

# Using Social Networks to Conduct Online Eco-Project Based Learning with Students

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## Abstract

The article explores the integration of social networks into Eco-Project Based Learning to enhance the quality of education and increase ecological awareness among young people, aligning with the United Nations Sustainable Development Goals. The Eco-Project Based Learning methodology is adapted to facilitate online student eco-projects conducted through social networks. The key pedagogical practices dedicated to Eco-Project Based Learning were examined and provided examples of the main parts of online student eco-projects for Ukrainian youth on social networks. In this context, online student-driven Eco-Project Based Learning initiatives aim to cultivate innovative ideas in the industry of renewable energy for Ukraine. The article outlines the process of utilizing social networks to engage students effectively in the educational process as well as suggests refined strategies for idea dissemination and success achievement in the modern digital world. It scrutinizes the crucial role of social networks in promoting educational initiatives, offering practical insights for the creation of online student Eco-Project Based Learning works, audience interaction, and maximizing the overall impact. This innovative educational approach aspires to empower young people while addressing critical sustainability challenges.

## Keywords

Eco-Project Based Learning, social networks, sustainability, online, education, students

## 1. Introduction

Quality education for sustainable development is crucial in preparing students to address the challenges of the 21st century, including climate change and resource depletion, while fostering a sense of responsibility and stewardship towards our planet [1].

The integration of Ukraine within the European educational framework underscores the urgency of modernizing domestic higher education. This transformation aims not only to prepare highly skilled specialists but also to develop their non-professional competencies, enabling them to adapt swiftly to the evolving socio-economic conditions and meet the demands of a market-driven economy.

In the context of distance learning for Ukrainian higher education students affected by Russian military aggression, there is a compelling need to incorporate interactive information and communication technologies into the educational process. This objective can be accomplished by utilizing social networks and implementing online educational initiatives.

In an era defined by digital connectivity and an ever-increasing need for environmental awareness and action, the integration of Eco-Project Based Learning (Eco-PBL) with social networks emerges as a powerful educational strategy. The intersection of technology and ecological consciousness is transforming the way students engage with real-world challenges and collaborate on solutions. By leveraging the ubiquity of social media platforms and the principles of Eco-PBL, educators have a unique opportunity to foster environmentally responsible citizens who are not only informed but also actively involved in preserving our planet.

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## 2. Literature review

A review of the literature reveals the presence of numerous studies focusing on various aspects of integrating social networks into the educational process [2-7]. Our study, in particular, addresses the promotion of online educational eco-projects through social networks using methods of Eco-PBL to enhance learning effectiveness. Additional insights into increasing audience engagement and attracting participants to online projects via social networks can be found in [8-9]. However, there is a significant gap in the literature regarding the provision of online projects through social networks for higher education students in colleges and universities.

Figure 1 illustrates the reasons for the students' use of social media [5]. The chart highlights that the most common student activities on social networks include searching for academic information and engaging in self-education.

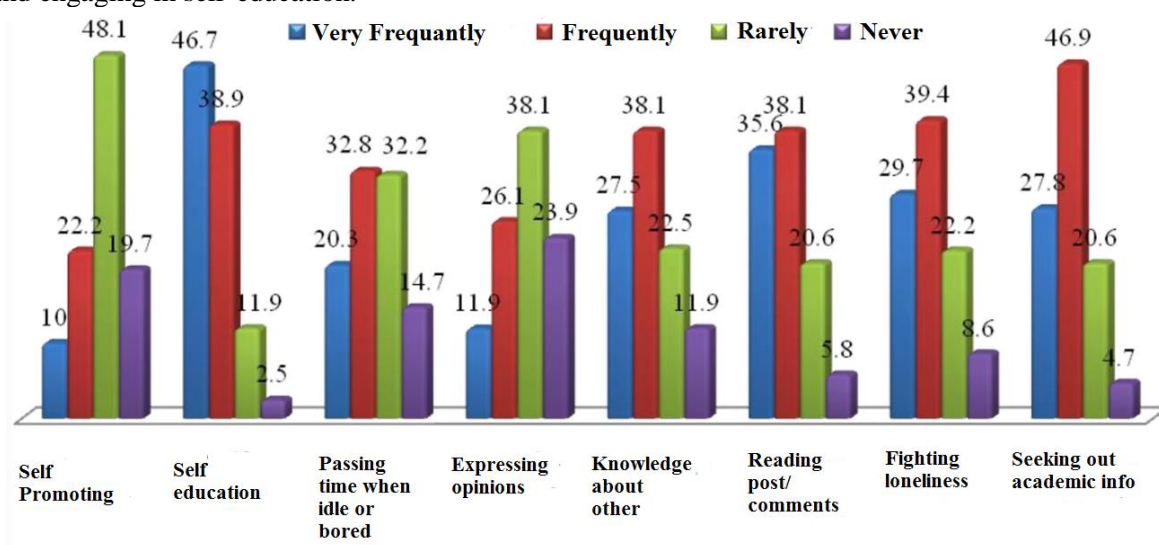


Figure 1. Reasons for Using Social Media [5]

The most popular social media platforms in Ukraine are presented in Fig. 2.

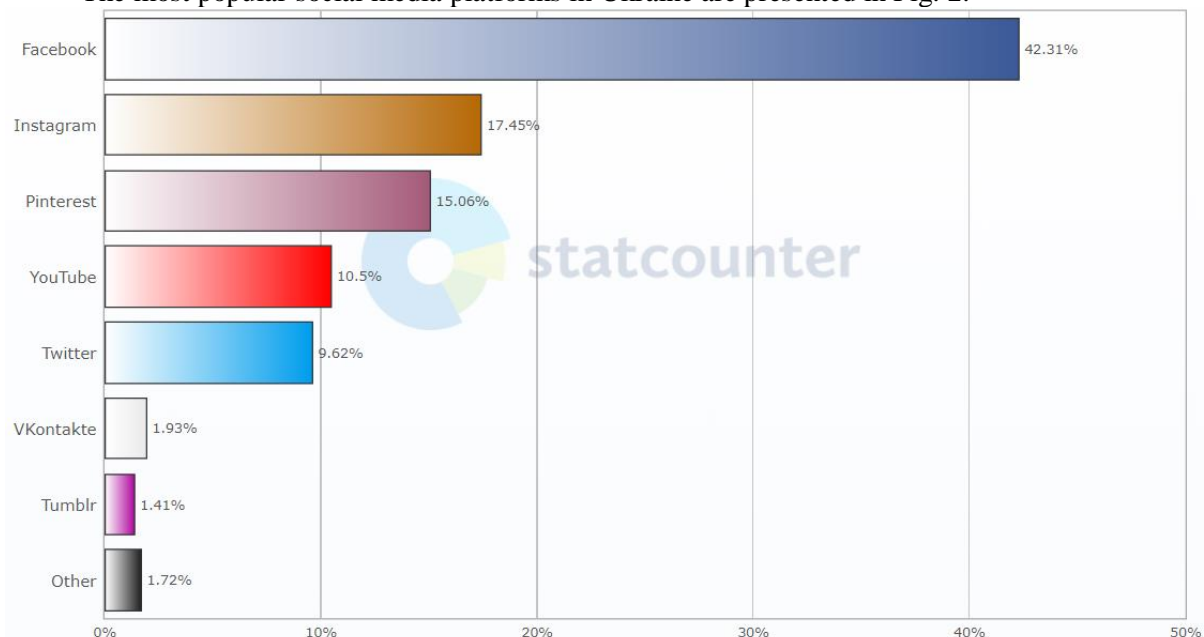


Figure 2. Social Media Stats in Ukraine [10]

An essential aspect of developing an online educational Eco-PBL project on social networks involves the process of generating creative ideas. Methods for developing creativity and their practical

results are explored in [11-12]. The perspectives and preferences of the target audience can serve as the base for shaping the project's concept.

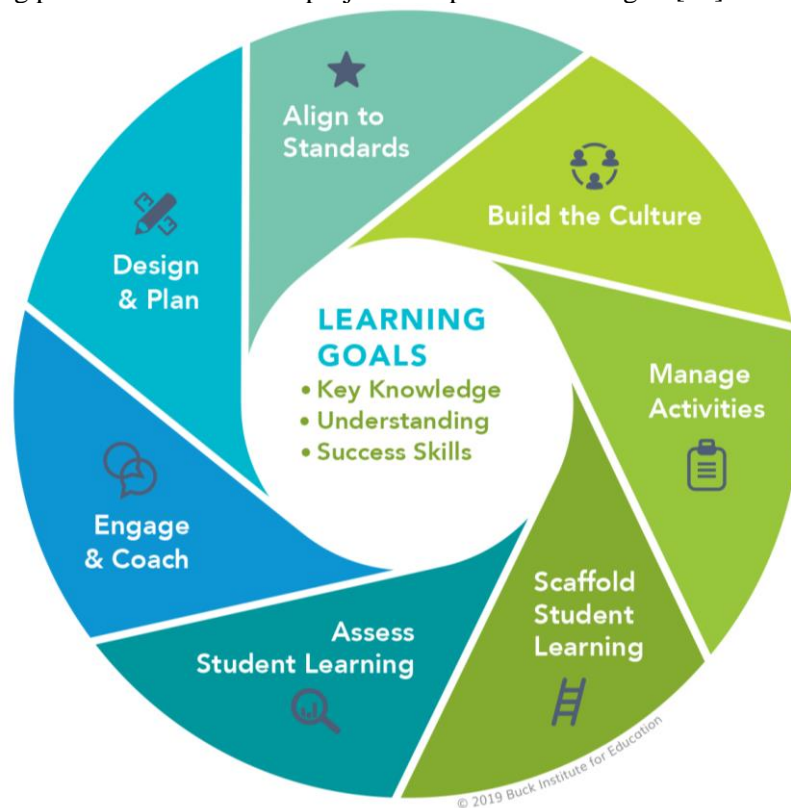
Many studies devoted to the PBL strategies [13-18]. In our study, we examine Eco-PBL as an educational approach that combines problem-solving with environmental and sustainable issues of our country using social networks for Ukrainian students.

The purpose of this article is to explore the use of social networks in student Eco-PBL projects with a focus on methods and approaches for drawing the attention of the target audience, enhancing participation, and gaining recognition within the educational environment, all while promoting ideas related to sustainable development.

### 3. Eco-Project Based Learning

Eco-Project Based Learning (Eco-PBL) is an innovative approach to education that combines project-based learning with a focus on environmental sustainability. It engages students in meaningful, real-world projects that address environmental issues and challenges.

The key teaching practices for Eco-PBL projects are presented in Fig. 4 [14].



**Figure 3.** Gold Standard PBL: Seven Project Based Teaching Practices [14]

These teaching practices include:

1. Design and Plan. Educators develop or modify a project suitable for their specific context and students, then design its execution from initiation to completion, while also incorporating a level of student input and options.

2. Align to Standards. Educators apply academic standards as a guide to structure the project and ensure that it encompasses essential knowledge and comprehension in the relevant subject areas.

3. Build the Culture. Educators actively encourage and foster an atmosphere that supports student autonomy and development, inquisitiveness without strict boundaries, collaborative teamwork, and a strong emphasis on delivering high-quality work, both directly and indirectly.

4. Manage Activities. Educators collaborate with students to structure activities and timetables, establish progress markers and due dates, locate and utilize available resources, generate final products, and share them with the public.

5. Scaffold Student Learning. Educators utilize a diverse range of lessons, resources, and teaching methods to assist all students in achieving the project's objectives.

6. Assess Student Learning. Educators employ both ongoing assessments (formative) and final assessments (summative) to gauge students' grasp of knowledge, comprehension, and essential skills. These assessments may also encompass self and peer evaluations of individual and team-based work.

7. Engage and Coach. Educators actively involve themselves in the learning process and collaborate with students. They recognize instances when students require additional skill development, redirection, motivation, or acknowledgment, and provide support accordingly.

When making the transition to Eco-PBL, a significant challenge for many teachers is the necessity to relinquish some level of control within the classroom and place trust in their students. However, in this article, we focus on online Eco-PBL for students in higher education institutions of Ukraine who have gained valuable experience in online education during the Covid-19 pandemic. Moreover, due to the Russian military aggression in Kharkiv, a front-line city, online education is being approached with the safety of students and teaching staff as a paramount concern.

In the Eco-PBL method, numerous conventional teaching practices are retained and redefined within the framework of an eco-project.

An example of Eco-PBL project is the study of renewable energy technologies, which is relevant to the sustainable development of our country and post-war reconstruction. This project is student-driven. The main idea is that the online materials prepared by students (videos, presentations, posters, articles, and other) can be used in schools to raise the awareness of schoolchildren in the industry of renewable energy using social networks. As part of career guidance work, the Ukrainian Engineering Pedagogics Academy cooperates with many schools and colleges in Kharkiv as well as the Kharkiv region.

This is a four-week interdisciplinary eco-project. It is driven by technical disciplines and social studies, with other subjects thematically related.

Week 1. Objective: Students will be able to identify issues of climate changing due to applying fossil fuel and its effect on the planet. Teachers create some activities based on renewable energy technologies that align with students' prior interdisciplinary learning.

Week 2. Objective: Students will be able to explain the importance of implementing renewable energy technologies in protecting climate and providing sustainability. Students take a survey and interview each other about being eco-activists or energy experts. This is one of the aspects of PBL in a professional context.

Week 3. Objective: Students will review the opportunities of renewable energy in Ukraine and explain actions we can take to use them. Here, it can be developed student abilities to locate relevant information from graphics. They use infographics (authentic texts) from different sources, they find information that can be used to complete the writing and presenting activities next week.

Week 4. Objective: This week, all classes will focus on writing a script for a video to pupils from schools about renewable energy technologies and their effect on our planet.

These considered types of activities can be implemented online using social networks.

## **4. Social networking**

The value of social networks in pedagogical activities is determined by their capacity to facilitate a wide range of educational objectives. On social networks, it is possible to effectively organize teamwork for long-term projects, share international information, and enable continuous learning and self-education for individuals who can work remotely, even if they are located in different countries.

### **4.1. Advantages of using social networks in the educational process**

The use of social networks in education offers several significant advantages for both teachers and students, including:

1. Enhanced Communication Efficiency: Social networks facilitate streamlined and efficient communication between teachers and students, making it easier to exchange information and provide support.

2. Convenient Collaboration: They offer a convenient platform for organizing collective research or practical activities, fostering collaborative learning and project work.

3. Diversified Learning: Social networks present an opportunity to enrich the educational experience by incorporating creative projects, fostering innovation, and engaging students in dynamic and interactive learning activities.

Furthermore, it is worth noting the accessibility of social networks in the educational process, which aligns with the goal of inclusivity and provides opportunities for an interactive and engaging educational experience.

Thanks to social networks, students can access online education regardless of location and time. This form of education ensures interactive interaction between students and teachers and activates students' independent work with information network materials.

## **4.2. Analyzing the classification of social networks and their opportunities**

We can classify the main types of social networks according to their purpose:

- Communication Networks (e.g., Facebook, LinkedIn, Telegram, Viber, WhatsApp). These platforms are designed for people seeking communication without a specific common interest. Users can choose to share or withhold personal information. Their primary purpose is to establish communication channels within various communities.

- Media Sharing Networks (e.g., Instagram, YouTube, TikTok, Snapchat, Twitch). These networks revolve around the sharing of various forms of media content. Users actively engage in sharing and consuming media.

- Feedback and Review Networks (e.g., Foursquare, TripAdvisor). These networks have a narrow focus, where users primarily provide feedback and reviews about specific places, events, or individuals.

- Showcase Networks (e.g., Pinterest, Flipboard, StumbleUpon). Users on these networks create personal profiles to showcase their skills and share their work results.

- Authorship Networks (e.g., X, Tumblr, Medium). These networks provide a platform for users to publish personal content, such as blogs, articles, opinions, and personal diaries.

- Discussion and Debate Networks (e.g., Quora, Reddit, 4PDA). These social networks aim to create platforms for open discussions and debates. They often operate on a "question-and-answer" system, encouraging engagement and conversation.

Social media platforms offer students a wide range of educational resources and activities. They can listen to lectures, watch educational videos, take quizzes, complete assignments, engage in discussions with teachers, and acquire knowledge through infographics and interactive games, among other options. Organizing education on these platforms is made possible through using modern information technologies, including web resources. These web resources come in various formats, such as archives, graphics, videos, and audio files, enhancing the educational experience.

In the present day, video conferencing platforms are rapidly gaining popularity among both teachers and students. These platforms enable a wide range of educational activities, including individual classes, screen sharing for interactive discussions, lecture recording, and the presentation of educational materials.

A distinct format of online Eco-PBL projects involves utilizing a platform to host project portfolios on a website. Google Sites is frequently employed for this purpose. Google Sites is a user-friendly website builder that allows users to incorporate various types of information, including documents, surveys, presentations, and databases. Additionally, it offers the capability to set access parameters for the site, making it a versatile tool for creating and sharing eco-project portfolios.

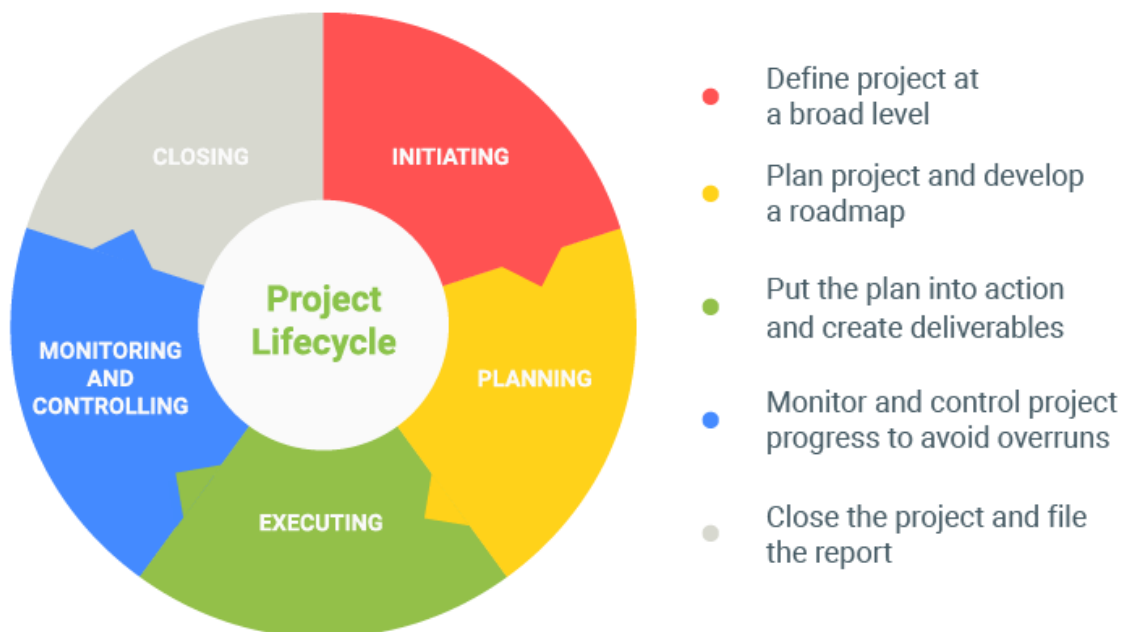
Google services comprise a network accessible to any registered user with a Google account. Through these services, the owner can grant access to various files and resources to other users. In essence, Google services facilitate the collaboration of a community of interested individuals online, thus creating a novel educational environment beyond the confines of a traditional educational institution. This environment fosters the activation of students' cognitive engagement and the development of their creative and analytical skills.

### 4.3. Main stages of implementing an online Eco-PBL project on social networks

An online educational Eco-PBL project represents a modern educational and cognitive method for students. It involves a goal and task, a set of agreed-upon methods, and activities directed toward achieving a common outcome in the resolution of significant issues for project participants. Our educational Eco-PBL project is created using social networks. This type of work is characterized by common features of projects:

1. Planning actions to address a problem.
2. Information gathering, which is subsequently processed and comprehended by students.
3. Designing a 'product' that represents the culmination of this endeavor.
4. Presenting the 'product' to communicate the results of the Eco-PBL project.

The project life cycle consists of distinct phases that outline the process of project implementation. These phases typically include: Initiating, Planning, Executing, Monitoring and Controlling, Closing [19].



**Figure. 4.** Step-By-Step Project Lifecycle Methodology [19]

The initiation phase starts the process of developing the Eco-PBL project concept, where a preliminary plan is formed for subsequent approval. Concept development is a multifaceted process, influenced by a variety of factors.

The concept of an online Eco-PBL project includes several crucial elements, including: a detailed description of the project idea; identification of the involved stakeholders, along with their issues and interests; the eco-project's goals and criteria for measuring success; specific project tasks; key product attributes; a breakdown of events and activities.

The idea is for students to create an educational eco-project designed for schoolchildren with the goal of promoting the principles of sustainable development. This initiative not only boosts students' educational motivation but also provides an innovative alternative to traditional teaching methods.

To gain a comprehensive understanding of the target audience, one effective method is the 5 W's analysis, developed by M. Sherrington, which involves a set of questions that help uncover the needs, desires, and requests of the target audience [12]. In the context of creating an educational online Eco-PBL project, it is crucial to seek answers to the following questions (Table 1):

Who: Identifying the target audience and potential users of the project.

What: Understanding the specific needs and preferences of the audience, as well as the type of content or resources they seek.

Where: Discovering where the target audience spends their online time, including which social networks or platforms they use.

When: Determining when they are most active online and their preferred times for engaging with educational content.

Why: Exploring the reasons the audience might be interested in the online project and the motivations driving their engagement with educational materials.

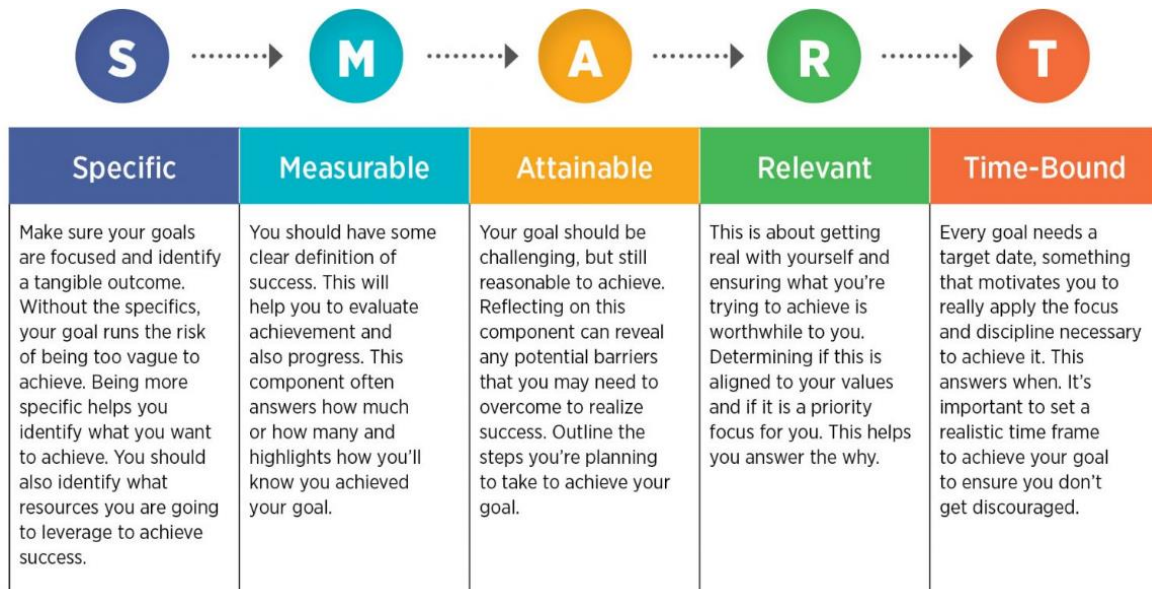
By addressing these questions, we can tailor our online educational Eco-PBL project to better align with the needs and expectations of the target audience.

**Table 1**

Characteristics of the target audience of the online educational project according to the 5W method

Question	Description
Who?	The primary target audience comprises pupils in high school levels. These learners should be inspired by concepts related to sustainable development, energy saving, and resource management. They require motivation to enhance their learning experience, and an interactive approach is important. Furthermore, there is an additional audience to consider, which includes educators and parents of schoolchildren.
What?	The goal is to acquire or improve skills and abilities in energy and resource saving in everyday life in accordance with the course of sustainable development of our country, develop creativity, meet new people, find new opportunities for self-realization.
Why?	In order to gain new or additional knowledge; to increase the motivation to learn, so that the implementation of the goals of sustainable development is more interesting.
When?	During their time in school, as well as in extracurricular clubs and similar additional educational settings.
Where?	On social networks, the internet, and platforms for media and video hosting.

To enhance the comprehension and achievement of the project's objectives, we propose employing the SMART goals system, Fig. 5 and Table 2 [20-21].



**Figure. 5.** SMART goals [20]

The activity of our student Eco-PBL project on social networks involves the process of development, creation and presentation of educational and scientific content for schoolchildren.

**Table 2.**

The SMART goal for the Eco-PBL project

Definition	Description
Specific	Creating an online educational Eco-PBL project with students, aimed to schoolchildren.
Measurable	- involved students, schoolchildren, teachers; - thematic and educational events at online conferences; - constant content filling of social networks.
Attainable	The goal is achievable due to: - creating pages on social networks; - active sharing information about the establishment of the student Eco-PBL project for schoolchildren through social networks.
Relevant	The creation of an eco-project will help to increase students' and schoolchildren's knowledge of sustainable development and issues of energy and resource saving, as well as promote motivation to study.
Time-Bound	1 month to create an Eco-PBL project and the necessary educational material, shoot video lectures and fill social networks with this content. Next - the continuous time of its action.

Applying social networks for conducting online educational Eco-PBL projects can be highly effective. The main stages of this process are outlined below:

1. Creating a profile and Eco-PBL project page. Initially, it is imperative to establish or revise one's personal social media profile and establish an independent page or profile dedicated to the educational Eco-PBL project. This page will serve as the platform for disseminating project-related content.

2. Defining the target audience. Identify the specific characteristics of the audience that the educational Eco-PBL project is intended for. Tailor the content to resonate with this particular audience and formulate strategies to effectively engage and attract them.

3. Posting useful and interesting content. Consistently share content that holds both interest and value for the target audience. This content may encompass brief videos, written articles, informative infographics, Q&A sessions, and similar formats. Maintain a consistent and cohesive style throughout posts.

4. Using hashtags. Relevant hashtags can help you find the target audience. Additionally, this approach will enhance the visibility of your content in social network search results.

5. Collaborating influencers. Consider collaborating with influencers in your industry or learning segment. They can help attract more students and increase the circulation of the educational eco-project.

6. Driving engagement and discussion. Create incentives for your audience to comment, like and share your content. Active discussions and interaction will help attract new learners.

7. Analyzing and improving. Use social media analytics tools to determine the effectiveness of your strategy. Based on this data, you can refine your approach and adapt your engagement strategy.

8. Launching advertising campaigns. We can consider this possibility on social networks to attract new students. They should be targeted precisely at the target audience.

Today's youth prefer viewing blogs on various topics, interviews, entertainment, and humorous programs. The selection of content based on search queries is available on YouTube video hosting. The advantages of Youtube is that you do not need to register and identify yourself to use this platform. You only need to enter keywords in the search engine and similar topics will be grouped into the list of your preferences. Access to such a communication channel is almost unlimited. Authentically combined visuals and ideas help users choose exactly the content they are looking for on YouTube.

Telegram is the most popular messenger among young people and mostly high school students. Therefore, it is effective to consider it for the implementation of an educational Eco-PBL project. These can be channels with articles on a certain topic, development of stickers to improve interactive



learning, games, as well as surveys. Telegram is not a social network, but a messenger. However, it is advisable to consider it, because currently the application includes Telegram bots, Telegram channels, and Telegram chats. All this is a platform for the placement and presentation of educational information. For example, teachers can maintain an educational media page in the Telegram channel, while giving feedback to students in the Telegram chat and create an auxiliary tool from any information in the Telegram bot.

## 5. Practical results for implementing social networks in Eco-PBL projects

The Ukrainian Engineering Pedagogics Academy actively engages in career orientation initiatives for high school pupils in grades 10-11, vocational school students, and college attendees at the Kharkiv region. These efforts encompass activities such as "Open Door Days," virtual tours of department laboratories, and a range of thematic events including the use of social networks and online Eco-PBL projects. The Department of Automation, Metrology, and Energy-Efficient Technologies focuses on fostering awareness about renewable energy technologies as well as resource saving, actively contributing to the promotion of sustainable development ideals among young people.

Participation in Eco-PBL and individual growth contribute positively to student academic achievements (based on data from students' academic performance at the Faculty of Energy and Automation, Ukrainian Engineering Pedagogics Academy).

## 6. Conclusions

A feature of the functioning of the online Eco-PBL project is a high degree of interactivity between participants who are separated both geographically and in time. Implementation of online Eco-PBL projects has its own social advantages of personal interaction. Students can express their thoughts at different times, they are more thoughtful about their responses to class materials and their classmates' questions than in a traditional classroom.

Another advantage of digital learning using social networks is that it records almost everything that happens on a given platform. All materials, correspondence and interactions can be in an electronic cloud environment. Participants can go back and view course materials, lectures and presentations, as well as correspondence between participants. This information is generally available at any time to the participants of the educational process, which makes learning mobile, adaptive, and effective.

## 7. Acknowledgements

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