

Development of an Outcome-Based Education (OBE) Approach in Conservation Biology Lectures to Increase Student Awareness and Conservation Efforts in the Campus Environment

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Abstract: This study aims to examine the application of the Outcome-Based Education (OBE) approach in Conservation Biology lectures and its impact on improving students' knowledge, practical skills, and attitudes towards conservation issues in the campus environment. This study uses a quantitative method with an experimental design, where data is collected through pre-test and post-test questionnaires, field observations, interviews, and evaluation of conservation projects carried out by students. The results showed a significant increase in students' knowledge of conservation, with the average post-test score increasing by 30%. Students also demonstrate improved practical skills in designing and implementing conservation projects, such as greening and waste management on campus. In addition, the implementation of OBE has succeeded in fostering a more caring attitude towards environmental conservation, with 75% of students showing a stronger commitment to conservation issues after attending OBE-based lectures. Student involvement in conservation activities on campus has also increased, with 70% of students actively participating in various conservation programs. However, this study also finds challenges related to limited resources and time in the implementation of larger conservation projects. Overall, this study indicates that the OBE approach can be an effective method in improving students' knowledge, skills, and attitudes towards conservation, and can strengthen environmental conservation efforts on campus.

Keywords: Conservation biology; Environmental conservation; Outcome-based education; Project-based education

Introduction

Environmental issues and nature conservation are now increasingly becoming global concerns. Ecosystem damage and biodiversity loss affect the balance of nature leading to threats to the sustainability of human life. Lack of individual concern for the environment can cause problems that often have a sustainable impact (Jayadinata et al., 2024). Therefore, conservation efforts

are very important and require active participation from various parties, especially the young generation who will be the nation's successors. In this context, education is the key to forming students' awareness and understanding of the importance of nature conservation.

Improper environmental management is one of the problems caused by the lack of environmental awareness of the community. Many green spaces such as plantations, forests, and rice fields, have been

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converted into residences, workplaces, commercial buildings, recreation centers, and other uses (Purnayudhanto et al., 2023). Not only knowledge about the environment but also attitudes and actions that reflect environmental care (Chan et al., 2019). Because the success of character education is not only from a cognitive perspective, but also affective and psychomotor (Ahmad, 2022; Marlina et al., 2022; Sin et al., 2022). By forming an attitude of caring for the environment from an early age, a generation will be formed who is more aware of the importance of protecting the environment. Students as prospective teachers need to have environmental awareness as a character value of environmental concern. Because later the prospective teachers will be an integral part of the teaching and learning process in developing human resources who have the potential to develop (Jainiyah et al., 2023).

One of the approaches that is now increasingly popular in higher education is Outcome-Based Education (OBE). OBE is an approach that emphasizes the achievement of measurable learning outcomes that are relevant to real-world needs (He et al., 2024). This approach focuses not only on mastering the material, but also on developing competencies that include the knowledge, skills, and attitudes needed to face life's challenges. In the Conservation Biology lecture, the application of OBE aims to ensure that students not only understand the basic theories related to ecosystems and biodiversity, but also are able to apply this knowledge in real conservation activities (Negara et al., 2024; E. Zulfa et al., 2022).

Outcome Based Education or OBE is also one of the *de facto* standards for the modern education system. Outcome is the peak of learning that should be able to be done by students at the end of the study program, and in the process at the end of the degree program. Therefore, OBE is an educational approach in which decisions about the curriculum are driven by the final learning outcomes that should be carried out by students in their professional lives (Syeed et al., 2022).

Integrating OBE in the Conservation Biology curriculum in higher education is expected to increase students' awareness of environmental problems and encourage them to be actively involved in conservation efforts, both on campus and in the wider community. A number of studies show that this competency-based education is effective in shaping character and improving students' practical skills in dealing with environmental problems (Yunus et al., 2024). Thus, the application of OBE in Conservation Biology lectures is not only a matter of knowledge transfer, but also building attitudes and behaviors that support nature conservation.

This study aims to develop and examine the application of the OBE approach in Conservation Biology lectures and its impact on increasing student awareness and participation in conservation efforts in the campus environment. It is hoped that the results of this research can contribute to the development of a more effective conservation education curriculum in producing students who are not only academically intelligent, but also care and actively involved in environmental conservation efforts.

Outcome-Based Education (OBE) is an educational approach that focuses on the outcomes or competencies that must be achieved by students or students after participating in the learning process. The concept was first introduced by William G. Spady in the 1980s and has become a popular model in many countries in an effort to improve the quality of education. In OBE, each component of education, including curriculum, learning strategies, and evaluations, is designed to achieve specific and measurable outcomes (He et al., 2024).

Basically, OBE emphasizes the competencies that must be possessed by students after completing a course or study program. These competencies include knowledge, skills, and attitudes that are relevant to the real world and the needs of society. In the context of higher education, the implementation of OBE aims to ensure that graduates have skills that are ready for use in the professional world and can make a positive contribution to the development of society, including in the field of conservation.

Conservation Biology is a branch of biological science that studies the protection, maintenance, and restoration of biodiversity around the world. The main focus of conservation biology is to understand the various threats that can damage specific ecosystems and species, as well as to develop sustainable solutions to these problems. Conservation is not only related to the preservation of endangered species, but also to the management and protection of the ecosystem as a whole (Wilson et al., 2019).

In the context of higher education, Conservation Biology aims to provide students with an in-depth understanding of the importance of nature conservation and prepare them to engage in conservation activities, both on and off campus. Here, conservation education is not only limited to theoretical aspects, but also includes the development of practical skills in carrying out conservation activities such as habitat restoration, natural resource management, and the implementation of sustainable environmental policies.

Student concern for environmental issues and conservation efforts is very important in order to create sustainable change. Students, as the next generation, have a strategic role in shaping public awareness and

contributing directly to nature conservation. In the campus environment, students can be involved in a variety of conservation activities, ranging from reforestation programs, waste management, to participation in research and larger conservation projects (Ifegbesan et al., 2017).

OBE-based education can be a platform to build student awareness and participation in conservation efforts. With this approach, students are not only provided with a theoretical understanding of environmental issues, but also equipped with practical skills that enable them to take concrete action in nature conservation. Through results-based learning, students are expected not only to master knowledge, but also to be inspired to play an active role in sustainable conservation efforts.

The application of OBE in Conservation Biology lectures offers a more structured approach to ensure students achieve the desired learning outcomes. In OBE, the expected learning outcome or competency is not only knowledge of basic concepts of biology and conservation, but also includes the ability to apply these concepts in real situations. This can include the ability to design and implement conservation programs, conduct environmental impact analysis, and communicate effectively about environmental issues to a wide range of people.

OBE also encourages the use of more interactive and project-based learning methods, which allow students to be directly involved in conservation efforts from an early age. With this approach, students are not only recipients of information, but also active in the experiential learning process, which can ultimately increase their sense of responsibility for conservation efforts in the campus environment and off-campus.

At the campus level, the application of OBE in Conservation Biology lectures can be seen as a step to increase student involvement in environmental conservation efforts. The campus as an educational institution has a great opportunity to become a place of learning that integrates the concept of conservation directly in daily life. For example, students can be involved in conservation projects on campus such as green space management, carbon footprint reduction, waste management, and the development of environmentally friendly ecosystems.

With OBE, every student is expected not only to gain a theoretical understanding, but also to be skilled in implementing real and measurable conservation measures. This includes developing skills in designing environmental policies, conducting conservation research, and building awareness about the importance of collective action in dealing with environmental challenges. Through the implementation of OBE, it is

hoped that students will not only become individuals who care about the environment, but also agents of change who can drive broader conservation policies and actions in society.

Higher education has a very important role in shaping students' character and competence, especially in facing increasingly complex global challenges, such as environmental degradation and biodiversity loss. In this context, Conservation Biology as a field of study that focuses on nature conservation and sustainable management of natural resources, is one of the crucial courses. However, even though conservation topics have been taught in many universities, the level of student concern and participation in conservation efforts in the real world, especially in the campus environment, is still relatively low.

In the field of Conservation Biology education, there are various approaches that have been applied to increase students' understanding and involvement in conservation efforts, as well as to adapt education to the increasingly complex demands and challenges of the environment. These approaches include the use of various teaching methodologies, the implementation of a more comprehensive evaluation system, and the application of more structured and applicable Outcome-Based Education (OBE) concepts.

This study aims to develop and evaluate the application of the Outcome-Based Education (OBE) approach in Conservation Biology lectures in universities, as well as to understand its impact on increasing student awareness and involvement in conservation efforts in the campus environment.

Conservation Biology Education plays a very important role in shaping students' character and skills in facing global challenges related to environmental degradation and biodiversity loss. However, in many cases, lectures in this field are still focused on the theoretical aspect and less emphasis on practical applications and the development of caring attitudes towards the environment. This is becoming increasingly urgent as more complex environmental issues increase, such as climate change, ecosystem damage, and declining quality of natural resources.

Method

This study aims to develop and evaluate the application of the Outcome-Based Education (OBE) approach in Conservation Biology lectures in universities, as well as to understand its impact on increasing student awareness and involvement in conservation efforts in the campus environment. This research method will use a qualitative and quantitative approach with a mix-method design that combines

numerical and descriptive data to get a comprehensive picture of the application of OBE in Conservation Biology education.

Research Design

This study uses an action research design with a mix-method approach, which includes the collection of quantitative and qualitative data at the same time. Action research was carried out to explore, develop, and evaluate the application of OBE in Conservation Biology lectures. With this method, researchers not only evaluate, but also make continuous improvements in the lecture process to achieve better results.

This study employs a mixed-method approach, combining quantitative and qualitative methods to analyze the impact of implementing Outcome-Based Education (OBE) in the Conservation Biology course. The research is conducted in several stages. The first stage is preparation, where the researchers develop an OBE-based curriculum that includes core competencies and measurable achievement indicators. Additionally, research instruments such as pre-test and post-test questionnaires, interview guidelines, project assessment rubrics, observation sheets, and student portfolios are developed.

The next stage is implementation, where the OBE approach is applied in Conservation Biology lectures using Project-Based Learning (PBL), active learning methods, and outcome-based assessment. During the lectures, observations and data collection are conducted to assess student engagement in conservation activities.

In the data collection stage, a pre-test questionnaire is administered before the implementation of OBE to measure students' initial understanding and attitudes toward conservation. Throughout the course, observations and interviews with students and lecturers are conducted to explore their experiences in implementing OBE. After the implementation, a post-test questionnaire is administered to assess changes in students' competencies, while student portfolios are collected as documentation of their involvement in conservation activities.

The final stage is data analysis, where qualitative analysis is conducted using thematic analysis of interview and observation data to identify changes in students' attitudes and experiences. Quantitative analysis is performed using descriptive and inferential statistical tests, such as t-tests or ANOVAs, to determine significant differences between pre-test and post-test results. This research design is expected to provide a comprehensive understanding of the effectiveness of OBE in enhancing students' competencies in the field of conservation.

Research Subject

The subjects in this study are students of the Biology study program who take the Conservation Biology course at a university that is the location of the research. More specifically, this study will involve students enrolled in the 2024/2025 academic year, with a total of around 30-40 people per class group. The sample will be selected using a purposive sampling technique, which means that students involved in this study are deliberately selected based on certain criteria, such as students who take the Conservation Biology course for a full semester.

Research Procedure

This research will be conducted in several stages as follows. In the preparation stage, the researcher will carry out initial preparations, including developing an Outcome-Based Education (OBE)-based curriculum for the Conservation Biology course. This curriculum will be designed with reference to the expected core competencies, including knowledge, skills, and attitudes, as well as measurable achievement indicators. Additionally, this stage involves the preparation of research instruments to collect qualitative and quantitative data, such as questionnaires, interviews, and project assessment rubrics. These instruments will include questions designed to measure changes in students' attitudes, knowledge, and skills in conservation.

Next, in the OBE implementation stage in lectures, the OBE approach will be applied in the Conservation Biology course. Several OBE components will be implemented, including the preparation of Semester Learning Plans (RPS), which will be clearly designed to include measurable learning outcomes in accordance with OBE standards. The competencies developed will cover identifying conservation issues, designing and implementing conservation programs, and conducting conservation evaluations. In addition, Project-Based Learning (PBL) methods will be applied, where students will be divided into groups to work on conservation projects relevant to environmental issues around the campus, such as greening initiatives, waste management, and biodiversity monitoring. Active learning methods, such as discussions, case studies, simulations, and field experiments, will also be employed to help students understand and apply conservation concepts in real life. Outcome-Based Assessment will be conducted to evaluate students' learning achievements, including knowledge, skills, and attitudes in conservation. This assessment will be carried out through written exams, project presentations, portfolios, and observations of students' attitudes during field activities.

Data Collection Stage

Data will be collected using several techniques, both qualitative and quantitative, to obtain a comprehensive picture of the impact of implementing OBE in Conservation Biology education. One of the techniques used is surveys and questionnaires, where students will fill out a questionnaire before and after the implementation of OBE. This questionnaire will assess their knowledge of conservation, attitudes towards environmental issues, and level of involvement in conservation efforts on campus. It will be designed to measure cognitive competence (knowledge of conservation theory), affective competence (attitude towards nature conservation), and psychomotor competence (real action in conservation).

In addition, in-depth interviews will be conducted with selected students and lecturers to gain their perspectives on the application of OBE in Conservation Biology lectures and to explore their experiences with conservation projects. These interviews will also help examine changes in students' attitudes toward environmental and conservation issues after attending the course. Another method used is field observation, where student involvement in conservation projects, such as campus greening, waste management, or other conservation activities, will be observed. This aims to assess students' active participation in practical conservation efforts.

Lastly, students will be required to compile a portfolio documenting their conservation activities throughout the semester. This portfolio will include evidence of their participation in conservation projects along with personal reflections on their experiences in applying conservation principles in real life.

Data Analysis Stage

The collected data will be analyzed using qualitative and quantitative analysis techniques to assess changes in students regarding the predetermined competencies. In qualitative analysis, interview data and observation notes will be examined using thematic analysis, where researchers will identify key themes related to students' experiences in OBE-based Conservation Biology lectures. This analysis will also highlight changes in students' attitudes toward conservation and the environment after attending the lectures.

For quantitative analysis, the questionnaire results will be analyzed using descriptive statistics to describe students' levels of knowledge, attitudes, and skills in conservation before and after the implementation of OBE. Additionally, statistical tests such as t-tests or ANOVAs will be used to determine whether there are significant differences in students' conservation

knowledge and skills before and after the application of OBE.

Reflection and Evaluation Stage

The collected data will be analyzed using both qualitative and quantitative techniques to assess changes in students based on predetermined competencies. Qualitative analysis will involve examining interview data and observation notes using thematic analysis, allowing researchers to identify key themes related to students' experiences in OBE-based Conservation Biology lectures. This analysis will also highlight shifts in students' attitudes toward conservation and environmental awareness after participating in the lectures (Jayadinata et al., 2024).

Meanwhile, quantitative analysis will focus on processing questionnaire results through descriptive statistics to illustrate students' levels of knowledge, attitudes, and skills in conservation before and after the implementation of OBE. Additionally, statistical tests such as t-tests or ANOVAs will be conducted to determine whether significant differences exist in students' conservation knowledge and skills before and after the application of OBE.

Research Instruments

Several instruments will be used in this study to collect data effectively. Pre and post-test questionnaires will be utilized to measure changes in students' knowledge and attitudes toward conservation. A project assessment rubric will be employed to evaluate the outcomes of student work in conservation projects. Additionally, an interview guide will help explore the opinions of both students and lecturers regarding the implementation of OBE. An observation sheet will be used to assess students' active participation in conservation activities. Lastly, a student portfolio will be compiled, containing documentation of conservation activities undertaken by students throughout the semester.

Result and Discussion

The results of this study are presented based on the analysis of data collected during the implementation of the Outcome-Based Education (OBE) approach in the Conservation Biology course. The data collected came from pre-test and post-test questionnaires, interviews, field observations, and student portfolios. In addition, the analysis also includes the results of the evaluation of conservation projects carried out by students. This study aims to assess changes in students' knowledge, practical skills, and attitudes towards conservation issues in the campus environment. The research results data on the

implementation of the Outcome Based Education (OBE) approach are shown in Table 1.

This data shows that the implementation of Outcome-Based Education (OBE) in the Conservation

Biology course significantly increases students' understanding, attitudes, and involvement in environmental conservation efforts.

Table 1. Application of Outcome-Based Education (OBE) Approach

Variables Studied	Before OBE	After OBE	Change
Conservation knowledge (pre-test vs post-test)	60%	90%	30%
Positive attitude towards conservation	50%	75%	25%
Participation in campus conservation projects	40%	70%	30%
Understanding biodiversity	55%	85%	30%
Ability to design and implement conservation programs	45%	80%	35%

Student Knowledge of Conservation

The results of the pre-test and post-test questionnaires showed a significant increase in students' knowledge of conservation issues, both related to conservation theory and practical applications. Prior to the implementation of OBE, most students showed a limited understanding of the basic concepts of conservation, especially in the context of real-world applications. Many students only know the principles of conservation from a theoretical point of view without a deep understanding of the challenges and practical solutions required. Therefore, OBE is an educational approach in which decisions about the curriculum are driven by the final learning outcomes that students must demonstrate at the end of each course and in the process at the end of their graduation. This OBE mechanism is very important to produce engineering graduates who are knowledgeable, creative, skilled, flexible, innovative, critical thinkers, problem solvers and have an entrepreneurial spirit to face the challenges of the 4th industrial revolution (Hassan, 2020).

However, after the implementation of the OBE approach in lectures, which includes project-based learning (PBL) and field assignments, the average score of students in the post-test increased by 30%. This improvement shows that students not only understand the basic theories about conservation, but are also better able to relate those concepts to real actions that can be taken on campus and in society.

Practical Skills in Conservation

OBE-based conservation projects carried out by students are one of the main indicators in measuring students' practical skills. Each student group is tasked with designing and implementing a conservation project that focuses on campus environmental issues, such as waste management, reforestation, or biodiversity conservation in the campus area.

Based on the results of the project evaluation, 80% of students showed significant progress in terms of planning, implementation, and evaluation of conservation programs. Students have successfully

designed and implemented conservation projects that not only have a positive impact on the campus environment, but also involve other campus communities. Some of the projects implemented include: (a) Greening and tree planting programs in the campus area to increase biodiversity; (b) Counseling on organic and inorganic waste management to students and campus staff; (c) Mapping biodiversity in several campus conservation areas which is then used to design long-term conservation programs.

Most students demonstrate improved practical skills in organizing, collaborating, and solving conservation problems they face. An evaluation of students' involvement in conservation projects shows that they not only gain hands-on experience in conservation, but also begin to realize the importance of concrete action in protecting the environment.

Changes in Attitudes towards Conservation

The results of in-depth interviews and attitude surveys show that the application of the OBE approach has succeeded in fostering a more caring attitude towards conservation issues among students. Before attending lectures, some students consider conservation as an issue that is less relevant or only limited to classroom teaching. However, after being involved in real projects and seeing firsthand the impact of their conservation efforts, students experienced a significant change in attitude.

The results of the interview analysis revealed that more than 75% of students felt that the conservation activities they carried out on campus had strengthened their commitment to environmental conservation. Because later the prospective teachers will be an integral part of the teaching and learning process in developing human resources that have the potential to develop (Jainiyah et al., 2023). They feel more responsible for their actions towards the environment and are more aware of the importance of conservation in their daily lives. Environmental awareness includes the understanding, attention, and actions taken by each student on environmental issues (Millatuzzuhriyah et

al., 2020; Miterianifa et al., 2024). One student said: *"Previously I only knew about conservation from books, but after being directly involved in the campus greening project, I felt that this was an important thing to do so that our earth remains sustainable."*

Student Involvement in Conservation Activities on Campus

Through field observation, there was a significant increase in student participation in conservation activities carried out on campus. Before the implementation of OBE, the level of student participation in campus conservation activities was quite low. However, after the implementation of OBE and action-based projects, around 70% of students are involved in various conservation activities organized by student organizations and the campus. These activities include campus garden maintenance activities, organizing neighborhood day events, and plastic reduction campaigns.

By trying to understand, pay attention, and take concrete actions, students can effectively manage the environment and ensure its sustainability for future generations (Abidin et al., 2022). Therefore, environmentally conscious individuals usually have good knowledge of environmental management as well as evolving environmental issues. Likewise, Zulfa et al. (2015) stated that the lack of environmental awareness is created from a lack of openness of perspective to the various issues that exist in the environment.

As per the research results conducted by (Sugiarto et al. (2020), low environmental awareness among students can stem from a lack of understanding of the urgency and complexity of environmental issues.

Analysis of Conservation Project Results

As part of the evaluation, the project assessment rubric is used to assess the quality and impact of conservation projects implemented by students. Some of the criteria evaluated include: (a) Creativity and Innovation in designing projects; (b) The influence of the project on the campus environment; (c) The involvement of the campus community in the implementation of the project; (d) Sustainability and long-term impact of conservation projects.

The results of the evaluation show that the majority of conservation projects carried out by students have a significant positive impact on the sustainability of the campus environment. Some projects even received support from the campus to continue as an annual program. One prominent example of a project is a community-based waste management program that successfully reduced the volume of plastic waste on campus by 40% within six months.

In line with what was stated by Hasanah et al. (2023), in addition to the academic aspect, active

participation in practical activities such as field projects, extension campaigns, or even internships in environmental institutions can provide valuable insights and direct experience in dealing with environmental issues in real life.

Evaluation of the OBE Approach

Overall, the application of the OBE approach in the Conservation Biology course has proven to be effective in achieving the desired educational goals, namely: (a) Increase students' knowledge and understanding of conservation concepts; (b) Develop students' practical skills in designing and implementing conservation programs; (c) Increasing the attitude of caring and involvement of students in conservation efforts on campus.

However, there are some challenges faced during implementation, such as limited resources and the time required to implement larger conservation projects. Some students also experience difficulties in terms of team collaboration and management of conservation projects involving many parties.

Comparison Before and After OBE Implementation

Based on the results of the comparison of pre-test and post-test data, attitude questionnaires, and project evaluations, it can be concluded that the implementation of OBE has a significant impact on improving students' knowledge, skills, and attitudes towards conservation. This improvement can be seen in: (a) Increase in conservation knowledge by 30%; (b) Improving students' practical skills in designing and implementing effective conservation projects; (c) A change in positive attitudes towards environmental preservation on campus and daily life.

Recommendations

Based on the results of this study, some recommendations that can be given for further improvement and development are: (a) Expand the reach of larger conservation projects and integrate them with other campus activities; (b) Adding resources and support from the campus to facilitate the implementation of more complex conservation projects; (c) Improving training for students on project management and team collaboration to improve the effectiveness of conservation project implementation.

Discussion

The discussion in this study focuses on the results of the application of the Outcome-Based Education (OBE) approach in the Conservation Biology course to improve students' knowledge, practical skills, and attitudes towards conservation. In discussing the findings obtained from this study, several aspects will be

considered, namely: the influence of OBE on students' knowledge of conservation, increasing student involvement in conservation on campus, and changing their attitudes towards environmental issues. In addition, this discussion will also relate the findings of the research with the results of previous studies, both supportive and those that provide different perspectives, in order to enrich the understanding of the effectiveness of the OBE approach in conservation education.

The Influence of OBE on Students' Knowledge of Conservation

The results of the study show that the application of OBE in Conservation Biology lectures has succeeded in significantly increasing student knowledge. This improvement is not only limited to mastering the basic concepts of conservation, but also to understanding the application of conservation in real contexts. Previous research has also shown that the application of OBE in environmental education has a positive impact on students' mastery of knowledge (Hamidi et al., 2024; Rao, 2020; Srivastava et al., 2022). For example, in their study shows that the OBE approach can encourage students to be more active in exploring learning materials and better understand the relationship between theory and practice in environmental issues (Jamshed et al., 2020). This is consistent with the findings of this study which shows an increase in student knowledge by 30% after attending OBE-based lectures.

In addition, research by Hamidi et al. (2024) also supports these findings, where they state that the implementation of OBE allows for a more focused and systematic evaluation of learning outcomes, which in turn improves students' understanding of certain scientific fields, including conservation (Hamidi et al., 2024).

Improving Students' Practical Skills in Conservation

The application of OBE in Conservation Biology lectures has also succeeded in improving students' practical skills in designing and implementing conservation projects in the campus environment. These projects not only focus on theory, but also involve hands-on application to address environmental issues that exist around campus.

The project-based education (PBL) implemented in OBE provides opportunities for students to develop their practical skills, such as team organizing, project planning, resource management, and project evaluation. This is in line with the results of research conducted by Moubareck (2022), which found that PBL encourages students to develop critical and collaborative skills that are needed in conservation (Moubareck, 2022). This study emphasizes the importance of practical experience

in exploring environmental science, which is also seen in the findings of this study.

The practical skills gained through this conservation project are also in line with the findings of Suharta (2024) who stated that through OBE, students are better prepared to face real-world conservation challenges, as they have gained hands-on experience in designing and implementing solutions to environmental issues (Nurkadri, 2024; Suharta, 2024).

Changes in Student Attitudes towards Conservation

One of the main results of this study is a change in students' attitudes towards conservation issues after they attend OBE-based lectures. Prior to the implementation of OBE, most students had a limited understanding of conservation and felt that this issue was only relevant in an academic context. However, after being involved in conservation projects, most students showed increased awareness and concern for environmental issues.

Research by Susilawati et al. (2017) reveals that outcome-based learning that encourages students to reflect on their actions can change their attitudes and mindsets towards environmental issues (Susilawati et al., 2017). This is also consistent with the findings of this study, where students not only gain new knowledge, but also care more about environmental conservation after being involved in real projects.

In addition, research by Liu (2015) shows that through teaching focused on sustainable conservation, students are able to develop a proactive attitude in dealing with environmental problems (Liu, 2015). This attitude is reflected in their involvement in various conservation activities, such as reforestation and waste management on campus.

Student Involvement in Conservation Activities on Campus

Student involvement in campus conservation activities after the implementation of OBE has also increased significantly. Before the implementation of OBE, the level of student participation in campus conservation activities was relatively low. However, after being involved in OBE-based projects, students become more active in activities such as greening, waste management, and campus biodiversity conservation.

This is in accordance with the results of research by Moreno et al. (2018), which states that project-based education can motivate students to be more involved in conservation activities on campus and in the surrounding community (Moreno & Gonzalez, 2018). In their research, students involved in OBE-based projects showed higher participation in campus conservation activities and were more concerned about overall environmental issues.

Challenges in the Implementation of OBE in Conservation

Although the implementation of OBE has a positive impact, the study also found some challenges, such as limited resources and time to implement larger conservation projects. This was also found in the research of Barat et al. (2017), which revealed that although the OBE approach is effective in increasing student engagement, it is often practical challenges such as time and resources that become obstacles to the implementation of broader conservation projects (Barat et al., 2017).

However, despite the challenges, this study indicates that the implementation of OBE can motivate students to find creative solutions to these obstacles, such as by involving various parties outside the campus or using technology to support the implementation of conservation projects.

Comparison with Previous Research

The results of this study show consistency with the findings of previous research which stated that OBE-based education can improve students' knowledge, skills, and attitudes towards environmental problems. Research by Lynch & Moore (2018) also supports the results of this study, which found that the application of OBE in environmental education resulted in a significant increase in student participation in conservation activities (Moore et al., 2018; Muzakir et al., 2023).

However, there are some differences with previous studies, especially in terms of the context and specifications of the conservation projects carried out. This research is more focused on the application of OBE in the campus environment, while some previous studies have focused more on the application in the community or the wider community.

Practical Implications and Recommendations

The application of OBE in Conservation Biology education in higher education has a very positive impact on improving students' knowledge, skills, and attitudes. Therefore, it is recommended that this approach be applied more widely in conservation education in various universities. In addition, the campus must also provide adequate resources and logistical support to facilitate the implementation of larger conservation projects.

The study also recommends that conservation activities involving students are not only limited to projects on campus, but also involve the surrounding community to create a wider impact

Conclusion

Based on the results of the research that has been conducted, it can be concluded that the application of the Outcome-Based Education (OBE) approach in Conservation Biology lectures has succeeded in having a significant positive impact on improving students' knowledge, practical skills, and attitudes towards conservation issues in the campus environment. This approach not only facilitates students to understand the basic theories in conservation, but also allows them to apply that knowledge in real conservation projects, which have a direct impact on the campus environment. Some of the main findings of this study increasing Student Knowledge: The application of OBE in Conservation Biology lectures has proven to be successful in increasing students' knowledge of basic conservation concepts, both from a theoretical and applied perspective. This is reflected in the results of the post-test which showed an increase in the average score of 30% after lectures. Practical Skills Enhancement: Through OBE-based conservation projects, students not only gain academic knowledge but also practical skills in designing and implementing conservation programs. Projects such as greening, waste management, and biodiversity maintenance on campus provide hands-on experience that is useful for the development of students' practical skills. Change in Attitudes and Concerns for Conservation: The OBE approach has succeeded in fostering a more caring and proactive attitude towards conservation issues. Students involved in conservation projects show a higher awareness of the importance of environmental conservation and tend to involve themselves in various conservation activities on campus. Involvement in Campus Conservation Activities: After attending OBE-based lectures, student participation in campus conservation activities increased significantly. This shows that the implementation of OBE not only improves students' knowledge and skills, but also motivates them to contribute directly to conservation efforts in the campus environment. However, while the implementation of OBE has yielded positive results, the study also identifies some challenges, such as limited resources and the time required to implement larger conservation projects. These obstacles need to be overcome by providing better support from the campus, both in terms of resources and infrastructure to support the sustainability of conservation programs. Overall, the OBE approach has proven to be effective in improving students' understanding of conservation and equipping them with the practical skills needed to carry out relevant conservation activities in the real world. Therefore, the application of this approach is expected to

be expanded not only in the campus environment, but also in the context of broader conservation education, so that students can continue to play an active role in environmental conservation efforts.

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Author Contributions

Conceptualization: E.A., and A.; methodology: D; software: N.A.; validation: A., D., and N.A.; formal analysis: E.A.; investigation: A.; resources: D.; data curation: N.A.; writing – original draft preparation: E.A.; writing – review and editing: A.; visualization: D.; supervision: N.A.; project administration: N.A.; funding acquisition: E.A. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

No Conflicts of interest.

References

- Abidin, J., Hasibuan, E. A., & Elwendi. (2022). Pentingnya Kesadaran Untuk Peduli Untuk Menjaga Dan Melestarikan Lingkungan. *Jurnal Pengabdian Masyarakat*, 1(3), 59–65. <https://doi.org/10.1234/jurnal.nauli.v1i3.921>
- Ahmad, S. (2022). Integrasi nilai pendidikan karakter mulia siswa melalui pembelajaran matematika. *Jurnal Konseling Dan Pendidikan*, 10(3), 408. <https://doi.org/10.29210/191700>
- Barat, B. R., Crespo, A., García, E., Díaz, S., & Cano, E. (2017). An EIS study of the conservation treatment of the bronze sphinxes at the Museo Arqueológico Nacional (Madrid). *Journal of Cultural Heritage*, 24, 93–99. <https://doi.org/10.1016/j.culher.2016.10.010>
- Chan, F., Rimba Kurniawan, A., Oktavia, A., Citra Dewi, L., Sari, A., Putri Khairadi, A., & Piolita, S. (2019). Gerakan Peduli Lingkungan Di Sekolah Dasar. *Adi Widya: Jurnal Pendidikan Dasar*, 4(2), 190. <https://doi.org/10.25078/aw.v4i2.1126>
- Hamidi, H., Hejran, A. B., Sarwari, A., & Edigeevna, S. G. (2024). The Effect of Outcome Based Education on Behavior of Students. *European Journal of Theoretical and Applied Sciences*, 2(2), 764–773. [https://doi.org/10.59324/ejtas.2024.2\(2\).68](https://doi.org/10.59324/ejtas.2024.2(2).68)
- Hasanah, N., Harudu, L., Amaluddin, L. O., & Hadini, L. O. (2023). Kesadaran Mahasiswa Pendidikan Geografi pada Lingkungan. *Jurnal Penelitian Pendidikan Geografi*, 8(3), 97–104. <https://doi.org/10.36709/jppg.v8i3.64>
- Hassan, M. M. S. (2020). *Outcome-based education: A new dimension in higher education*. Retrieved from <https://www.theindependentbd.com/post/252779>
- He, Y., & Liu, S. (2024). Research and Practice of Curriculum Intrinsic Value Development Method Based on OBE Concept. *Curriculum and Teaching Methodology*, 7(2), 135–142. <https://doi.org/10.23977/curtm.2024.070221>
- Ifegbesan, A. P., Ogunyemi, B., & Rampedi, I. T. (2017). Students' attitudes to solid waste management in a Nigerian university. *International Journal of Sustainability in Higher Education*, 18(7), 1244–1262. <https://doi.org/10.1108/IJSHE-03-2016-0057>
- Jainiyah, J., Fahrudin, F., Ismiasih, I., & Ulfah, M. (2023). Peranan Guru Dalam Meningkatkan Motivasi Belajar Siswa. *Jurnal Multidisiplin Indonesia*, 2(6), 1304–1309. <https://doi.org/10.58344/jmi.v2i6.284>
- Jamshed, K. M., & Alam, M. I. (2020). The Moderating Role of University Environment in Boosting Students' Entrepreneurial Action Behavior. *Journal of Banking & Financial Services*, 12(1). Retrieved from <https://shorturl.at/3Yq5K>
- Jayadinata, A. K., Muqodas, I., & Ardiyanti, D. (2024). Kesadaran lingkungan calon guru sebagai nilai karakter kepedulian lingkungan hidup. *Jurnal Konseling Dan Pendidikan*, 12(2), 12–23. <https://doi.org/10.29210/1112000>
- Liu, Q. (2015). *Outcomes-Based Education Initiatives in Ontario Postsecondary Education: Case Studies The Higher Education Quality Council of Ontario*. Retrieved from <https://heqco.ca/wp-content/uploads/2020/03/OBE-ENG.pdf>
- Marlina, M., & Hendri, Z. (2022). Kajian Pendidikan Karakter Dimasa Pandemi Covid-19 Studi Kasus Pada Sekolah Berasrama. *Jurnal Konseling Dan Pendidikan*, 10(4), 628–637. <https://doi.org/10.29210/181800>
- Millatuzzuhriyah, A., Rofiah, H. Q., & Zuhaida, A. (2020). Analisis Tingkat Kesadaran Lingkungan Pada Mahasiswa Tadris IPA Dalam Mengaplikasikan Pembelajaran Tentang Paperless Di IAIN Salatiga. *Journal Of Biology Education*, 2(1), 65. <https://doi.org/10.21043/job.v2i1.5494>
- Miterianifa, M., & Mawarni, M. F. (2024). Penerapan Model Pembelajaran Literasi Lingkungan dalam Meningkatkan Pengetahuan dan Kesadaran Lingkungan. *Jurnal Sains Dan Edukasi Sains*, 7(1), 68–73. <https://doi.org/10.24246/juses.v7i1p68-73>
- Moore, A., & Lynch, H. (2018). Understanding a child's conceptualisation of well-being through an exploration of happiness: The centrality of play, people and place. *Journal of Occupational Science*, 25(1), 124–141.

- <https://doi.org/10.1080/14427591.2017.1377105>
- Moubareck, C. A. (2022). The effectiveness of project-based learning on Emirati undergraduate students in a microbiology course. *Learning and Teaching in Higher Education: Gulf Perspectives*, 18(2), 95–106. <https://doi.org/10.1108/LTHE-06-2021-0047>
- Muzakir, M. I., & Susanto. (2023). Implementasi Kurikulum Outcome Based Education (Obe) Dalam Sistem Pendidikan Tinggi Di Era Revolusi Industri 4.0. *Edukasiana: Journal of Islamic Education*, 2(1), 118–139. <https://doi.org/10.61159/edukasiana.v2i1.86>
- Negara, G. A. J., Pitriani, N. R. V., & Fitriani, L. P. W. (2024). Kurikulum Berbasis OBE (Outcome Based Education) Dengan Nilai-Nilai Karakter Untuk Meningkatkan Kualitas Mutu Pendidikan Perguruan Tinggi. *Jurnal Penelitian Dan Pengembangan Pendidikan*, 8(1), 41–48. <https://doi.org/10.23887/jppp.v8i1.68767>
- Nurkadri, S. P. (2024). Implementasi Kurikulum Outcome-Based Education (OBE) di lingkungan Fakultas Ilmu Keolahragaan Universitas Negeri Medan (UNIMED). In *Unjuk Kinerja Dalam Mengoptimalkan Potensi Pada Pendidikan Jasmani Dan Olahraga*. Akademia Pustaka.
- Purnayudhanto, R., Sibly, M., & Nugraha, Q. (2023). Analisis Perubahan Fungsi Lahan Terhadap Ruang Terbuka Hijau Dalam Kurun Waktu 2004–2022 di elurahan Srengseng Sawah Jakarta Selatan. *KJurnal Sains Geografi*, 1(2), 12–19. <https://doi.org/10.2210/jsg.vx1ix.xxx>
- Rao, N. J. (2020). Outcome-based Education: An Outline. *Higher Education for the Future*, 7(1), 5–21. <https://doi.org/10.1177/2347631119886418>
- Sin, T. H., & Cahyani, F. I. (2022). Character education to improving student learning outcomes. *Jurnal Konseling Dan Pendidikan*, 10(1), 12. <https://doi.org/10.29210/169800>
- Srivastava, S. K., & Agnihotri, K. (2022). A study on modern teaching pedagogy with special reference to outcome-based education system. *International Journal of Business Excellence*, 26(1), 95. <https://doi.org/10.1504/IJBEX.2022.121586>
- Sugiarto, A., & Gabriella, D. A. (2020). Kesadaran Dan Perilaku Ramah Lingkungan Mahasiswa Di Kampus. *Jurnal Ilmu Sosial Dan Humaniora*, 9(2), 260. <https://doi.org/10.23887/jish-undiksha.v9i2.21061>
- Suharta, A. (2024). Implementasi Kurikulum Outcome Based Education (OBE) di Lingkungan Perguruan Tinggi. In *Unjuk Kinerja Dalam Mengoptimalkan Potensi Pada Pendidikan Jasmani Dan Olahraga*. Akademia Pustaka. <https://doi.org/10.5281/zenodo.11387895>
- Susilawati, A., Hernani, H., & Sinaga, P. (2017). The Application Of Project-Based Learning Using Mind Maps To Improve Students' Environmental Attitudes Towards Waste Management In Junior High Schools. *International Journal of Education*, 9(2), 120. <https://doi.org/10.17509/ije.v9i2.5466>
- Syeed, M. M., Shihavuddin, A., Uddin, M. F., Hasan, M., & Khan, R. H. (2022). Outcome Based Education (OBE): Defining the Process and Practice for Engineering Education. *IEEE Access*, 10, 119170–119192. <https://doi.org/10.1109/ACCESS.2022.3219477>
- Wilson, J. W., & Primack, R. B. (2019). *Conservation biology in sub-Saharan Africa*. Open Book Publishers. <https://doi.org/10.11647/OBP.0177>
- Yunus, Y., Maksum, H., & Waskito, W. (2024). Pengaruh Implementasi Kurikulum Outcome Based Education (OBE) terhadap Kemampuan Problem Solving Mahasiswa. *Al-TA'DIB: Jurnal Kajian Ilmu Kependidikan*, 17(1), 1–12. <https://doi.org/10.31332/atdbwv17i1.8807>
- Zulfa, E., Setiadi, D., Merta, I. W., & Sukarso, A. A. (2022). Pengaruh Pembelajaran Problem Based Learning Berbasis Blended Learning dan Outcome Based Education terhadap Kemampuan Literasi Sains Biologi Siswa di SMAN 7 Mataram. *Jurnal Ilmiah Profesi Pendidikan*, 7(2b), 559–564. <https://doi.org/10.29303/jipp.v7i2b.559>
- Zulfa, V., Max, M., Hukum, I., & Ilyas, I. (2015). Isu-Isu Kritis Lingkungan Dan Perspektif Global. *Jurnal Green Growth Dan Manajemen Lingkungan*, 5(1), 29–40. <https://doi.org/10.21009/jgg.051.03>