ÑEMITỸRÃ, Vol. 8, Núm. 1 – ABRIL 2026
Revista Multilingüe de Lengua, Sociedad y Educación

ISSN (en línea): 2707-1642
ISSN (impreso): 2707-1634

Tipo: Articulo original
Dosiser: Real Issues in Real English Classrooms - Problemáticas reales en aulas reales de enseñanza del Inglés

Sustainability, Agency, and Language Learning: Integrating Tinkercad and the SDGs in Primary EFL

Sostenibilidad, Agencia y Aprendizaje del Idioma: Integrando Tinkercad y los ODS en la enseñanza del inglés en la educación primaria

Marcela Danowski
ISFD Pedro Poveda and ISFD St. Trinnean's, Buenos Aires, Argentina.
https://orcid.org/0009-0003-2315-7879
marceladanowski@gmail.com

Recibido: 30/7/2025
Aprobado: 1/12/2025

ABSTRACT
This article presents a classroom-based innovation implemented in a real primary EFL context in Buenos Aires, Argentina. The project integrated the United Nations Sustainable Development Goals (SDGs), Tinkercad, visual thinking strategies, and collaborative design thinking to address the dual challenge of promoting meaningful English language use and global citizenship. The bilingual students in their final year of primary education worked in small groups to investigate different sustainability issues, chose one SDG, and collaboratively designed a 3D-printed prototype of a solution using Tinkercad. Visual thinking strategies were employed to help students analyze, connect with, and represent each of the selected goals. These visual tools supported comprehension, reflection, and communication throughout the project. This interdisciplinary initiative created authentic opportunities for learners to use English for inquiry, creativity, and problem-solving. Students developed their linguistic skills across all four macro skills while also fostering agency, empathy, and teamwork. The methodology combined project-based learning (PBL), digital literacy development, visual thinking, and socioemotional learning. The article describes the design, implementation, and impact of the project through classroom observations, students' reflections, and teacher insights. Findings reveal increased motivation, deeper engagement with global issues, and improved ability to use English in real-life contexts. The article concludes by discussing how sustainability-focused innovation and simple digital tools can transform English classrooms, especially in under-resourced settings.

Keywords: project-based learning, student agency, sustainability, Tinkercad, interdisciplinary learning, digital literacy

RESUMEN
Este artículo presenta una innovación pedagógica implementada en una escuela primaria de la provincia de Buenos Aires, Argentina, en el contexto del aprendizaje del inglés como lengua extranjera. El proyecto integró los Objetivos de Desarrollo Sostenible (ODS) de Naciones Unidas, Tinkercad, estrategias de pensamiento visual y el pensamiento de diseño colaborativo con el fin de fomentar el uso significativo del idioma inglés y el compromiso con la ciudadanía global. Los alumnos bilingües trabajaron en grupos para investigar sobre diferentes problemáticas ambientales y sociales, seleccionar un ODS y diseñar prototipos en 3D usando la aplicación Tinkercad. Se utilizaron estrategias de pensamiento visual para analizar, representar y conectar con cada uno de los ODS seleccionados. Estas herramientas visuales facilitaron la comprensión, la reflexión y la comunicación durante todo el proceso. El proyecto generó oportunidades auténticas para emplear el idioma inglés en actividades de indagación, creatividad y resolución de problemas, desarrollando al mismo tiempo la agencia, la empatía y el trabajo en equipo. La metodología empleada combinó el trabajo en proyectos (ABP), alfabetización digital, pensamiento visual y aprendizaje socioemocional. Este artículo describe el diseño, la implementación y el impacto

Conflictos de Interés: ninguno que declarar
Fuente de financiamiento: sin fuente de financiamiento.
DOI: https://doi.org/10.47133/NEMITYRA20260801b-A8
BIBLID: 2707-1642, 8, 1, pp. 90-95
Editores responsables: Beatriz Erazo (https://orcid.org/0000-0002-8929-2825) y Araceli Salas (https://orcid.org/0000-0002-1092-3568).

de la propuesta mediante observaciones, reflexiones estudiantiles y la perspectiva docente. Los resultados evidencian mayor motivación, un compromiso más profundo con los problemas globales, y un uso del idioma inglés de manera más funcional y contextualizado. El artículo concluye reflexionando sobre el potencial de integrar sostenibilidad e innovación digital en las clases de inglés, incluso en contextos con recursos limitados.

Palabras clave: aprendizaje basado en proyectos, agencia estudiantil, sostenibilidad, Tinkercad, aprendizaje interdisciplinario, alfabetización digital

ESD in action

Our increasingly complex world demands pedagogical approaches that transcend disciplinary boundaries and foster global awareness. Education for Sustainable Development (ESD), as defined by UNESCO (2017), seeks not only to transmit knowledge but also to develop critical thinking, creativity, and responsible decision-making. Integrating ESD into English Language Teaching (ELT) can transform traditional classroom practices. Rather than focusing solely on grammatical structures or vocabulary, learners engage with real-world issues that require meaningful communication and higher-order thinking.

This article reports on a classroom project carried out with a sixth-grade bilingual class in Argentina. The project integrated English learning, digital literacy, and sustainability education through selected Sustainable Development Goals (SDGs). The students worked with Tinkercad, a free and accessible 3D design tool, and employed visual thinking strategies inspired by the work of Ritchhart, Church, and Morrison (2011). These strategies supported learners in understanding global challenges, expressing ideas visually and verbally, and developing solutions that reflected their personal and collective concerns.

The pedagogical design was grounded in principles of Neuropedagogy, particularly the work of Tokuhama-Espinosa (2014), which highlights the role of emotions, attention, and motivation in learning. In alignment with these principles, the project promoted student agency, provided meaningful and context-rich tasks, and incorporated hands-on tools to stimulate both cognitive and affective engagement. Additionally, the project drew on Project-Based Learning (PBL), following frameworks such as those suggested by Larmer, Mergendoller, and Boss (2015), in which students collaborate to investigate topics, develop prototypes, and present their learning to others.

A central component of the project involved the use of visual thinking strategies to introduce each SDG. Instead of beginning with textual descriptions, the learners examined compelling photographs, artwork, and infographics representing the issues underlying each goal. This process of careful observation enhanced comprehension, encouraged personal connections, and supported the acquisition of the language needed to describe, analyze, and evaluate the visual materials. As a result, students produced richer, more authentic language and demonstrated higher levels of engagement.

Following this visual exploration, the students worked in small groups to generate possible solutions and create 3D models using Tinkercad. For instance, one group focused on SDG 6 (Clean Water and Sanitation) and designed a portable water-purification device intended for rural communities. Another group selected SDG 2 (Zero Hunger) and developed a model of an urban smart greenhouse. These projects extended beyond mere technological manipulation; they allowed learners to demonstrate creativity, apply newly acquired vocabulary, and show their understanding of complex sustainability concepts (replacing *“tricky ideas”* with *“complex concepts”*).

The integration of Tinkercad supported multiple dimensions of learning. It strengthened spatial reasoning, digital competencies, and problem-solving skills. It also enhanced the

students' motivation to use English, as they were required to describe their prototypes, justify design decisions, and reflect on the potential impact of their solutions—all in the target language. This shift from receptive to productive language use positioned the learners as communicators, designers, and critical thinkers.

Research methodology

This study was conducted in a private bilingual school in Buenos Aires, Argentina, with a group of sixth-grade students aged 11–12. The institution promotes interdisciplinary project work and encourages the use of English across the curriculum. The instructional intervention lasted five weeks, with weekly 80-minute sessions designed to integrate English as a Foreign Language (EFL), selected Sustainable Development Goals (SDGs), and digital design tools.

Research design

A qualitative descriptive design was utilized to investigate learners' engagement with sustainability-related content via inquiry-based and project-based learning methodologies. The pedagogical sequence was informed by Neuropedagogy (Tokuhama-Espinosa, 2014), which guided the selection and ordering of activities to ensure emotional relevance, cognitive stimulation, and meaningful learning. Four SDGs were chosen as focal areas: SDG 2 (Zero Hunger), SDG 4 (Quality Education), SDG 5 (Gender Equality), and SDG 6 (Clean Water and Sanitation). Visual Thinking Strategies (VTS), drawing on the work of Ritchhart et al. (2011), were incorporated to support observation, interpretation, and discussion.

Procedures

At the beginning of each session, the participants were exposed to curated visual stimuli (photographs, infographics, and short video clips) aligned with the SDG selected for that week. These visual prompts served as elicitation tools to activate prior knowledge, generate inquiry, and stimulate English-language production.

Following the visual exploration, the students collaborated in small groups to investigate real-world challenges associated with their assigned SDG. They examined existing global initiatives and discussed potential areas for improvement or innovation. Tinkercad, a free 3D design platform, was then introduced as the technological medium through which each group would prototype a solution. A brief demonstration was provided, after which students engaged in exploratory use of the tool, negotiating design decisions and articulating their reasoning in English.

Throughout the project, participants maintained individual visual journals where they documented vocabulary, sketches, reflections, and emerging ideas. These journals served both as learning tools and as data sources for the research. The project culminated in a public exhibition, during which groups presented their prototypes, described their design processes, and articulated the relevance of their chosen SDG.

Data collection

Data were collected through multiple sources to allow for triangulation:

- Classroom observations documenting collaboration, engagement, and language use
- Student visual journals capturing individual learning processes

- Audio-recorded group discussions during inquiry and design phases
- Final presentations and prototypes, which served as evidence of conceptual, linguistic, and creative development
- Self-assessment checklists and peer feedback forms completed by students

Data analysis

The data were analyzed using thematic analysis. Observation notes, journal entries, and audio recordings were coded inductively to identify patterns related to language development, critical thinking, creativity, collaboration, and emotional engagement. Codes were then grouped into broader themes reflecting the aims of the instructional design and the research questions. The students' 3D prototypes and presentation materials were examined as complementary artifacts demonstrating conceptual understanding and communicative competence.

Ethical considerations

All procedures were conducted in accordance with institutional guidelines for research involving minors. Informed consent was obtained from parents or guardians, and all personal information was anonymized to ensure confidentiality.

Results

The project produced measurable educational and linguistic outcomes, as evidenced by classroom observations, students' visual journals, group discussions, and final presentations.

Linguistic outcomes

The students demonstrated increased engagement with English as a medium of communication. Observation notes indicated that learners frequently initiated conversations, asked questions, and explained ideas with greater elaboration than expected for their proficiency level. Audio recordings of group discussions showed an expanded use of vocabulary related to sustainability topics, particularly terms associated with SDGs such as *pollution, inequality,* and *sustainable development*. Visual Thinking Strategies (VTS) contributed significantly to this progress. An examination of student journals indicated that learners utilized visual prompts to formulate longer, more coherent sentences and to articulate abstract concepts with greater confidence. Also, self-assessment checklists showed that students were more at ease speaking and writing in English when they could connect language use to meaningful projects.

Educational outcomes

The project also fostered a deeper understanding of global issues and enhanced students' personal engagement with the content. Observations indicated that learners were able to identify and investigate specific SDGs of personal interest, and their journal entries reflected thoughtful reasoning about local and global implications. For example, one group focused on SDG 6 (Clean Water and Sanitation) proposed a water purification system for their community, while another group addressing SDG 13 (Climate Action) designed a bike-sharing initiative to

reduce local pollution. These artifacts, along with students' Tinkercad models and final presentations, demonstrated both creativity and practical problem-solving skills.

Tinkercad also supported the development of digital literacy and spatial reasoning. Teachers' observational records documented students' rapid adaptation to the platform, the level of detail in their prototypes, and their ability to communicate design decisions in English. Reflections in visual journals confirmed that turning abstract ideas into tangible models enhanced comprehension of the SDG topics and facilitated collaborative discussions regarding feasibility and impact.

Additionally, the project positively affected students' collaboration, self-regulation, and motivation. Observations indicated that students effectively negotiated roles, managed group tasks, and demonstrated peer support. Self-assessment checklists revealed a sense of accomplishment and increased pride in their work, particularly when presenting prototypes to a public audience. During the exhibition, feedback from parents and peers showed how real the learning experience was and boosted students' intrinsic motivation.

Summary

The results show that combining English learning with visual thinking strategies, project-based inquiry, and technology-mediated design helps students learn more about language and school. Students not only enhanced their English communication skills and digital competencies but also demonstrated creativity, social responsibility, and an increased awareness of global challenges—skills that are critical for future learning and civic engagement.

Conclusion

The project had a significant impact on students' affective, cognitive, and linguistic development. When learners engaged with real-world problems, including access to education, climate change, and gender equality, they reported increased understanding and a sense of empowerment. Rather than acting as passive observers, the students became active participants in addressing global challenges. This sense of ownership enhanced their motivation, strengthened collaborative work, and improved confidence in using English for meaningful communication. Overall, the project aligns with pedagogical approaches that value interdisciplinary learning, creativity, and the development of competencies necessary for global citizenship.

Integrating English learning with the Sustainable Development Goals (SDGs) and technology-mediated design created a rich, meaningful context for language use. The use of Tinkercad in the English as a Foreign Language (EFL) classroom, combined with Visual Thinking Strategies (VTS), enabled students to observe, interpret, and generate their own solutions to sustainability challenges. By engaging in authentic problem-solving tasks, learners developed not only English proficiency but also essential skills such as collaboration, critical thinking, empathy, and creativity.

The incorporation of VTS exercises—including *See, Think, Wonder*, collaborative mind mapping, and visual journaling—provided inclusive opportunities for all students to participate, regardless of their initial language proficiency. These strategies allowed learners to express understanding through multiple modalities, including drawings, spoken and written language, and 3D model creation. Evidence from classroom observations, visual journals, and

final presentations indicates that these practices facilitated deeper comprehension of SDG concepts and increased student engagement.

Furthermore, the deliberate integration of design-based activities within the EFL curriculum encouraged learners to take intellectual risks and perceive themselves as capable contributors to addressing global challenges. The classroom environment shifted from one focused solely on accuracy and repetition to a space where exploration, creativity, and inquiry were valued. This transformation promoted higher levels of engagement, particularly among students who had previously participated less actively.

From an instructional perspective, the findings suggest that teaching English in conjunction with interdisciplinary, technology-enhanced projects can cultivate well-rounded, socially responsible learners. Embedding SDGs within EFL instruction demonstrates the practical application of language, design, and problem-solving skills in addressing real-world issues. The outcomes of this project demonstrate the value of rethinking language education to include experiential, contextually meaningful tasks that engage students cognitively, emotionally, and socially. In doing so, educators can foster not only language development but also the growth of thoughtful, creative, and responsible global citizens.

References

Larmer, J., Mergendoller, J., & Boss, S. (2015). Setting the Standard for Project-Based Learning: A Proven Approach to Rigorous Classroom Instruction. ASCD. ISBN 978-1416620334.

Ritchhart, R., Church, M., & Morrison, K. (2011). Making Thinking Visible: How to Promote Engagement, Understanding, and Independence for All Learners. Jossey-Bass.

Tokuhama-Espinosa, T. (2014). The Brain-Targeted Teaching Model: A Framework for Teaching Based on How the Brain Learns. Corwin / SAGE.

UNESCO. (2017). Education for Sustainable Development Goals: Learning Objectives. UNESCO.