaces, responsible consumption, sustainable urban life. Digital tools are good for learning real language and output in EFL learners. Students are able to read online texts, watch videos, create digital posters, make oral presentations, collaborate on projects and revise written work in the classroom based on feedback from teachers. These are reading, writing, listening and speaking and all the above are activities that help to develop self-confidence and creativity for our students to work together.

Artificial intelligence and formative feedback in EFL

Artificial intelligence has opened up new possibilities in EFL teaching and learning, especially in formative assessment. AI-supported tools can provide immediate comments on grammar, vocabulary, sentence structure, coherence, organization and clarity. Writing in a foreign language is often difficult and teachers may not have time to give individual feedback to each learner within school hours. Recent research on generative AI in education shows that AI can support personalized learning, complex feedback, and new forms of assessment but it does require careful pedagogical design and ethical guidance [4]. AI can also support the writing of an EFL document to revise the drafts, look for grammatical errors, compare different expressions and build confidence. AI feedback should not substitute for the teacher or learner's work. It can be used as a tool for editing, reviewing and reflecting. UNESCO's guidance on generative AI in education and research calls for a human-centered approach and underscores that human agency, privacy, equity, inclusion and pedagogical quality should be protected. In the EFL classroom, that means students should be given instructions about how to use AI responsibly. They should learn to ask for feedback, evaluate suggestions, reject incorrect corrections, cite or acknowledge support if needed, and avoid copying AI-generated texts as their own work.

In the present study, AI-supported teaching is connected to both language learning and sustainability because AI feedback is applied to students' English work on environmental topics. At the language level, students use feedback to notice and revise grammar, vocabulary, sentence organization, and clarity. At the sustainability

level, the same revision process is embedded in tasks on green schools, pollution, recycling, energy saving, and sustainable transport. AI therefore functions as a formative support within sustainability-oriented communication rather than as a separate activity, while the teacher remains responsible for guiding students in evaluating suggestions and maintaining academic integrity.

Education for sustainable development in language learning

ESD (Education for Sustainable Development) requires students to understand global and local issues and to take responsible actions. UNESCO's ESD for 2030 Roadmap highlights education as a key component of making the world a more just and sustainable place in policy, learning spaces, educators, young people, and community development [1]. They are relevant for EFL learning as they are natural and accessible to students in language classrooms: reading, writing, speaking, debating, and giving ideas on the real world. Sustainability topics have a lot of content to teach communication in language. Students can talk about climate change, pollution, recycling, green schools, biodiversity, sustainable transport, energy saving, and responsible consumption. These topics work as language learning relates to real-life problems. In Elbasan, environmental issues can be linked to the local reality such as air pollution, waste management, school recycling, green spaces, and community responsibility.

Green digital pedagogy as an integrated approach

Green digital pedagogy brings together digital learning with sustainability education. It promotes teachers to leverage technology and to promote learning and to raise environmental awareness in order to avoid the need to write. In practice, this may be digital worksheets, online quizzes, electronic portfolios, collaborative documents, digital posters, multimedia presentations, AI-assisted writing feedback, and digital storytelling. It is also relevant to EFL learning, seeing as English is a worldwide language for dealing with scientific, environmental, and technological problems. Through green digital pedagogy, students acquire vocabulary around sustainability, practice speaking in debates and presentations, and develop writing skills through essay and report writing, and learn digital skills online. Students can also benefit from this approach as they are more

involved in creative learning and problem solving and can also effectively present their ideas.

Within this case study, green digital pedagogy is operationalized as the purposeful integration of sustainability-related EFL content, digital learning tools, collaborative work, and teacher-mediated AI feedback. It is applied through online vocabulary quizzes, digital presentations and storytelling, collaborative projects, and AI-supported revision of student writing. The 'green' dimension refers to the environmental focus of the learning tasks and the reduced dependence on paper-based activities, while the 'digital' dimension refers to the tools used for practice, feedback, collaboration, and presentation. The pedagogical dimension lies in aligning these tools and topics with specific language-learning goals rather than using technology as an isolated classroom addition.

Challenges in implementation

But green digital pedagogy, however, could be very hard to do. Digital devices and stable internet access are not the same for all students. Some students may have smartphones and laptop access while others may have no smartphones at all and the internet is always down. This can also lead to a difference in participation and learning. Digital competence of teachers is also a problem. When it comes to digital tools, teachers need to not only be trained in the use of digital tools to teach, but also to be able to get them to fit in effectively and meaningfully at the core of the lesson objectives and assessment and classroom interaction. Digital tools can be a superficial addition to students' classroom learning in the absence of careful planning or are not effective tools to teach. The third challenge is ethical use of AI. AI-based content can't replace ideas or writing from the creators of the content. They need advice on how to use AI wisely and ethically; how to check facts, how to revise rather than copy, as well as how to maintain academic honesty. Finally, assessment is hard in digital and project-based EFL learning. Teachers need to develop rubrics to assess language performance and project quality.

Research methodology

Research design

This study was a case study research design using a mixed-method approach to study the integration of green digital pedagogy into EFL classrooms in high schools in

Elbasan, Albania. The mixed-method approach was chosen because it focused on the learning characteristics and classroom experience in this study. Quantitative data were used to identify general tendencies in students' perceptions and language development and qualitative data were used in terms of classroom interaction, teachers' participation and project performance of students. The participants were 240 students in the 10th and 11th grades in high schools in Elbasan, Albania. They were all EFL learners with varying levels of English proficiency from A2 to B1 according to the Common European Framework of Reference for Languages [12]. Male and female students were included. These grade levels were chosen because students are now able to talk about social and environmental issues in English, work together on digital projects, and use online tools for writing, presentations and learning tasks. A smaller number of EFL teachers were also included through classroom observation and informal interviews and their participation disclosed opportunities and challenges in green digital pedagogy in practice. This study used a case study research design with a mixed-method approach to explore the integration of green digital pedagogy into EFL classrooms in high schools in Elbasan, Albania. The mixed-method approach was chosen since the study was based on both learning indicators and classroom experiences. The quantitative data were used to identify general tendencies in students' perceptions and language development, while the qualitative data were used to interpret classroom engagement, collaboration, teacher observations and student project performance.

Participants

There were 240 students in the 10th and 11th grades of high schools in Elbasan, Albania. They were EFL students with diverse English language skills (A2 - B1) according to the Common European Framework of Reference for Languages [12]. There were male and female students. These grade levels were chosen because students can talk about social and environmental issues in English, work together on digital projects and use online resources to write, present and learn. There were also a few EFL teachers who were observed in the classroom and interviewed. They demonstrated practical challenges and opportunities of implementing green digital pedagogy in real classroom practice.

The study focuses on regular EFL classes in high schools in Elbasan rather than on comparisons between

individual schools. The participant characteristics used in the analysis are therefore grade level (10th and 11th grades), English proficiency (A2-B1), and participation in the green digital activities. Both male and female students were included. The smaller group of EFL teachers contributed contextual evidence through classroom observation and informal interviews; their participation was used to identify implementation opportunities and challenges rather than as a separate quantitative sample.

Research goals

To investigate how AI-based feedback and digital tools affect students' learning in EFL; how sustainability topics impact students' motivation in the classroom; how students' attitudes towards green digital activities affect students' motivation; what are the main challenges teachers and students face in EFL teaching and how does green digital pedagogy support language development and sustainability awareness? The research responds to the following research questions: How do AI-supported and digital tools affect students' motivation in EFL classrooms? How does sustainability education impact vocabulary, writing and speaking skills? How do students understand how AI feedback in English writing tasks impacts them? What are the challenges with green digital pedagogy? How do EFL classrooms in Elbasan balance language learning and sustainable development at the same time?

Instruments for data collection

Four instruments were used to collect data: a student questionnaire, classroom observation, student project analysis and teacher interviews. The student questionnaire contained closed-ended Likert-scale statements and open-ended questions. It covered motivation, digital tools, language skills, sustainability awareness and challenges of internet access, devices and AI use. In some of the EFL lessons, students showed digital skills and sustainability-oriented activities in the classroom during class. Student engagement, English language use, collaboration, digital competence as well as sustainability awareness were noted in the observation notes. Students' projects were scored on a rubric, focusing on vocabulary use, grammar accuracy, content relevance, creativity, collaboration and speaking skills, and more. Teacher interviews explored the use of AI feedback, student motivation, technology access, teacher

confidence and sustainability in education, training and motivation.

Procedure

The study was conducted in regular EFL classes. Students were introduced to green digital pedagogy and responsible AI use from the beginning. The teacher explained that AI tools should be used for feedback and revision, not to replace students' writing. This was followed by vocabulary work, short readings, online quizzes, short essays, AI-supported revision, collaborative planning, and digital project presentations. The process was organized in five stages: sustainability-related EFL topics and digital tools; green digital activities were implemented; group work, qualitative work based on questionnaires, observation, project rubrics, teacher interviews, and analysis of the data using descriptive statistics and thematic analysis.

Data analysis

The quantitative data were analyzed using descriptive statistics (percentages, frequency counts). The questionnaire responses were grouped into the main areas of motivation, AI feedback, online quizzes, digital presentations, language skills, sustainability awareness, and challenges with implementation. Pre- and post-activity language indicators were compared to identify changes in writing accuracy, vocabulary use, speaking confidence, grammar accuracy, and learner autonomy. The qualitative data from open-ended questionnaire responses, classroom observations, projects, and teacher interviews were analyzed thematically. The key themes were increased motivation, language improvement, sustainability awareness, digital confidence, ethical AI concerns, and access challenges.

Ethical considerations and limitations

The study adhered to basic ethical principles in educational research. Students were made aware that the activities were being done for learning and research purposes. Their responses were treated with confidence and no personal names were used in the analysis. Ethics in AI was addressed. Student feedback was provided to AI: to help them enhance their vocabulary and revise, not to copy full answers. The study has limitations. It was done in high schools in Elbasan and so does not reflect the experiences of all Albanian EFL classrooms. The focus was mainly on how students perceived the classroom

environment and project performance and not on language achievement in the long term. The technology is not available to all students and the quality of AI-supported learning was dependent on the guidance of the teacher and students' digital capabilities.

Results

The results suggest that green digital pedagogy is a positive factor towards students' engagement, motivation and language use in EFL lessons. Students were more motivated in tasks that linked English to real-world environmental problems if the tasks asked them to build digital products, work in a group and present solutions to school or local community. The results are organized into five major areas: motivation and engagement, language development, AI-supported writing feedback, sustainability awareness and implementation issues.

Most students felt digital and sustainability-based activities were more motivating than traditional textbook-only tasks. Most students said online quizzes brought vocabulary learning to life and digital presentations helped them become more confident in English. This was also reflected in the classroom: Students seemed to be more engaged when they had a project to work on, such as green schools, pollution in Elbasan, recycling and sustainable transport. AI-supported feedback was also appreciated. Students said AI comments helped them identify grammar mistakes, improve word choice and revise sentences. But students still needed to be guided by the teacher on what AI suggestions were helpful and which needed to be checked. The teacher was still in charge of the feedback, correcting mistakes and ensuring students that AI supports revision and not replaces them with their own writing.

The project results also showed vocabulary and content organization to be improved. Students used sustainability-related vocabulary such as recycling, pollution, energy saving, sustainable transport, green school, waste reduction, climate action, and responsible consumption. Students who created digital materials and worked in groups before they presented in oral presentations were more confident in their presentations.

Language pre- and post-activity indicators showed improvement across all measures. Writing accuracy was up from 6.4 to 7.8, vocabulary use from 6.7 to 8.0, speaking confidence increased from 6.1 to 7.5, grammar accuracy increased from 6.5 to 7.9 and learner autonomy

improved from 6.2 to 7.7. These results indicate that digital tools, AI feedback and sustainability topics can be used to ensure language performance and independent learning.

Qualitative results supported quantitative results. The students said sustainability topics made English lessons meaningful because they could address issues they had seen in their own city and school. There was peer support for group work and digital presentations helped students organize ideas visually before speaking. Teachers found that students were more willing to participate when the task had a practical purpose and a visible final product. But the results also presented several challenges. The basic problem was unequal access to devices and internet connection. In many instances, students could do digital work well, but others had to share devices or do some of the work at school.

Also, the digital competence of students was a challenge. Some students were confident with online tools on a one-on-one basis and others had to work on it in steps. And ethical use of AI was also an issue as some students were initially expecting AI to produce complete answers. Teacher guidance and clear rubrics helped alleviate that problem. The results suggest, in general, that green digital pedagogy is also a great way to make EFL learning more interactive and inclusive and future-oriented if planned properly. Digital tools were most effective in terms of putting language goals in alignment with sustainability content, group work and teacher-driven feedback.

Practical implications for EFL teachers and high-school education

For EFL teachers, the findings suggest that sustainability topics can be incorporated directly into vocabulary, writing, speaking, and project-based tasks rather than treated as an additional subject. AI-supported feedback can be used primarily during revision, with students comparing suggestions with their own drafts and retaining responsibility for the final text. Online quizzes and digital presentations can support formative assessment, vocabulary practice, collaboration, and speaking preparation. Clear rubrics can combine language criteria with content relevance, creativity, collaboration, and environmental awareness. Where access to devices is unequal, group work and school-based sharing can help maintain participation.

At the high-school level, implementation requires practical teacher support in digital pedagogy, responsible AI use, online assessment, and rubric design. The approach can be integrated gradually within regular EFL teaching because the same activity can address language objectives while connecting English to local sustainability issues. The findings therefore emphasize purposeful technology use: digital tools are most useful when they are selected for a clear language-learning goal, linked to meaningful sustainability content, and mediated by the teacher.

Conclusions and recommendations

In this paper, we have examined green digital pedagogy for EFL teachers in high schools in Elbasan, Albania. It showed that AI-backed feedback, digital tools, online quizzes, collaborative platforms, digital storytelling, and sustainability-based project work can improve motivation, classroom engagement, vocabulary development, writing skills, speaking confidence, and learner autonomy in EFL courses. It also showed that EFL classrooms can be places where students can engage in real-world environmental issues and build digital and civic skills in English.

The research shows that sustainability topics make English content relevant because they relate the students' context and global reality to the classroom language environment and so students write about green schools, discuss pollution in Elbasan, complete quizzes on environmental vocabulary, and talk about sustainable lifestyles in English. This makes EFL education a human sciences area where communication is promoted, critical thinking and social responsibility are promoted, and citizenship is encouraged.

AI feedback was a valuable tool for writing revision, but it was mediated by teachers. The students received immediate feedback on grammar, vocabulary, and organization but needed guidance to critically examine the AI suggestions. AI should be used as a learning aid, not a substitute for teacher feedback, student effort, or independent thinking. Such clear guidelines on responsible AI use are needed for academic integrity and critical AI literacy development.

The study also examined practical challenges. Obviously, the lack of device connections and internet access, low digital literacy of students and teachers, and the lack of ethical AI use are obstacles to green digital

pedagogy. But these limitations do not reduce the value of the approach and highlight how the implementation should be planned and supported by the institution.

In addition to the limitations already identified, the findings should be interpreted as context-specific case-study evidence. Because the analysis relies mainly on descriptive statistics, student perceptions, classroom observations, project performance, and teacher interviews, it does not establish causal effects in the same way as a controlled experimental design. The study also does not determine whether the observed improvements are maintained over time or whether the same patterns would occur in other Albanian regions, school contexts, or proficiency groups. Future research could include comparison or control groups, longitudinal follow-up, larger and more geographically diverse samples, and inferential statistical analysis. Further studies could also compare specific AI-feedback strategies and examine their effects on writing quality, critical AI literacy, and sustainability awareness.

So far, there are some thoughts based on the findings. For the first, EFL teachers need to incorporate sustainability topics into the communicative tasks, writing assignments, vocabulary, and project-based learning. Second, AI tools must be used in formative lessons, revision, vocabulary support, and reflective practice, with guidance on responsible use. Third, schools should offer practical teacher training on digital pedagogy, AI-based feedback, online assessment, and project rubrics. Fourth, teachers should plan inclusive activities in which students with limited device access are able to take part using group work and school-based digital support. Fifth, assessment rubrics should be designed to measure the language performance and sustainability-related content, vocabulary, grammar, creativity, collaboration, speaking skills, and environmental awareness.

The main contribution of the study is to bring together three dimensions that are often discussed separately in EFL education: language development, digital and AI-supported formative learning, and education for sustainable development. By examining these dimensions through classroom activities with high-school learners in Elbasan, the study offers a context-specific model in which English functions both as a learning goal and as a medium for digital, environmental, and civic engagement. Its contribution therefore lies not in the use of technology

alone, but in the pedagogically structured combination of AI feedback, collaborative digital production, and sustainability-oriented communication in EFL teaching.

So green digital pedagogy is a promising direction for EFL in Albanian secondary education. It facilitates language learning, but it also prepares students to face a digital and sustainable future. If it's structured, ethical, and inclusive, and well-managed, English lessons will be interactive, meaningful, and connected to the future needs of learners. We declare that it's an original work and not already published as it is not yet published elsewhere. All sources have been acknowledged and cited, and any AI-assisted tools used in the text were used only for language editing and did not replace the authors' intellectual work.

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Citation: Doçi J (2026) Green Digital Pedagogy in EFL Teaching: AI, Sustainability, and Language Learning in High Schools in Elbasan, Albania. Educational Development in Various Fields: EDIVF-153.