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Integrating Extensive Reading with Environmental Education: A Meaningful and Engaging Pedagogy Approach

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Abstract

This article described and analysed a project done at an urban government secondary school in the southern Malaysia state of Johor. With guidance from their teacher, a class of 16students, 18-19 years old, worked in groups to create mini-ecosystems in which a plant was grown. The students' goals were to learn about eco-systems generally and to share their learning with peers and teachers in other classes via Gallery Walk presentations. The project was analyzed as to whether it met various criteria for environmental education, using the United Nations environmental education objectives,

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and criteria for extensive reading, based on Day and Bamford's (2002) suggestions for extensive reading principles. The six Environmental Education objectives were awareness, knowledge, concern, skills, evaluation, and participation. The extensive reading criteria included students choosing what they would read, reading materials that were comprehensible, reading done for real purposes, and teachers modeling enthusiasm for reading. Sample posters from the presentations were included in the article.

Keywords: Environmental education, Extensive reading, Mini-ecosystems, Projects

Introduction

In 2015, the United Nations promulgated 17 Sustainable Development Goals (United Nations Development Program, 2022) with the overall aim of providing for an adequate life for all the planet's people while protecting the ecosystems which enable that life. Quality Education constitutes one of the 17 goals. Literacy plays a key role in education, and literacy extends far beyond people's ability to read and write their own names (Montoya, 2018). To promote sustainable development, children, youth, and adults also need the ability to use literacy as a tool to help the Earth bloom in a sustainable and equitable manner. The current article first describes a project done by Malaysian senior high school students and then compares the project with two sets of guidelines: one for Environmental Education (EE) and one for Extensive Reading (ER). The authors of this article hope that other educators will be encouraged by the article to reflect on their own efforts at EE and ER.

The Project

This project integrated ER with EE. The project was created by the first author, a secondary school English teacher, and a class of 16 students (18-19 years old). The project's goal was to enhance the students' English

language proficiency and promote reading habits at the same time the students increased the environmental awareness, understanding, concern, and evaluation ability of themselves and other students and teachers at their school, a government secondary school in Malaysia's southernmost state of Johor. The class planned and participated in the project each school day for 80 minutes a day over two weeks, i.e., 10 school days. The 10-day project schedule is described as the following:

Days 1 & 2: Initially, the project topic was completely open. A brainstorming session was held by the class and the teacher to decide on a project topic, and a unanimous decision was made to have a project related to the environment. Students, in groups of about three, then used the internet and intragroup discussion to identify possible small, inexpensive, short-term classroom projects on the environment. The groups presented their ideas to the class, and finally everyone agreed to create an ecosystem project. An ecosystem is an area of interconnected, interdependent life. It includes the air, water, soil, animals (including humans), plants, and bacteria in that area. The ecosystem created for this project is shown in Diagram 1:

Diagram 1

The Glory Ecosystem

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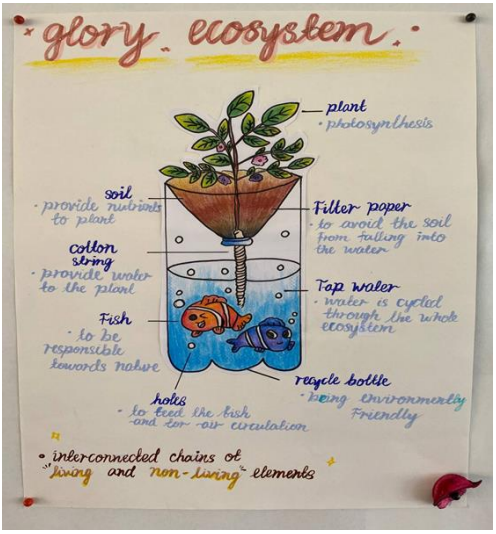
Days 3 & 4: Students read more about ecosystems to better understand the key concepts involved in an ecosystem, how to create one, the function of the various parts, the benefits of an ecosystem, and the issues in maintaining ecosystems. There are many websites that promote creating and learning from an ecosystem; one example is Pop Bottle Ecosystem (layers- of-learning. com). This website illustrates an ecosystem in a bottle showing how animals, plants, and non-living things are all connected. The ecosystem consisted of a clear 5- liter soda bottle, a small plant, 2- 3 small fishes, aquarium rocks, string, paper coffee filters, and water. The project was called "Glory Project" for two reasons: one, the first plant used was a morning glory, which, sadly, died; two, the students wanted to honor the glory of nature as seen in ecosystems. Based on the students' research, the following poster (Diagram 2: Glory Ecosystem Functions) was created in which the materials required were labeled and the functions briefly stated.

Diagram 2

The Glory Ecosystem Functions



Students volunteered to do certain tasks, and teams were set up to oversee the tasks. The teams had to bring the materials to school, locate the fishes, build the ecosystem, create educational posters, and use Google Forms to create a simple questionnaire on the ecosystem. There were also photographers and a coordinator to welcome the visitor groups on Days 8 and 9.

While creating and maintaining the mini-ecosystems, students faced a few issues. Principally, the health of the fishes created challenges. How often to change their water? What to feed the fishes? Should we use tap water or water from the school drain? Problems arose when the fishes eyes turned red and they were observed to be floating near the water's surface. Also, where to place the ecosystems? These issues were addressed largely by doing more reading.

Days 5 & 6: To educate others about ecosystems, the class decided to organize a Gallery Walk (Ridwan, 2019). In this version of a Gallery Walk, the class would form seven groups, and each group would set up an education station as part of a gallery. Visitors from elsewhere in the school would form groups to walk around the gallery, visiting each of the stations. At each station, the group who had built the station would give a short talk and take questions and comments. The following poster (Diagram 3: The Glory Ecosystems Process) highlights the processes involved in creating an ecosystem:

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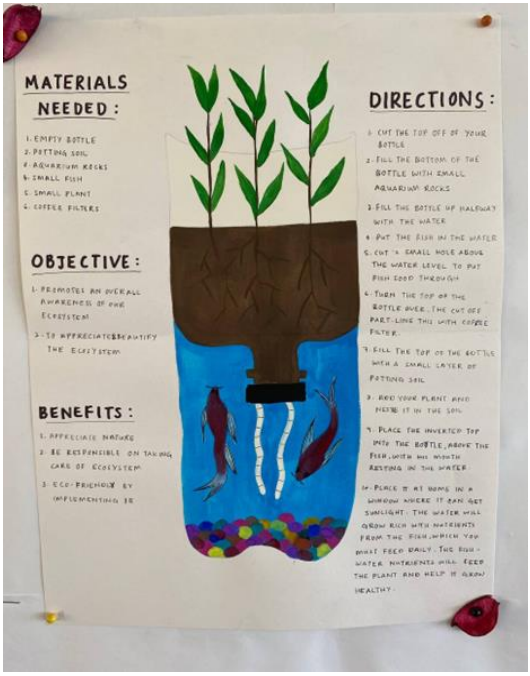
Diagram 3

The Glory Ecosystem Process



The functions of the seven stations were:

Station A - Introduction - the definition of ecosystem and the purposes of ecosystems.

Station B – How we built our ecosystems – the materials and how we set up our ecosystems.

Station C – The functions of the various parts of the ecosystems.

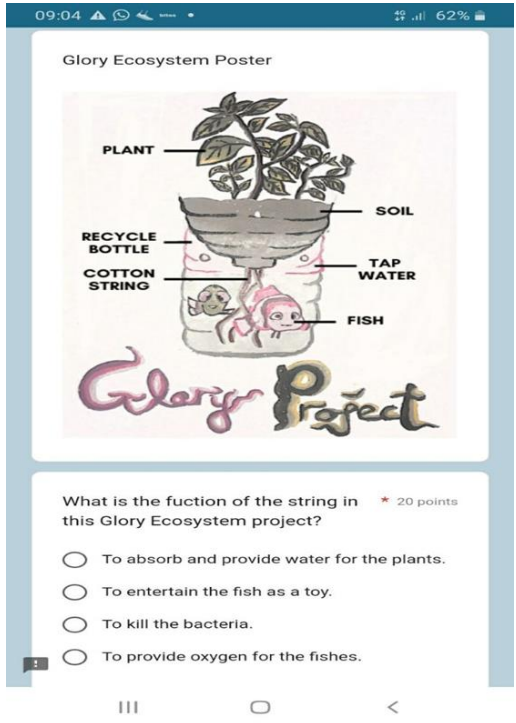
Station D - The benefits of the project - learning about photosynthesis, importance of clean air, avoidance pollution, our responsibilities towards nature.

Station E – Visitors scan a QR code and attempt to answer the questions in the Google Form quiz. An e-certificate is generated and sent to the email addresses of those who successfully responded to the questionnaire. The

google form is located at https://forms.gle/xAyBzeLyp6qdmebL8. Diagram 4 (Glory Ecosystem Questionnaire) is a screen shot of the google questionnaire.

Diagram 4

The Glory Ecosystem Questionnaire



Station F - Feedback corner- Visitors rate the project from 1 (lowest) to 5 (highest) and give feedback.

Station G - Cheer time - visitors create a cheer/jingle about appreciating / protecting nature. A poster (Diagram 5: was created to inform students of their responsibility to protect and care for earth.

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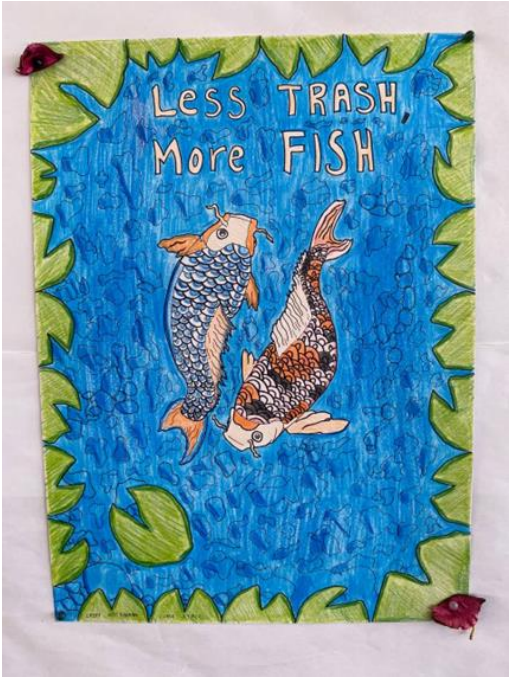
Diagram 5

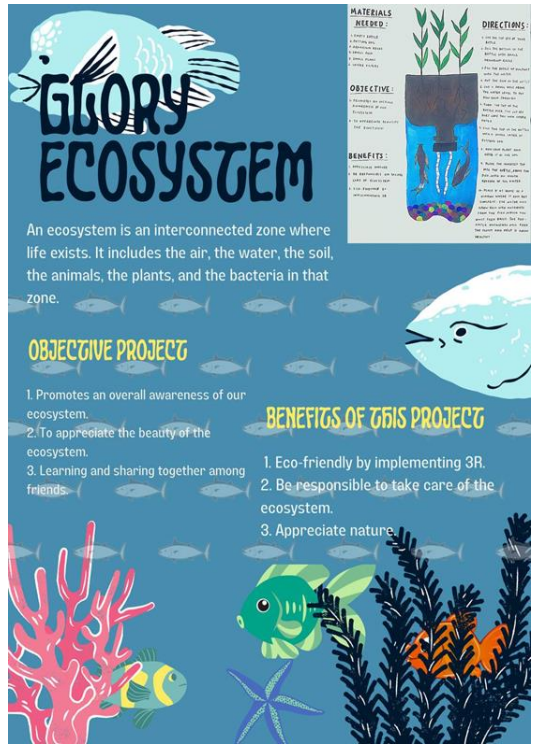
The Glory Ecosystem - Love and Care



Day 7: Invitations were sent to persuade other classes to come for the Gallery Walk. The seven stations were set up in the classroom. Students rehearsed and received feedback from their classmates and their teacher. Also, the technical aspects, such the QR Code and the e-certificate, were checked. An E-poster (Diagram 6) was also created to infuse digital innovation in action as shown in Diagram 6:

Diagram 6

The Glory Ecosystem - Benefits



Days 8 & 9: The Gallery Walk sessions were held. Students referred to the internet when visitors raised points that required further information.

Day 10: The class reviewed feedback from the visitors, which was very positive, as well as their own feedback. Among the visitor comments were: "We learned many things," "It was fantastic and good for our Earth," and "Enjoyed the activities." All the visitors rated the project as a '5' on a scale of 1-5. The project left students feeling confident about their English and motivated to learn more and do more for the environment.

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Analyzing the Project

In the remainder of this paper, the project described above is analyzed first via criteria from the environmental education literature and then via criteria from the literature on literacy education, in particular, the literature on extensive reading. Readers of this article are warmly welcomed to formulate their own views and to continue to implement environmental education and literacy education as best fits their own beliefs and circumstances.

Environmental Education

While escalating disasters such as forest fires, heat waves, droughts, floods, disappearing land, diminishing forests, melting icecaps, and galloping extinctions of plant and animal species have in this decade directed previously unheard of levels of attention to environmental concerns, scientists, educators, and others had long urged that humans must lessen the negative environmental consequences of our actions (Maley, 2022, McCrea, 2006). Folke et al. (2021) explained why the current geologic era should be called the anthropocene, with *anthro* meaning human and *cene* meaning geological epoch. In other words, while thousands, even hundreds of years ago, humans had little or almost no impact on the planet and the other beings living on the planet, in the 21st century, we play a major and not always benevolent role.

Environmental Education exists to help students become more aware of humans' role and to make it a more benign role. In 1975, the United Nations Environment Program expounded six Environmental Education Objectives. These objectives are explained and exemplified in Table 1.

Table 1

1975 United Nations Environmental Education Objectives

	Environmental Education Objective	Meaning	Example
1.	Awareness	Students are aware that environment issues exist.	Students know that water pollution exists and that this pollution mean less water for drinking, washing, and other needs of humans and other animals.
2.	Knowledge	Students have a basic understanding of environmental issues and humans' role in these issues.	Students know that water pollution has causes such as lack of sanitation and various industrial processes that cause pollutants to enter bodies of water.
3.	Attitude	Students care about environmental issues and feel motivation to address them.	Students want to provide sanitation facilities to people to protect these people's health and to reduce water pollution.
4.	Skills	Students have and are further developing the scientific, language, and other skills needed to overcome environmental problems.	Students know how sanitation facilities can be built and how to persuade people to participate in building them.

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Table 1 (Continued)

	Environmental Education Objective	Meaning	Example
5.	Evaluation	Many means are proposed for addressing environmental concerns. As citizens, students need to analyze which are the best means.	Students know what are the best, most affordable, long-lasting ways to build sanitation facilities that will fit with a community's ecosystem.
6.	Participation	The other five objectives must be operationalized by students' actual participation in environmental protection.	Students find ways to support plans, including using their own labor, enlisting involvement of companies, governments, the media, and NGOs so that sanitation systems can be built and maintained.

How did the EE project done by the Malaysian secondary school students measure up on the six 1975 United Nations EE objectives? In general, the project seemed to be successful when judged by these criteria. Certainly, it raised the Awareness (Objective 1) and Understanding (Objective 2) of the 16 students and the visitors to their Gallery Walk by exploring the concept of ecosystem. Too often, people take a silo view of nature, with each organism, each part of the ecosystem, and each natural body incorrectly seen

as existing on its own. The interdependencies of the web of life go unrecognized. As to Objective 3 (Concern), an oft-cited phrase in EE by Baba Dioum states that, "We will conserve only what we love, we will love only what we understand, and we will understand only what we are taught." By teaching themselves and others about the environment, the students may have increased their own and others' understanding and, we hope, their concern.

The UN EE objective 4 focuses on Skills. In this project, by learning how to find relevant information on the internet and building their vocabulary knowledge in this area, students enhanced their skills. Doing a large quantity of reading in a specific area, known as "narrow reading," is facilitated by the internet, because of the large supply of related information, e.g., internet features which recommend related reading. Furthermore, the internet offers many tools which students above a foundation level can use for overcoming comprehension deficits, e. g. , translation tools, online dictionaries, and online discussion groups. Objective 5 (Evaluation Ability) involves making choices. The democratic way that students, with their teacher's guidance, discussed their project options, provides them with a foundation for future well-grounded evaluations.

EE objective 6 may be the one most often left out in EE programs. In the case of the project being discussed in the present article, students' participation took the form of educating others. Participation can take other forms as well. These can be categorized into two types. Participation at an individual level involves behaviors such as turning off lights when leaving a room and not taking plastic bags from stores. The other category of participation for the environment involves actions aimed at societal level change, such as influencing governments to speed the day when alternative energy sources more completely replace fossil fuels.

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Extensive Reading

The secondary school students who engaged in the EE project needed to read in order to do their project. Did this reading constitute ER? To consider that question, let us look at a well-known list of ten principles of ER (Day & Bamford, 2002). However, first, it should be stated that Day and Bamford clearly noted that these principles are not meant as inflexible rules: "We posit these ten principles in the hope that others will consider them and react to them" (p. 136). Second, the ten principles were presented in 2002, before students had easy access to the many internet-enabled tools available to many – but still not enough – of today's students.

To help readers of this article consider and react to the ten principles in the context of the students' EE projects, Table 2 presents and explains the principles. Caveats are also provided for the principles.

Table 2

Ten Principles of Extensive Reading (Day & Bamford, 2002)

	Extensive Reading Principle	Explanation	Caveat
1.	The reading material is easy for the students.	In order for reading to be enjoyable and to contribute to students' language acquisition, the reading materials must be understandable for students. Understandable materials build students' confidence and is likely to lead students to read more.	If students are sufficiently motivated, they will make the effort to understand materials that are not easily understood at their current proficiency level.

Table 2 (Continued)

	Extensive Reading Principle	Explanation	Caveat
2.	Students have access to a wide variety of reading materials.	Such varied materials cater to students of different and changing proficiency levels and interests.	The internet has begun to make this principle less necessary by providing both a wide range of materials and tools, such as translation software, for making the materials comprehensible, although low proficiency students will still have difficulty as will those students who lack internet access.
3.	Learners choose what they want to read.	The idea is that students will (a) develop a lifelong reading habit, and (b) become self-directed learners.	Students may make wrong choices, such as choosing books that seem interesting but are too difficult.
4.	Learners read in large quantities	Reading large amounts of comprehensible materials accelerates students' subconscious language acquisition.	Will students have time to do so much reading, especially if the content of their extensive reading books is not clearly tied to their curriculum?

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Table 2 (Continued)

	Extensive Reading Principle	Explanation	Caveat
5.	Students have the same reading purposes as does the general public: enjoyment and obtaining information.	The hope is that students will see reading as an important and regular part of life, not as something people do only as students. Instead of artificial after-reading tasks, when students finish one book, they find another and begin to read this new book.	A difference between students and the public is that students are learning to read, whereas it is assumed that the public are already proficient readers.
6.	Reading is done for real, not artificial, tasks.	Students should not read to write book reports or answer comprehension questions. No tasks are needed to check whether students have read and understood what they read.	Without after-reading tasks and extrinsic rewards, many students may not read, and teachers will have difficulty monitoring student reading for evaluation purposes.
7.	Students read faster than when reading standard academic material.	Reading materials are not demanding in terms of students' language proficiency, and the content is more fun, such as an adventure story. On the other hand, slow reading in which students need to stop reading and look up words may impede comprehension and take the enjoyment out of reading.	Even if the language level of texts poses little or no difficulty to students, the content may be challenging and students may want to pause to ponder or discuss what they are reading and its implications for various areas of their lives.

Table 2 (Continued)

	Extensive Reading Principle	Explanation	Caveat
8.	Students read silently and by themselves.	This contrasts with a common practice in which the entire class reads the same book, with each student taking a turn to read aloud.	Even when students read alone, they may sometimes wish to come together to share with others about what they are reading and to read aloud particularly impactful or well-written parts of the books.
9.	Teachers explain how extensive reading differs from other forms of reading instruction.	Reading in accord with the above eight principles may be different for students. Thus, teachers need to explain the rationale behind this approach and how intensive and extensive reading can complement each other.	Not all teachers and administrators support extensive reading. Nonetheless, students can still read extensively.
10.	Teachers model enthusiasm for reading.	Day and Bamford quoted Nuttall who wrote that "reading is caught not taught, infect your students." Thus, teachers need to "walk their talk," when they urge students to read and tell them that reading is enjoyable and useful.	Teachers are busy. When students are productively involved in extensive reading, teachers may need to use that time to catch up on marking, as well as planning upcoming lessons.

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Extensive Reading for Environmental Education

It goes without saying that reading, along with all the other language skills, plays an important role in EE for students as well as for all people. For instance, Stevenson et al. (2017) highlighted the complexity of issues in EE and called for teachers to join students in inquiry learning involving critical and creative thinking, and to combine these academic endeavours with more practical efforts as part of co-curricular and community projects. Monroe et al. (2019) reviewed the literature on effective climate change education strategies and identified the two most common approaches for engaging students in EE as: (1) centering instruction on what students would find relevant and meaningful; and (2) using active learning and other strategies to engage students beyond their classrooms. ER, especially when linked to group projects, as was done in the project described in the current article, offers the potential for promoting student engagement.

The learning and reflection that result from students reading on EE topics need not stay within their classroom walls. For instance, Lawson et al. (2019) noted that intergenerational learning from students to their family members can also take place. Not only can students tell their families about what they read, family members can read what the students read. The internet facilitates this. Similarly, others in the same family can suggest EE-related reading materials to the students.

Not only can students go outdoors to apply what they read about EE, they can also read outside. Chawla (2020) lamented that so many children and youth nowadays spend so little time out of doors. Thus, when possible, either during or beyond the hours when they are at their educational institutions, students and their teachers can read outside. Research on biophilia, i.e., love of nature, suggests that benefits to both physical health and mental health can result from time spent with nature (Lim et al., 2020). Furthermore, some researchers have reported that such benefits can even arise indoors when plants and pictures of nature are present (DeLauer et al., 2022).

Maley and Peachey (2017) edited a list of English as a Second Language lesson plans in support of the United Nation's Sustainable Development Goals. At least three of the lesson plans dealt with environment goals, and all three lessons involved reading. Hadfield and Hadfield's (2017) lesson plan concerned protecting marine life and the cleanliness of the water. Early in the lesson, students read a poem about an octopus. Next, inspired by visuals of octopuses and a song about them, students work together to write a pattern poem about octopuses, reading their own poem and those of classmates. On another aspect of protecting the seas and other bodies of water, students do another type of reading: reading an infographic about water pollution. This is in preparation for writing autobiographies of items of human-made water pollution, e.g., cigarette butts. Students read and give feedback on their peers' writing. Other tasks in the lesson for which students need to read include a simulated debate at the United Nations.

In the same book, the lesson by Katona and Tartsay (2017) deals with how humans' patterns of consumption and production impact our species' environmental footprint. The authors address a concern of many teachers of second language reading, i.e., the shortage of texts that fit their students' current levels of proficiency. Suggestions for addressing this concern include modifying texts, pre-teaching vocabulary and concepts, students working in groups that are heterogenous as to proficiency level, and allowing students to use online and offline reading help, including electronic vocabulary glosses. The lesson necessitates students' acquisition of knowledge and skills. This is supported by websites such as, for content, https://www.cleaninginstitute.org/understanding-products/science-soap about soap, and, for skills, https://www.wikihow.com/Do-a-Voice-Over on how to do voice overs.

Theologidou's (2017) lesson plan in the Maley and Peachey book looked at climate change. Vocabulary building was highlighted. This relates to another, previously mentioned, way to prepare students to succeed at

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reading texts that might otherwise seem to be too difficult: narrow reading (Renandya et al., 2018). The idea is that by reading a particular type of text, e.g., instructions texts, students become proficient at the attendant grammar and organization patterns of such texts. Furthermore, by reading multiple texts on the same topic, in this case energy use, students build their vocabulary in that area. Theologidou facilitated second language students' comprehension of what they read by using texts written for proficient speakers but of a younger age level, e.g., https://www.eia.gov/kids/energy-sources and https://www. energystar. gov/ index. cfm?c= kids. kids_index www3. epa. gov. Online games were also recommended as another way to integrate reading with learning about the environment. The popular online game, Minecraft, has a version for kids with an EE focus: https://education.minecraft.net/

Author (2022) took a somewhat different approach to linking reading to student and teaching involvement in EE. His key idea was that instructional practices, such as ER, cooperative learning, and learner autonomy, empower students to be more involved in controlling their own learning. For instance, with ER, students have input into what they and peers read and what they and peers do after reading. In turn, taking greater power over their own learning prepares a path for students to be more involved in controlling the wider world in which they now live and, in the future, will live. Increasingly central to those now and future worlds is how humans interact with the environment. Thus, students assuming more responsibility for shaping the learning environment they experience encourages students to take more responsibility for shaping the living environment experienced by current and future humans and other species of animals and plants.

Research supports the impact of ER on language skills, but these studies generally involve " stand alone" reading where participants do ER individually. Projects add a group element to ER. Also, Mohd Asraf and Ahmad (2003) highlighted the need for students to have reasons to read. Projects supply such reasons, and the digital world, so well equipped with

reading material, allows students to read almost anything anytime at minimal cost. The information is not only readily available but at minimal cost for those who possess the hardware and the internet access.

Internet access addresses Day and Bamford's principle 2 – a wide range of reading materials. Groups address principle 1, that the materials be comprehensible, because peers can assist as can various internet affordances. Principle 3 – students choose what they read – was addressed in part because the class chose the topic of their project. Principle 4 – students read in large quantities – may be the most difficult principle to satisfy, as nothing was done to measure how much students read or how much of what they read was understood. Principles 5 and 6 – real purposes for reading – may overcome difficulties on Principle 4, because the real world character of the project, the narrow reading involved, and the ease of access of the internet-based reading materials may motivate some students to move toward making reading a lifelong habit.

The reading in the project described in this article was definitely not in line with principle 7 - Students read faster than when reading standard academic material. What students read as part of the project was definitely more difficult than a typical, carefully chosen graded reader used for ER. Principal 8 - Students read silently and by themselves – was fulfilled, although sometimes when using the internet to design their ecosystems and prepare for the Gallery Walk, students would discuss while reading, as they sought to find the information they needed as efficiently as possible.

Principle 9 - Teachers explain how extensive reading differs from other forms of reading instruction – was tricky, as the reading done on the project differed from typical ER. Whereas typical ER is book-based, reading for the project consisted mostly of mining for specific information on the internet. Here, a key role for the teacher involved helping students locate reliable information.

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Last but not least, Principle 10 – teachers model enthusiastic reading – was very much fulfilled, as the first author of the current article is enthusiastic about both EE and ER, and she did her best to help students grapple with the challenges involved in their project and the readings they did as part of the project.

Hence, this project was not conventional, stand alone ER, but was an approach to integrate ER with a particular output, in this case a Gallery Walk on an environment theme. Project- based non- fiction reading could supplement an ongoing ER program that fits more closely with Day and Bamford' s principles, especially principles 4 and 7, about the quantity of reading and the ease of the reading material. This means that students decide on a project first and then find ER materials on that topic.

Conclusions

The following three factors highlight the impact of this project which combined EE and ER.

1. Teachers' self-efficacy factor in ER

The ER project integrates ER with an environment- focused, output- based aim. Thus, it was not merely an input- based reading activity, but it also integrated reading with a real world scenario. As Lee (2010) and Byun et al. (2011) observed, the goal of language learning has moved beyond merely acquiring a communicative tool and is also about obtaining a valuable commodity that strengthens countries' and individuals' global influence and international role. In the case of the first author, a long- time advocate for and user of ER, by doing this project, her self-efficacy belief in applying ER rose, as she was able to supplement her use of graded readers. In this way, the project strengthened Day & Bamford's (2002) principle of the teacher's role to guide and keep track of student progress. Equally importantly, according to Bandura (1997), teachers' self- efficacy influences the kind of learning environment that teachers promote for their students.

2. Language proficiency factor in ER

During the Gallery Walk sessions, students had to explain and describe the ecosystem to the visitors. This activity required students to read extensively on ecosystems generally and in particular, the ecosystems they had built - the functions, benefits, and even overcoming the challenges. The positive feedback received from the visitors suggest the students had done well on both receptive and productive skills. The communicative nature of student interaction on the project is in line with the use of interaction to support language learning, as it the transfer of linear information to non-linear form in the posters. However, this project clearly did not include a pretest-posttest study with a control group and random assignment to conditions.

3. Peer cooperation factor in ER

One of the clearest impacts from the project was the team spirit among the 16 members. From the first day of deciding on the project, reading and sharing information on the ecosystem, creating the seven stations, and carrying out the gallery walk sessions, all students cooperated. Besides this commitment and diligence among members, another positive factor that emerged from this project was the determination of the students to share their knowledge with other classes. The students were keen to highlight nature' s ability to evolve and the role we can play to protect the environment. The initiative by the students is a small step in showing their participation to protect the environment and their connection to the world beyond the classroom. Author (1993) opined that language is often best taught through content, and that as educators, we have a broader role to play, which includes helping students to become good citizens. In this regard, a visitor to the project' s Gallery Walk wrote in the feedback form that the "The part I liked most was the cheer that the class led us to construct and perform at the end: 'Glory, glory ecosystem; we care and love you.'" Author and Goatly (2000) suggested the need for teachers and students to develop their own materials or to adapt coursebooks, rather than slavishly following existing materials. ER can take up this challenge and perhaps become even

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more engaging by supplementing graded readers with materials found online and elsewhere, and by linking ER to EE and other contemporary efforts to make the world an even better place.

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