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Research Article

Students' e-worksheet based on project and Character of Pancasila through environmental issues: What are the characteristics?

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Abstract: This research aimed to describe the character of project-based learning that uses e-worksheets with the integration of Pancasila values. This qualitative descriptive research uses interview techniques, observation, and literature study in data collection. Based on the observation results, each feature of the Pancasila student profile dimension was reflected in the learning syntax with the expected development criteria. The project-based learning is beneficial in developing the Character of Pancasila through the student strengthening project. Characteristics of project-based learning include: (1) independently, from planning, preparation, and manufacture to product presentation; (2) full responsibility for the project created; (3) involving peers, teachers, parents, and even the community; (4) train students' critical and creative thinking skills; and (5) space for dissemination of ideas. The Pancasila learner profile's dimensions are reflected in the electronic learner worksheet, within each project-based learning syntax presented in learning activities. The syntax for project-based learning includes (1) basic questions; (2) designing project planning; (3) developing a schedule; (4) monitoring project activity and development; (5) testing results; and (6) evaluating the learning experience. By following this syntax, students are expected to develop the dimensions of the Pancasila learner profile, which include: (1) believing in and fearing God, and having noble character; (2) embracing global diversity; (3) working collaboratively; (4) being independent; (5) critical reasoning; and (6) being creative.

Keywords: Character of Pancasila; e-worksheet; project-based learning.

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1. Introduction

The progress of education in Indonesia depends on how we respond to changes that occur dynamically (Handayani, 2020; Putri & Sesunan, 2019). More explicitly, the dynamics that occur need to be mapped within a curriculum framework that continues to be improved and developed on an ongoing basis (Hadzigeorgiou & Schulz, 2019; Lase, 2019). The implementation of the independent curriculum which is currently underway is an embodiment of systemic change through education, one of the aims of which is to produce a generation of students who have the character of Pancasila (Rohmah et al., 2022; Sari et al., 2023; Thompson, 2011). In this case, the government wants the results of the education system in Indonesia to have complete characters such as noble morals, respect for diversity, ability to collaborate, be independent, and reason critically and creatively (Haqiem, 2023; Irawati et al., 2022; Sari & Sinthiya, 2022). The independent curriculum focuses on developing students' talents and interests by optimizing project-based learning, soft skills and character development according to the Pancasila student profile. Indarta et al (2022) and Suriswo et al (2023) stated that learning in the independent curriculum has variations where the content is optimized which can provide sufficient time for students to explore a concept and develop their skills.

In practice, implementing the curriculum in schools requires learning media that can embody independent learning and its contextualization in the environment. Therefore, the implementation of an independent curriculum must be supported by

learning media that is relevant for students (Suriswo et al., 2023). Several researchers say that the current learning media has shifted to the use of digital media which can support the implementation of e-learning (Dhawan, 2020; Nikou & Maslov, 2021). Chiu (2022), Du et al (2018), and Yıldırım (2022) stated that e-learning is in line with current developments. One of the appropriate learning media for independent curriculum learning is the use of e-worksheets. This media can facilitate student learning through digitizing learning devices that can be viewed using electronic devices (Lathifah et al., 2021). This makes it easier for students to carry out project-based learning.

As previously explained, project-based learning is one of the focuses of implementing the independent curriculum (Carlina & Djukri, 2018; Indarta et al., 2022). Project-based learning models have been widely implemented in Indonesia (Alkautsar et al., 2023; Ilma et al., 2022; Purwaningsih et al., 2020). Some of the reasons behind using this model are the active involvement of students in the learning process and problem solving (Pressman, 2019; Young et al., 2023), working in groups and producing authentic work (Davidsen et al., 2020; Mamahit et al., 2020). The authentic products produced by these students are a real form of contextualizing learning in the classroom with the real world. Students are challenged to face real problems and significant problems that arise in everyday life, especially in the teaching and learning process (Zulyusri et al., 2023).

However, the system currently built does not optimally emphasize character formation and only focuses on cognitive aspects (Oktaviani, 2022; Widya et al., 2019). Therefore, it is important to shift the focus to learning that emphasizes character strengthening that is aligned with subjects, including biology. This is very important, because many problems in the environment are related to the study of biology. Unfortunately, biology learning is often still general in nature, one of which can be seen from how students' worksheets are made (Irawati et al., 2022).

This is proven by observations at various schools in the Special Region of Yogyakarta, including Senior High School (SHS) 1 of Depok, Senior High School (SHS) 2 of Yogyakarta, Senior High School (SHS) 1 of Sentolo, and Islamic Senior High School 2 of Bantul. Observation results show that biology material still does not fully involve students, and generally the media is still in the form of simple worksheets and general science textbooks even though they are equipped with Pancasila profile dimensions. This is similar to what was expressed by An'navi and Sukartono (2023) who stated that teachers are still lacking in the development and use of electronic media. Based on this description, this research aims to investigate the characteristics of electronic student worksheet learning projects based on Pancasila student profile dimensions in environmental change material.

1. Methods

This qualitative descriptive research took place in the Special Region of Yogyakarta with a high school population. Senior High School (SHS) 1 of Depok, Senior High School (SHS) 2 of Yogyakarta, Senior High School (SHS) 1 of Sentolo, and Islamic Senior High School 2 of Bantul were selected using a purposive sampling technique. Data collection techniques in qualitative research are observation, interviews, and literature study. Researchers involved teachers at the four schools as interview subjects.

Observation is a data collection technique that is carried out by studying and making direct observations. Literary research was carried out to obtain secondary data which will be used as a theoretical basis for the problems studied. There are four stages of literature study carried out including preparing the necessary equipment, preparing a working bibliography, managing time, and compiling notes on research materials (Wegerif, 2002). Sources used in this literature study include books and research articles that have been conducted.

2. Results

The results of the interviews showed that teachers experienced difficulties in developing learning media with the character of Pancasila. More specifically, material that needs to be closely related to problems in the surrounding environment (Taskiran, 2021). Teachers have difficulty developing project-based learning because they do not understand the syntax and what activities are carried out during the teaching and learning process. On the other hand, biology teachers are also often faced with time constraints and a lack of technological literacy. It makes teachers unable to develop project-based electronic worksheets with Pancasila learner profile and referring the students' need.

The results of observations during the teaching and learning process also show that there are limitations in the use of learning resources. Often students are only given instructions to summarize the material independently without any learning media. Learning in schools has not yet implemented character education and project-based learning with the Pancasila student profile dimension. The use of learning technology is also still limited so that the teaching and learning process is only limited to the use of printed teaching materials in the form of textbooks. This kind of condition is in line with research by Sutrisna et al (2020) which revealed that in teaching and learning activities teachers do not optimize the learning resources available around them but are only limited to using books that are already available and rarely use digital media. Apart from that, the learning process is still teacher-centered, causing students to be less active and less likely to understand the material taught at school.

The characteristics of students' project-based learning worksheets with the Pancasila student profile dimension should include:

2.1 Students' e-worksheet

Students' e-worksheet is a collection of sheets containing a summary of student learning activities and practice questions that can be accessed online using digital features such as video, animation and sound (Lathifah et al., 2021). Prastowo (2015) explains that as teaching material, students' e-worksheets must fulfil at least four functions, namely (1) minimizing the teacher's role but activating students more; (2) making it easier for students to understand the material provided; (3) concise and full of tasks for students to practice; (4) can be opened anytime and anywhere without being hindered by time and space. Students' e-worksheets must also meet didactic, structural, and technical requirements. The didactic requirements in question include providing space for students to actively participate in the learning process, focusing on the concept discovery process; encouraging students to learn independently, and developing communicative, emotional, moral, and aesthetic skills in students.

Students' e-worksheets also need to meet construction requirements which include language use, sentence structure, choice of diction, and vocabulary. This needs to be considered before students' e-worksheets are developed to make it easier for students, as users, to understand the context being studied. Technical requirements in developing students' e-worksheets relate to writing, selection of images and videos, and integration of supporting links. Preparing practice questions and student projects is also a substantive matter that must be planned well.

To integrate the Pancasila character, the essential aspects that must be studied in the students' e-worksheet are the general description of the material as well as the profile dimensions that are most relevant to the student's learning experience (Ramdani, 2018). Alkautsar et al (2023) and Sasmita et al (2021) states that what must be considered in preparing students' e-worksheets are the components contained in the student sheet, such as guidelines for using e-Learners sheets, project-based learning steps; learning outcomes and objectives, concept maps; to evaluation learning materials.

2.2 *Project-Based Learning*

The project-based model is often also called teaching that uses problems to make it easier for students to understand the theory being studied. This model uses a contextual approach to phenomena or problems that occur in the environment so that students can develop critical thinking skills to be able to solve problems and find the best solutions in dealing with them. Project-based learning is a learning technique that provides innovation in the art of teaching. The teacher's role in project-based learning is as a facilitator who facilitates students when asking about theory and motivates students to be active in learning (Anggraini & Wulandari, 2020).

Project-based learning is a learning model that can provide teachers with the opportunity to process learning in the classroom according to conditions or phenomena that occur in the environment through project assignments. The project assignments given consist of complex problem-based tasks, because the initial goal is to group and organize new knowledge based on knowledge in problem-solving activities, decision-making, implementation of design activities, and exploration, and allows students to work independently or in groups to produce authentic products. Project-based learning has the characteristic of developing students' thinking skills which allows them to develop creativity and skills and encourages them to collaborate (Sutrisna et al., 2020).

Several researchers stated that project-based learning facilitates students to make their own decisions within a predetermined framework (Sukmawijaya et al., 2019; Sutaphan & Yuenyong, 2019). Students try to solve problems or challenges that do not yet have a definite answer or have several possible answers. This series of scientific activities stimulates students to actively think critically to solve problems and elaborate on the various information they have collected (Kodtharin et al., 2019; Lase, 2019). More than that, students will also learn to be responsible in searching for and managing the information they collect themselves. Another characteristic of project-based learning is the existence of a collaborative space with parties related to the project being implemented (Achilleos et al., 2019; Wilcoxen et al., 2020). The parties in question can come from internal circles at the school or even external circles such as experts and practitioners. The involvement of various stakeholders is to provide new perspectives to students. This will make it easier to carry out evaluations and reflections in a more in-depth and constructive manner.

2.3 *Dimensions of the student profile of Pancasila*

The character of Pancasila is a form of elaboration of national education goals. The Pancasila student profile is the main reference for direct education policy, including being a reference for educators in building the character of students according to the learning objectives of the independent curriculum. A crucial goal of national education is expressly stated in Law Number 20 of 2003, especially Article 3 which regulates the national education system, is to develop the potential of students to become individuals who are faithful, devout, of noble character, healthy, knowledgeable, wise, creative and independent, as well as becoming democratic and responsible citizens in the life of society, nation, and state (UU Republik Indonesia No.20 Tahun 2003 Tentang Sistem Pendidikan Nasional, 2003).

The Pancasila student profile (Figure 1) refers to the ideal image of Indonesian students who continuously develop themselves through lifelong learning, have competencies that can be applied globally, and behave following the Pancasila values which are the foundation of the country (Rohmah et al., 2023). The main focus of the student profile dimensions in shaping student character includes various important, interrelated aspects, namely: (1) having faith and being devoted to God, as well as having noble character; (2) embracing global diversity; (3) work collaboratively; (4) independent; (5) reason critically; and (6) be creative.

The character of faith and noble character means that students can understand religious teachings and beliefs and apply them in everyday life. In this case, the problems given to them are a means to get closer to Allah (Putra et al., 2020). This is

also related to the role of humans as leaders in the world. Furthermore, the character of faith can also be strengthened by implementing solutions that will very likely involve many elements (Memon, 2011; Sari & Sinthiya, 2022). One important aspect that can increase the success of a solution in solving problems is the ability to understand global diversity. In this case, students learn to preserve culture to foster mutual respect and opportunities to form a new, positive culture.

Figure 1. Character of Pancasila

The things that are done are nothing but real examples of collaborative work. Every student has the opportunity to work together voluntarily so that the activities carried out can run smoothly, simply, and easily. Several researchers state that volunteerism at work can foster students' awareness and independence so that they can become individuals who are responsible for the process and results of their learning. Furthermore, this sense of responsibility grows through thinking activities objectively through analytical and evaluative processes which culminate in the ability to make modifications and produce thoughts that are original, useful, and impactful.

3. Discussion

3.1 Students' e-worksheet component

The cover is prepared by showing the e-worksheet title, logos, author's identity, and images relevant to the material contained therein. Covers often escape the attention of teachers, even though covers are an important part of the learning media produced by educators. The cover functions to complement, support and strengthen the contents of the worksheet being developed. An attractive cover can arouse students' interest and desire to learn and understand the content of the material contained therein. This gives students a positive impression when they see the e-worksheet that has been developed. The cover is the first part that provides learning instructions, where the material that will be discussed is represented in the title of the e-learning worksheet and what projects the students are working on regarding problems that often arise in the

environment where they live (Darwis et al., 2020). Figure 2 shows the cover image of the project-based e-worksheet developed in this research.

Figure 2. Cover of students' e-worksheet

The general description in this case is intended to explain what and how the contents of the project learning worksheet with the dimensions of the Pancasila student profile were developed (Mukhlisotin, 2022; Sari & Sinthiya, 2022). Students' project-based e-worksheet contains material about environmental changes due to global warming and greenhouse gases. By providing an overview of e-learning worksheets, students can learn about the description, content, and desired goals in the worksheet. So that students can easily understand the direction and objectives of learning on the students' e-worksheet provided.

On the other hand, the students' e-worksheet is also equipped with teacher guidance so that they can adapt field conditions to the objectives being developed. Things that need to be included in the teacher's guide include activities before learning begins, during learning activities, and at the end of the learning process. At the beginning of learning, teachers need to convey the learning objectives and stimulate students to think with relevant trigger questions (Pluta et al., 2013). Furthermore, teachers need to guide students in determining projects, time planning, and implementing and evaluating projects (Baur & Emden, 2020). These activities are carried out when the core learning is carried out. At the end, teachers also need to stimulate students' reflective thinking by providing space for feedback on the learning material that has been studied.

Student guidelines are also prepared to make it easier for them not to encounter difficulties in the learning process so that learning objectives can be achieved well. Similar to the teacher's guide, things that need to be included in the student's e-worksheet include what the students' initial activities were, what they did during the project, and how they reflected on the project they were carrying out. We facilitate students with concept maps at the beginning. This is done to help students understand what concepts are related to the material being studied. Furthermore, this will help students in designing projects in subsequent learning activities such as forming groups and making innovation plans during project creation (Syafitri & Tressyalina, 2020).

Another part of the students' e-worksheet is the learning objectives which cover the three domains of knowledge, skills, and attitudes. The learning objectives developed in this students' e-worksheet include:

a) Ability to explain global warming and greenhouse gases;
b) Ability to identify facts related to environmental changes due to global warming caused by greenhouse gases;
c) Ability to analyze the impact of environmental changes
d) Ability to identify human activities that cause environmental changes
e) Ability to design global warming mitigation projects.

Besides that, students' e-worksheet is also equipped with a concept map. The use of concept maps is used to describe relationships between concepts in the form of propositions. This conceptual scheme actualizes the relationship between the main concept and various other intersecting concepts. For instance, the problem of global warming is closely related to the environment and greenhouse gases. Each of these topics can be divided into several discussion topics including definitions, characteristics, causal factors, mechanisms, and impacts.

3.2 *Project-Based Learning Integrating*

The project-based learning step in the students' e-worksheet begins with asking basic questions related to the theme of environmental change (Gorghiu et al., 2015; Zulyusri et al., 2023). We raise the phenomenon of global warming, changes in the hydro-meteorological cycle, and the greenhouse effect (Figure 3). We raised this problem because it directly deals with students' daily lives. We also stimulate further by asking who should be responsible for the changes that occur. This trigger question correlates with the Pancasila student profile which emphasizes critical thinking skills and global diversity. Furthermore, students are asked to dive deeper into the problem by observing the presence of plants around the school. Students identify plants in the environment that can reduce the effects of global warming due to greenhouse gases. Through this activity, students can study directly the morphological forms of plants found and learn the benefits they contain based on reference sources such as books and journals. In this activity, students are required to work together with their groups to look for as many plants as possible.

Figure 3. Basic question

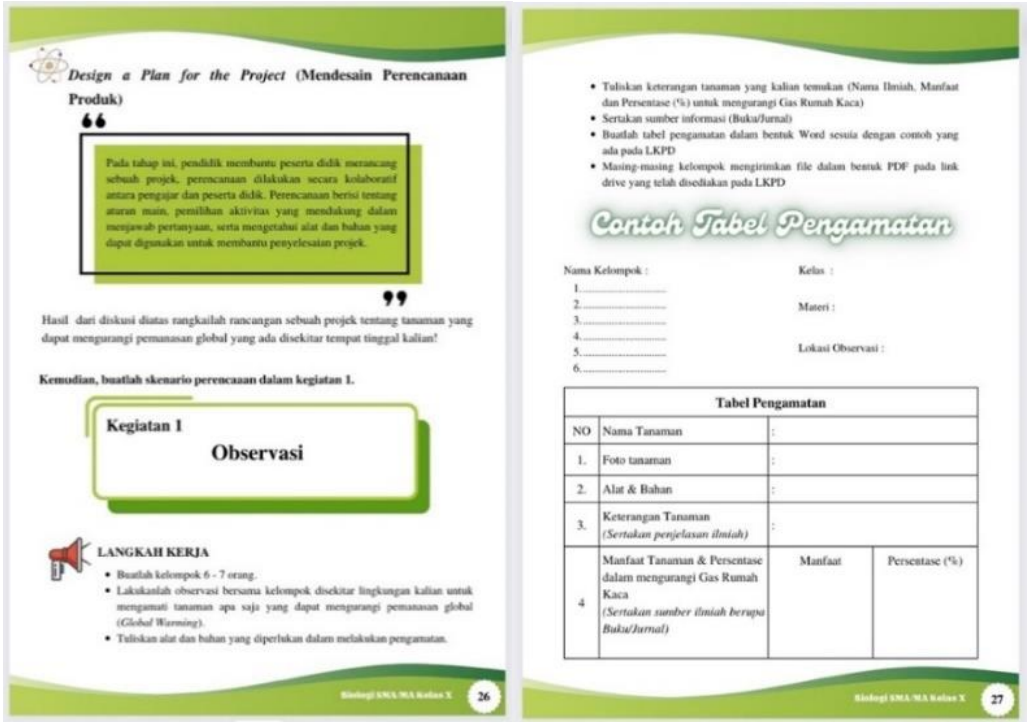

Figure 4. Observation activity project

Later, students will be guided in designing solutions that can reduce the impact of greenhouse gases that can cause global warming. Students are asked to make a monitoring table (Figure 4) that contains information about the tools and materials used during the observation process, the types of plants obtained, the location where the plants were taken, photos of the plants, and the function of plants in mitigating environmental changes caused by global warming. Implicitly, this activity is intended to enable students to love and appreciate plants as creatures created by God by getting to know them better. Moreover, students are also expected to be able to understand what types of plants can effectively reduce the impact of global warming (Dasgupta et al., 2019; Handayani, 2020).

The results of problem identification are translated into real action through projects. In this case, we are challenged the students to design the best vertical garden. This activity is relevant to the values of collaborative, critical, and creative thinking in the character of Pancasila. The implementation of this project is based on the results of identifying plants found during observations, especially plants that are effective as an antidote to environmental change to reduce greenhouse gas emissions due to global warming. This activity trains students to think critically to mitigate the impact of global warming and solve problems collaboratively (Liceaga et al., 2011; Rahman, 2019).

In this activity, there needs to be cooperation between groups to create a good vertical garden. For instance, how each group chooses appropriate plants and combines them in their vertical garden design (Figure 5). How the design and supporting components of a vertical garden are also a topic that needs to be discussed collaboratively in the group. Good cooperation within the group can speed up project completion. In this case, the creativity of each group plays a key role in creating a unique and aesthetic project, whether in terms of functionality and fineness.

Figure 5. Vertical garden manufacturing project

In project implementation, scheduling activities is one of the key aspects that need to be considered by student groups. The scheduling is essential to describe the relationship between activities and the project as a whole, identify priority relationships between activities, and show the estimated time required to complete the project. This activity is carried out so that students can work on projects systematically (Figure 6). A structured schedule can make students more responsible for the projects they work on. Meeting schedules can be arranged by mutual agreement between the teacher and students. The structured schedule aims to determine the relationship between work, both before and after, identifying the duration of each work and the duration of the project as a whole, as well as knowing the start and end time of each work. DePetris & Eames (2017) and Zulyusri et al (2023) states that project planning can help determine resource and time allocation priorities.

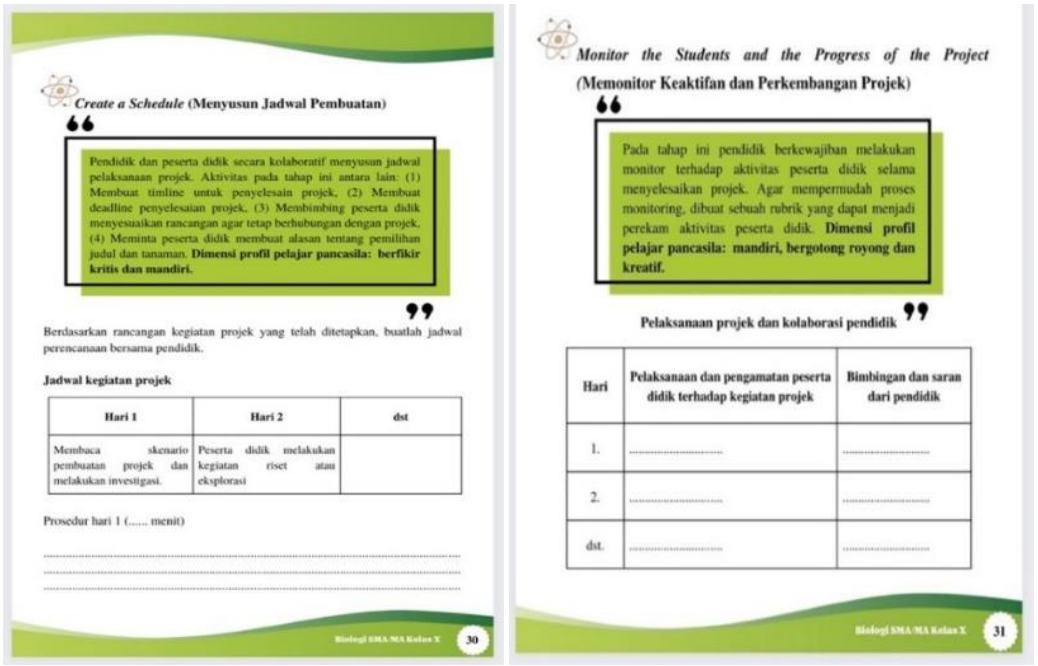

Figure 6. Project creation schedule and monitoring project activity

As a project facilitator, the teacher's role is to act as a mentor and discussion partner for students (Figure 6). Apart from that, teachers can also help students by connecting them with various relevant stakeholders in the projects being implemented. This activity aims to find out the extent to which students can understand the projects they are working on with their groups, as well as learning independently in dealing with problems.

Teachers can also provide feedback regarding the project and the results that students have obtained and even the level of understanding that has been achieved. Teacher feedback is provided in the form of a set of formative questions that can assess the depth of students' understanding of the main concepts of the projects they are working on (Figure 7). In that way, teachers can easily find out students' needs, the obstacles they face, and obtain information on student development, in order to develop further learning strategies. Several researchers report that this activity is material for reflection as well as a basis for improving the quality of learning.

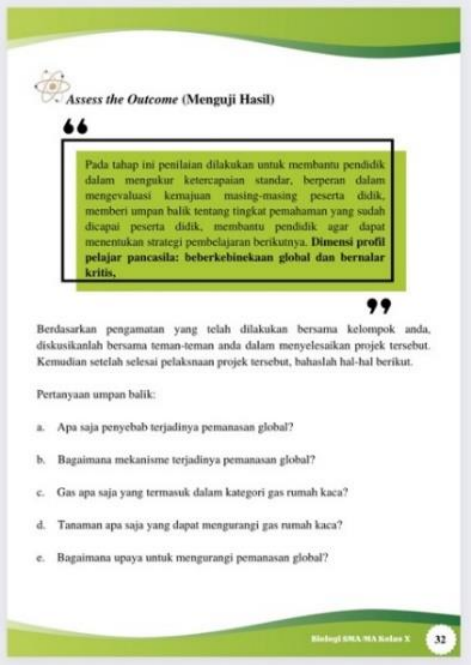

Figure 7. Feedback question for students

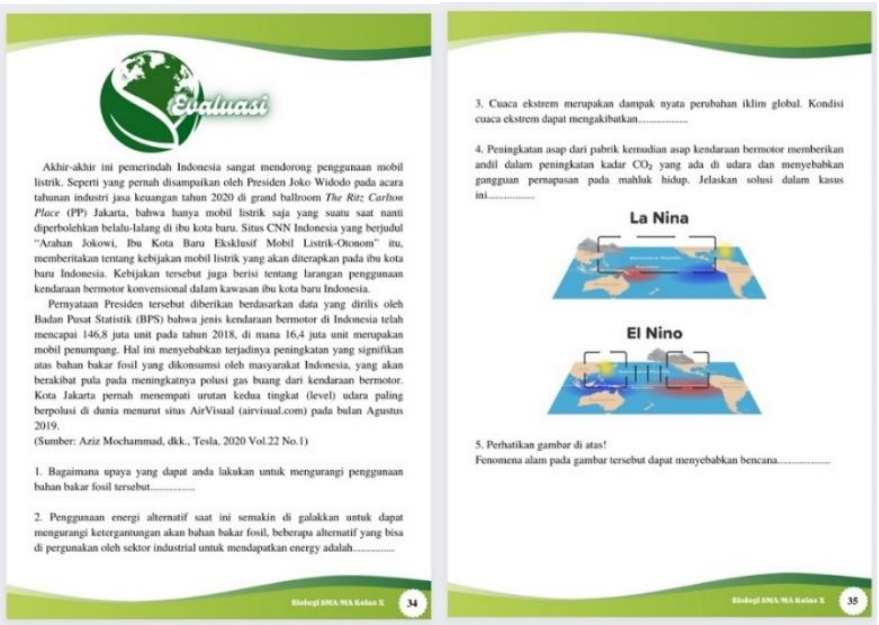

Figure 8. Evaluation

The reflection at the end of the e-worksheet is designed to provide space for students to express feelings and experiences gained during project implementation (Figure 8). This reflection is a small part of the evaluation that provides information related to student progress. More than that, reflection is also aimed at building a reflective learning culture, identifying abilities and difficulties, encouraging motivation, and assisting in the development of student behaviour. Doyle et al (2015) and Orosz et al (2022) said that evaluation is used to determine the extent of student achievement in obtaining the subjects that have been presented. Later than, teachers can get a real picture of how students relate to understanding environmental problems through the ideas offered and the characters that emerge through integration in learning.

4. Conclusion

The results of this research conclude that students' e-worksheets containing Pancasila characters can be developed through a series of project-based learning activities. Furthermore, this students' e-worksheet not only fulfils the elements of technical completeness but also emphasizes the cultivation of the six Pancasila character values in an integrated manner in the learning steps carried out.

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