



SDG Project-based Learning Through the Use of Technology for Young Learners

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This paper introduces the United Nations Sustainable Development Goals (SDGs) with the use of tablet and online tools in a project-based learning format. This research was specifically designed for Japanese junior high school learners and targeted towards teachers of young English as a foreign language (EFL) learners who may be interested in incorporating technology, project-based learning (PBL), and real-world content into the language learning experience. This project addresses challenges and impactful topics within a junior high school EFL class employing the content and language-integrated learning (CLIL) methodology and incorporates subjects, such as social studies, geography, intercultural studies, and environmental literacy. We have attempted to illustrate the individual steps and outcomes of this project and demonstrate that this project can not only improve English skills but also become a meaningful learning experience that draws on knowledge of other school subjects.

本稿では、タブレット端末とオンラインツールを用いて、国連の持続可能な開発目標 (SDGs) をプロジェクトベースの学習形式を用いて紹介する。特に日本の中学生を対象とし、テクノロジー、プロジェクト学習、実社会のコンテンツを言語学習に取り入れることに関心のある若い外国語としての英語学習者 (EFL) の教師をターゲットにしている。当該プロジェクトは、中学校のEFLクラスにおいて、社会科、地理、異文化研究、環境リテラシーなどの教科を取り入れ、内容言語統合型学習 (CLIL) の方法論を採用し、課題やインパクトのあるトピックを取り上げている。本稿は、当該プロジェクトの個々のステップと成果を説明し、プロジェクトが英語力を向上させるだけでなく、他教科の知識を取り入れた有意義な学習体験となることを実証する。

This paper aims to introduce and explain the steps for a United Nations Sustainable Development Goals (SDGs) project that has been underway for the past three years at a private junior high school in Japan. This was an extension of a prior long-term project that had involved researching countries and cultures around the world and included writing and posting letters to foreign embassies. Students would receive hand-written replies and even packages and gifts from the respective embassies. This was a complex and time-consuming undertaking, but the outcomes were worthwhile as the students were delighted when they received responses, which encouraged them to feel it was an authentic and meaningful use of the language. However, over the years, students gradually received fewer responses and were often directed to web pages for information.

We realized that the project needed to adapt the approach to meet the needs of a current and updated learning environment which accompanied the now ubiquitous technological tools such as tablets and high-speed internet that the students had daily access to. The need for integration of technology into learning is well expressed by Siemens (2004), who noted that “[o]ver the last twenty years, technology has reorganized the way we live, how we communicate, and how we learn. Learning needs and theories that describe learning principles and processes should be reflective of underlying social environments” (pg. 1).

We decided to let technology be the main tool for investigative research as it allowed students open access to the appropriate online resources. The SDGs theme evolved out of a desire to continue international and intercultural studies; however, we wanted to pivot from the previous approach of merely learning about different countries and aimed to introduce a current and impactful topic that has a globally profound outlook. The main aim of the project was to introduce students to the SDGs using technology and encourage them to form a deeper understanding and connection to the many challenges that are faced throughout the world. We wanted students to gain the perspective of people from different cultures and societies around the globe and be able to recognize and empathize with the challenges they face. We hoped this would lead to future



activism and attention to solving problems. This project was carried out in an English communication class. Due to a strong desire to integrate a number of subjects within the language-learning context, we decided to employ a content and language-integrated learning (CLIL) approach. Using the CLIL approach, “The benefits of CLIL may be seen in terms of cultural awareness, internationalization, language competence, preparation for both study and working life and increased motivation.” (CLIL: A lesson framework, 2022).

Why SDGs?

SDGs are increasingly more visible and relevant. SDG logos and campaigns can be seen in advertising and the media. Within our context, this visibility aided comprehension, helped students relate to the issues, and strengthened the authenticity of the project. Drawing on this local awareness enabled students to connect to the broader, global issues within the SDG framework. Through learning about SDGs, students not only acquired knowledge but also language to discuss these impactful issues. Additionally, we felt that the project gave students a positive message to counter what may be perceived by students as overwhelming and complex global challenges. Issues such as climate change, discrimination, and conflict are increasingly in the news. Moreover, there is increasing attention to learning about actions to address the SDGs which focus on identifying solutions.

In addition, investigating the SDGs drew on, and added to, knowledge of other school subjects such as science, history, and social studies. The CLIL approach enabled students to view this project as more than just an opportunity to learn a language and imparted significance on what they discovered, and importantly, encouraged students to look beyond their everyday experiences and venture into the unfamiliar. Bower (2020) wrote, “CLIL has been proven to have the potential to foster deep intercultural awareness and appreciation of other cultures” (pg. 25) and so this made it an appropriate pedagogy to follow for this SDG project. This approach also integrates one of Siemens (2004) principles of connectivism, whereby the “ability to see connections between fields, ideas and concepts is a core skill” (pg. 6). Using the SDGs as a basis improves English skills by increasing students’ vocabulary and comprehension, as evidenced by the production of their final posters and presentation. Furthermore, the incorporation of SDG-based projects in classroom settings acts as a meaningful learning experience. This experience integrated knowledge of other school subjects and enabled the students to develop skills in research, technology, critical thinking, and social awareness.

The SDG Project

We and another native English-speaking teacher, one of whom is bilingual in Japanese, carried out this project. The length of this project covered an entire term and took three and a half months to complete. Our school gave us permission to report on our results and share our data. The participants were in six different classes, and each class contained up to 42 students, all of whom had access to school iPads and the Internet. The classes attended two fifty-minute lessons per week. The students focused on the SDG project for approximately half of each lesson and worked on other materials in the other half. There are eight steps that were carefully designed to allow students time for reflection and self-guided research. The section below outlines the steps in a clear and concise manner that should provide a blueprint for other teachers who are interested in implementing similar topics and projects.

Step 1: Scaffolding the project.

SDGs are becoming increasingly visible in the Japanese media, and our students were exposed to the SDGs in Japanese from their English and Science textbooks. Despite this, we believed there was a need to introduce them in English carefully and to provide a series of age and level-appropriate scaffolding activities to ease students into the concept of the project without overwhelming them. The varying levels of abilities can also slow down or reduce the quality of work produced by students. To address these issues, we closely monitored individual students’ progress. In the first lesson, students were required to consider and finish the statement: “If I could do anything, I would ... to change the world.” This phrase was explained to them in Japanese and the concept was easily grasped by most students. In addition, we chose our own real-world problem and presented it on a slideshow (Figure 1).

After discussion in groups, students were asked to add their ideas to a list of problems on the whiteboard. This approach started the students thinking about global problems and potential solutions without addressing the SDGs directly and allowed the introduction of some significant current events and topics, such as LGBTQ and environmental issues.

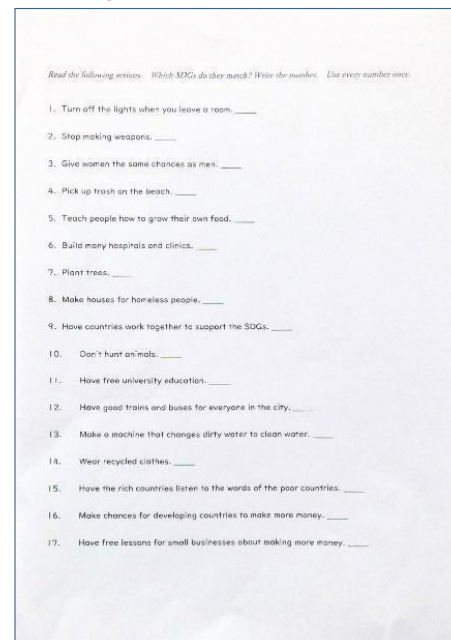


Figure 1
Teacher Example Slide



Next, we gave our students a worksheet (Figure 2) and they matched a list of SDG-related problems to their solutions. This task was accomplished quickly by most students, and they did not require much assistance. The second part of the worksheet was a more demanding activity in which the students needed to identify five social actions or problems they felt were important and come up with actions to help resolve them. This activity proved challenging for many students, and it was necessary to give extra support such as guided discussion and language support, such as advice on vocabulary choice or sentence construction. However, this was a valuable activity as it stimulated cognitive processing and encouraged students to think about topics that may challenge and even contradict their beliefs and worldviews.

Figure 2
Matching World Problems



Step 2: Introducing the United Nations and SDGs

In the next lesson, students watched a UN produced video, 'Do you know all 17 SDGs?' (YouTube, 2018) which visually introduced the logos and their history. Following this, students completed a worksheet (Figure 3) with comprehension questions about the SDGs using only United Nation webpages. These sites were in English, but the information was clear and simply laid out with visuals and graphs. Restricting use of other sites was important at this stage as we wanted students to experience navigating a site only in English; a first for many. The activity ended by matching the SDG logo to its name in English (Figure 4) which was done as a pop quiz. Students did not explore the SDGs in any depth at this stage as the goal was to accurately name and identify the seventeen logos.



Figure 3
Researching the UN

English 3 Name: _____ Class: _____ # _____

SUSTAINABLE DEVELOPMENT GOALS

SDG Research Project - Part 1

Use this website to research the following questions: <https://sdgs.un.org/goals>

- Who started the SDGs?
- What year will we hope to finish the SDGs?
- How many SDGs are there?
- Which goal focuses on education?
- What is SDG #5?
- What number is Sustainable Cities & Communities?
- Which goal focuses on partnerships?
- Which goals focus on animals?
- Which goal focuses on clean oceans?
- How many actions are there in Goal 7?
- Which goal has the most actions?
- Which SDG do you think is the most important?

Figure 4
Matching SDG Logo and Name

SUSTAINABLE DEVELOPMENT GOALS

Match the title with the SDG number above:

Good Health and Well Being =	Affordable & Clean Energy =
Sustainable Cities & Communities =	Decent Work & Economic Growth =
Quality Education =	Life Below Water =
Life on Land =	Responsible Consumption & Production =
Clean Water & Sanitation =	Gender Equality =
No Poverty =	Peace, Justice and Strong Institutions =
Climate Action =	Reduced Inequalities =
Partnership for the Goals =	Industry, Innovation & Infrastructure =
Zero Hunger =	

Step 3: Vocabulary

We realized we needed to focus on vocabulary at this stage as much of the language used to describe and discuss SDGs is new and difficult for our young students to understand. To address this, we provided students with an English word glossary (Figure 5) which they translated into Japanese using English-to-Japanese paper dictionaries. This was a familiar task and students stayed focused and completed this step independently. This allowed for more discussion and comprehension checking before students chose what they were going to research. To complete the lesson, on the reverse of the glossary printout (Figure 6), students matched seventeen specific actions to their goals, which provided additional practice in applying the new vocabulary.

Figure 5
Word Glossary

3-__ No. __ Name _____

SDGs Vocabulary

SUSTAINABLE DEVELOPMENT GOALS

1 poverty (1)	2 hunger (2)	3 good health and well-being (3)	4 decent work (4)	5 gender equality (5)	6 clean water and sanitation (6)
7 affordable energy (7)	8 economic growth (8)	9 industry, innovation and infrastructure (9)	10 reduced inequalities (10)	11 sustainable cities and communities (11)	12 responsible consumption and production (12)
13 climate action (13)	14 life below water (14)	15 life on land (15)	16 peace, justice and strong institutions (16)	17 partnerships for the goals (17)	

Word	Meaning (Japanese)	Word	Meaning (Japanese)
poverty (1)		infrastructure (9)	
hunger (2)		reduce (10)	
well-being (3)		inequality (10)	
quality (4)		sustainable (11)	
gender (5)		community (11)	
equally (5)		responsible (12)	
sanitation (6)		consumption (12)	
affordable (7)		production (12)	
decent (8)		climate (13)	
economic (8)		justice (16)	
industry (9)		institution (16)	
innovation (9)		partnership (17)	



Figure 6
Matching SDGs and Action

English 2: Solutions to problems in our society

Choose the best solution for each action.

- I would like more people to understand about LGBTQ+ by _____
- I would like to stop bullying by _____
- I would like to reduce the microplastic in the oceans by _____
- I would like to increase interest in space by _____
- I would like to have better education chances for poor people by _____

A. having more chances for people to go to the ocean D. using my own eco bag for shopping.
B. giving scholarships based on income E. having people talk about gender differences
C. having everyone be respectful to each other F. scholarship 奨学金 income 所得 base of 基礎, 土台

Write the action. Then write your own solution.

- _____
- _____
- _____
- _____
- _____

Name: _____ Class: _____ No: _____

Step 4: Choosing a Country and SDG

At the start of the lesson, we outlined the requirements, stages, and assessment criteria of the project (Figure 7) and presented it to the students. This included: a written report, poster and presentation, and assessment by the teachers for each item and by classmates for presentations. Instructions specified that the written report should be structured into a 3-paragraph format with content guided by research questions. The students also watched an example presentation that further highlighted the content and structure and demonstrated how to include the poster. This poster (Figure 8) illustrated the elements which needed to be included for assessment: information about the country, the SDG, the specific problem, actions taken, the group that is working on resolving this problem, the results, and sources.

Figure 7
SDG Project Outline

SDG Project

You will:

- Choose and introduce a country.
 - location
 - capital
 - population
 - something famous about the country
- Choose an SDG and an action of that SDG that country is working on.
 - What is the SDG in simple English?
 - What is the action?
 - Who (what group) started the action?
 - What kind of group are they?
 - When did they start?
 - What are the results so far (現時点で)?

3. Make a poster of the information.
4. Make a presentation of the information, using your poster.
5. Write a report of your information.
6. Listen and answer questions about your classmate's presentations.

You must list your sources. (データや写真等の引用はすべてソースを載せる)

Here are helpful links to start your research!

<https://dashboards.sdgindex.org/>
<https://country-profiles.unstats.un.org/>

評価

- Poster 30%
- Presentation 30%
- Written Report 30%
- Listening and Peer Feedback 10%

3- No. _____ Name: _____



Figure 8
Sample Poster

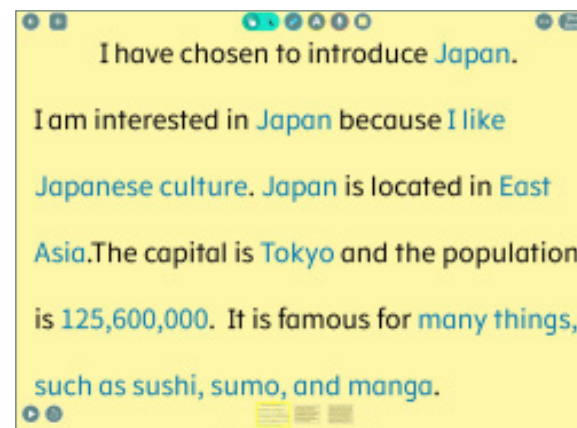


After discussing the scope of the project, students had time to research online and finally, choose a country and identify an action that led to achieving the SDG they chose. Students could not choose the same country and SDG combination as other classmates which meant that there were some countries repeated but not with the same SDG. This ensured variety and individual outcomes. Some students needed more guidance, for example, in choosing the correct SDG for the action they were interested in researching. In making these decisions it was necessary to answer questions about what was viewed online or to redirect to other sites. The remainder of the lesson was used to start the first stage of research (introduce the country) using the content questions from the printout.

Step 5: Introducing a Country

At this stage, we provided the students with a sample paragraph (Figure 9) on Loilonote, the school's chosen online learning platform, like that of Google Classroom. Students, therefore, had access to this material throughout the remainder of the project; it was a productive aid to self-directed learning. This sample showed how to write about and introduce their country, including their reason for choosing it, the capital, population, and things the country is famous for. We used highlighting to indicate which sections students needed to adapt for their own presentation although they were allowed to use this as a basic model, they were encouraged to use freer expression. Students were able to follow the model and accomplished this step mostly unassisted. At the end of the lesson, students handed in their first paragraph digitally, using Loilonote. Something interesting that was observed here was that when given this style of template, students were unlikely to use translation tools which was constantly being discouraged.

Figure 9
Model 1st Paragraph



After receiving the students' work, we made minor corrections and returned paragraphs via Loilonote. Two main issues were identified; using large numbers, and how to research effectively. We decided to add an extra lesson on writing and reading numbers as well as a section on how to find and reference sources. In the final phase of this lesson, students completed a number treasure hunt online whereby they followed

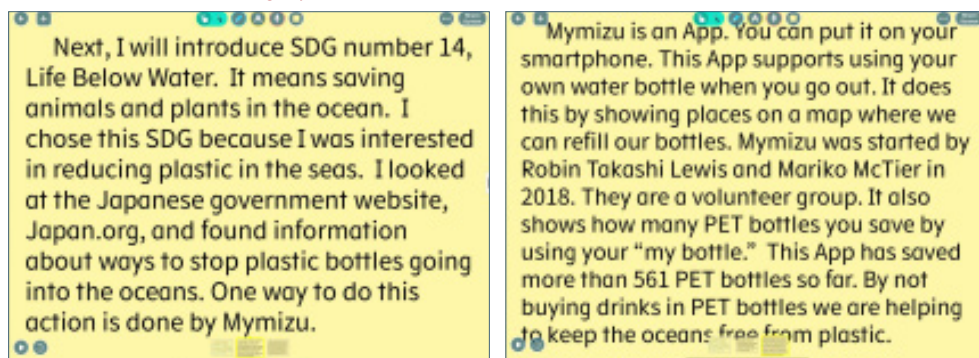


clues to find out the numerical answers to questions such as: ‘How many iPhones are made every day?’ and provided the source for their results. Students enjoyed the explorative nature of this activity and we found that completing the hunt helped students clarify how to find and present the information they discovered.

Step 6: Written report 1st draft

At this stage, we presented an example report to the students, who all had access to the example on Loilonote. Guidance on how to write up information for the 2nd and 3rd paragraphs (Figure 10) and how to use fixed expressions was also presented. A first draft was then submitted for editing and advice. This included: comprehension, content, structure, and use of language, online translation, and other difficulties. The first draft was returned, changes made, and content amended to produce a final written report for assessment. This step was vital as it provided a way to further check the content and give advice for improving writing.

Figure 10
Model 2nd and 3rd Paragraphs

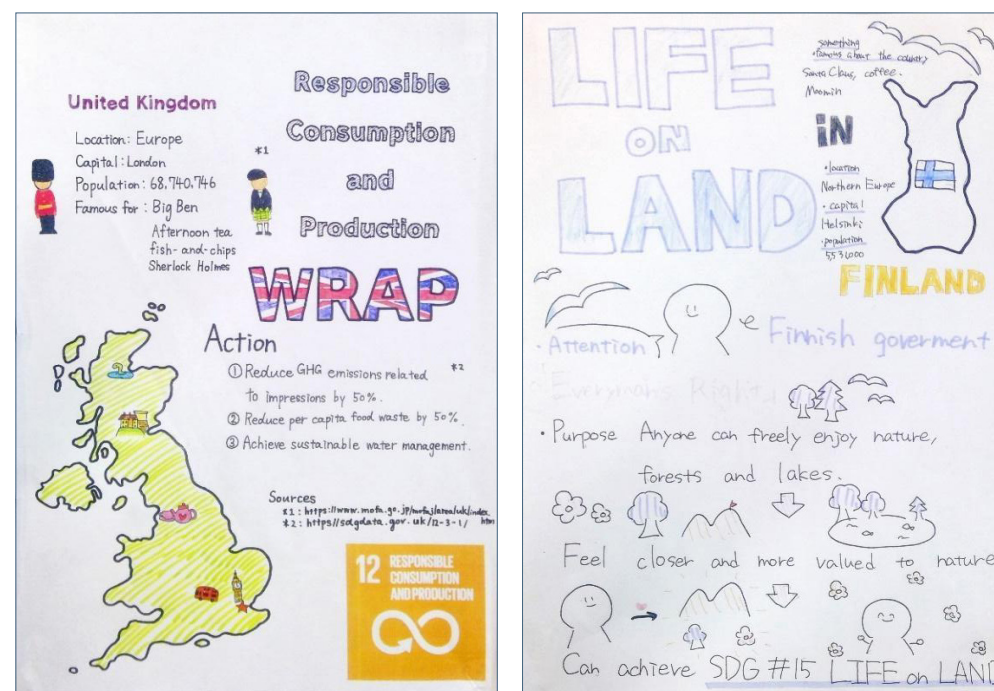


Step 7: Make a Poster

Next, the students were given a piece of B4 poster paper. The students followed the requirements outlined in Step 4, design and create a poster. There were no restrictions on how they did this, although guidance was required for some, and two lessons were needed. The poster was displayed during the students’ presentations and submitted for assessment at the end of the presentation. A variety of skills were demonstrated here,

and some posters from each class (Figure 11) were selected for display in the school, which generated a lot of interest from students and teachers.

Figure 11
Student Poster Examples



Step 8: Presentation and feedback

As a final step, students showed their posters on an overhead projector screen and gave a presentation in front of the class and teachers. The presentations were assessed on content and delivery. As they already had lessons on presentation skills and using memos to present, students did not need to use their written reports when they gave their presentations. In the first year of this project, students were asked to record each other and show these clips in class. We quickly realized that after the initial excitement



of using new technology wore off, this recording format was tiring to view in class and entirely one-way. We then decided to teach presentation skills from the first year and build on these over the next two years so that students were confident to give more complex presentations in front of their peers by the third year. While students gave their presentations, their classmates completed a listening comprehension survey, which included giving peer feedback. We did this to ensure that the rest of the class remained focused and engaged with the presentations and to act as a casual comprehension assessment opportunity. Watching the presentations and seeing the variety of posters was highly enjoyable as it gave students a chance to show off their skills whether they be English or artistic. Every presentation was different, and student engagement was high. Students gave each other a lot of support and encouragement here which was another positive outcome.

Challenges

Technology

The use of technology, specifically tablets and internet access including sites such as YouTube and Google Translate, while giving students unlimited access to information and resources, also presented several challenges. The first being, a general misuse of tablets which resulted in us having to be diligent and constantly monitor students' online activity using a monitoring application and general observation during class time. This was unsurprising given the age and maturity of our students, but their online activity led to occasional instances of us having to intervene and even retracting the devices from students. Fortunately, there were usually three teachers in the room, and one was always on tablet watch duty. In future endeavors, the teachers would like to find ways to better manage this aspect of the project so that students can have the full attention of all three teachers for content and presentation support.

The next significant technological challenge was students' lack of ability and an unwillingness to research in English. Teachers actively encouraged research to be done in English but, considering student ability and comprehension, they were allowed to research in Japanese. However, the students were assessed in English and were required to complete the other activities in English. Other related issues were the overuse and reliance on translation tools. Students were warned against the overuse of online translation tools and encouraged to use paper dictionaries. We worked closely with students to find ways to simplify their English and correct inappropriate translations. At times, the non-Japanese-speaking teachers had to rely on the Japanese-speaking

teacher to work with them but, in general, students were able to communicate their information clearly. Technology was highly necessary for the success of this project, but also contributed to a fair amount of its challenges!

Schema

The complex and wide scope of subject matter meant some students found it difficult to connect with the issues. This project ties in many unfamiliar fields and draws on individual world knowledge and life experience. Therefore, it is best viewed as a first step to raising awareness. Especially in the early stages, to assist comprehension and inspire, the lessons were supplemented with media content including short documentaries and animations as well as quizzes using Kahoot! Although these were informative, the most effective method to engage students was having them explore the SDGs at their own pace and in their preferred manner. The role of the teacher was as advisor and informant which provided the students with the freedom to choose what to research and present. For many students, this was the first time they had encountered this freedom and several of them commented that this was challenging but interesting.

Supplementary materials were added when an issue with progress was identified. However, having a flexible approach to output and expectations that match the ability of the students is needed. Additionally, after-school support allowed students one on one time with a teacher to address specific issues for those who needed extra help. The project was not rushed as it occurred over a term and a student directed approach empowers and imparts confidence to actively use English.

Finally, cognitive overload, the idea that our working memory is only able to cope with small amounts of information at a time (Williams, n.d.) also needs to be managed. This is achieved by an emphasis on a teacher/student collaborative approach. As discussed previously, teachers had a supporting role but instructed and gave prompts when students struggled with complex information. Allowing sufficient time for this process to occur not only aids comprehension but builds confidence in producing good work. This also becomes apparent when students voluntarily engage in these collaborative roles with each other, and they enjoy seeing the work produced by others which can be motivational. In promoting paper dictionary use over translation tools, the teachers noticed the effect of a less rushed writing process, and this helped engage students in the dissemination of meaning and resulted in a higher quality of work.



Conclusions

This paper described 8 important steps in establishing a CLIL project for junior high school students. Our aim was to introduce the SDGs using available technological tools and we were able to implement a CLIL based pedagogy with the SDGs as a specific type of impactful topic within English communication classes. Overall, the written reports, posters and presentations met expectations and it was evident the students had understood their chosen SDG and the project objectives.

The project was structured in a way that led to students becoming increasingly self-confident in using English. Students were given the chance to improve English skills such as vocabulary building, writing, and giving presentations in English. Despite some challenges arising from the use of technology, with support, students were able to utilize it effectively to research and complete the project. Technology was an essential element in this project because the research component would have been impossible to implement without it.

Additionally, the students' research and problem-solving skills increased with the use of technology and global awareness grew as the project progressed. The opportunities for collaborative activity resulted in a high rate of participation and demonstrated the effectiveness of self-directed learning. For example, in Steps 4 and 7, students used technology to research and create their posters and in both stages, they were engaged in discussing and comparing their choices with classmates. Technology provided a contemporary way to research dynamic topics in a method that students were able to partake in and enjoy. The students were motivated to share their work and there was a positive atmosphere of support and discovery. We were pleased to find students identifying faults and analyzing issues within the current SDG framework. One instance of this occurred when a student had trouble categorizing an LGBTQ+ issue into the existing SDGs. This challenge however, provided the opportunity for discussion and reflection concerning the limitations of the SDGs. Furthermore, this demonstrated the presence of strong comprehension and problem-solving skills. In the future the aim is to take the project in an even more impactful direction by having the students design and create personal solutions to social issues that they encounter in their own communities.

The SDGs provide a valuable opportunity for shared learning between student and teacher, broadening everyone's knowledge and awareness of some of the complex issues facing us in the world today. This project can also challenge us to find our own responses to what various charities, companies and government bodies are doing to tackle these serious issues. The teachers and students were amazed and inspired by the innovative

initiatives that exist in response to achieving the SDGs. Additionally, supporting students to become more socially responsible is an important task for all educators to consider. This project is ideally suited to third year junior high school students, although it could be adapted for upper elementary and university students by adjusting the content and outcomes. We hope this paper will act as a guide and lend support to other English language teachers that would like to implement technology supported learning in their own classrooms.

Bio Data

Susan Bremner is an Associate Teacher of English at Kwansei Gakuin Junior High School. She has a bachelor's degree from RMIT University, Australia and a Master of Arts TEFL/SL (Merit) from The University of Birmingham, UK. She is an experienced educator in Japanese, Singaporean, and Australian mainstream settings. Her interests are CLIL, project-based and independent learning, and she believes in incorporating critical thinking, intercultural awareness, and equal access to technology in classrooms.

Louisa Green is currently teaching English at several Kansai universities and is an ICT teacher at Saint Michael's International Saturday School in Kobe. She has a bachelor's degree from Queen's University, Canada and is currently doing a Master of Education Technology at the University of British Columbia, Canada. She uses a digital, project-based learning approach and is interested in a variety of content-based language learning including topics such as empathy, gender equality, and environmental literacy.

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