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Students' Classification and Collaboration Ability on Plant Classification Material Using Scientific Outbound Learning: Preliminary Study

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Abstract: This research is a quantitative descriptive analysis which aims to describe the implementation of scientific outbound learning on plant classification material to see students' classification and collaboration abilities using data obtained objectively. The research was conducted in the botanical garden of the Indonesia University of Education with class X students at Daarut Tauhid Girl's Boarding High School Bandung as research subjects. The research instruments used were a questionnaire assessing the design of scientific outbound learning, classification ability questions, as well as questionnaires and observation sheets of collaboration ability. The results of the research show that students' classification abilities are not yet optimal as seen through the pretest results, with an average of 38.13 and the posttest results with an average of 50.93 have not passed the school's KKM figure of 76 due to several obstacles and causal factors found, such as reduced students interest after learning is completed, lack of motivation given to students, and limited use of smartphones. Students' collaboration abilities are indicated to emerge through scientific outbound learning activities based on the results of students' collaboration abilities assessment which are already included in the category of developing collaboration abilities and already possessing collaboration abilities.

Keywords: Classification ability; Collaboration; Outbound; Outdoor learning; Plant classification

Introduction

The development of science nowadays means that future generations are required to have skills, productivity, critical character and literacy in the latest technology and information. Education is one of the efforts that can be the main basis for creating quality of human resources. The achievement of learning goals depends on the learning process that is implemented including the learning design in it (Muqit & Djuwairiyah, 2017). According to Law no. 20 of 2003 concerning the national education system, the basis for achieving national education goals is the curriculum, which is in the form of a series of plans and arrangements containing objectives, content, teaching materials and methods used as a guide in carrying out teaching and learning activities (Marlina, 2013).

Teaching and learning activities are required to be able to equip students with character and life skills that are appropriate to the living environment and needs of each student (Artobatama, 2018). Character building is part of the learning process which is expected to emerge in students, such as the characters of honesty, integrity, discipline and the ability to help others. The aim of education is not only to prioritize academic learning but also social, attitudinal, and emotional competence (Suryawan & Widyastuti, 2020).

Learning in the 21st century must be student-centered, collaborative and contextual so that students are required to have skills, one of which is the ability to collaborate. Collaboration ability is a person's skill to participate in an activity related to other people and carry out team work to achieve the same goal (Le et al., 2018). Collaboration abilities are one of the important things to instill from an early age in order to create a

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superior generation (Hidayati & Sugiharto, 2022). By collaborating, students can share knowledge, abilities, experiences, and the efforts needed to find solutions to the problems they are facing (Marita et al., 2023). The ability to collaborate between students is still not given enough attention in the learning process (Malik & Ubaidillah, 2021). Based on the facts at school, teachers still implement monotonous learning activities so that student activity is still considered very low (Octaviana et al., 2022). Therefore, it is necessary to have alternative learning activities that are able to build skills and character in students, one of them by integrated learning with activities outside the classroom such as through outbound activities.

Outbound is an activity in the form of a game that contains challenges and obstacles that are packaged in a fun and open manner. Outbound activities can be adjusted with various kinds of games that can be tailored to the participants' needs (Handini & Hasanah, 2017). A fun games can make students more interested in following the learning process and stimulate students' thinking and problem solving abilities through direct practice (Hakim & Kumala, 2016). Learning will be more meaningful when students are actively involved in investigative activities and have direct contact with learning resources (Wahyuni et al., 2017). Natural environment has great potential as a learning resource for students from various levels of education (Trinova, 2016). Natural science is a science in which learning not only understands knowledge but also discovers the process and reconstruction of knowledge based on scientific procedures. One of the fields of science in it is biology where the content is very close to the natural environment.

Environmental problems that are often discussed are nature conservation. Indonesia, especially in the plant world, is the country with the seventh largest number of plant species. Therefore, it is very important for students to have classification abilities so that they have awareness about the conservation of species in their own environment as stated by Kurniawan (2019) that students must be equipped with classification abilities. According to Zulfah et al. (2021), classification is the ability to group things based on certain characteristics through an identification process. Classification abilities are included in scientific process skills in which students try to find relationships between living things so that they can identify the differences and similarities in their characteristics (Maelasari, 2013).

One of the biology learning materials related to environmental problems is plant classification material. This material includes the characteristics, classification and role of plants for life. In plant classification material, students' classification skills are very necessary to place plant species into appropriate groups. Therefore, students need to make direct observations so they can carry out identification to find similarities or differences between plant species. In learning plant classification material, direct observation of plant types is rarely carried out. This causes the average student classification ability to be considered relatively low (Ramadhani et al., 2016). Based on the problems above, in this research an alternative scientific outbound learning was implemented which was prepared in accordance with the principles of outbound activities with a scientific approach to plant classification material. It is hoped that through scientific outbound learning, it will be able to build students' classification abilities in plant classification material and students' collaboration abilities in carrying out learning activities as a form of character building that students need in the living environment.

Method

This research is a preliminary study that uses a descriptive approach to describe students' classification and collaboration abilities by implementing alternative scientific outbound learning on plant classification material. This research was carried out from May to November. Implementation of scientific outbound learning activities regarding plant classification material at the botanical garden of the Indonesia University of Education. The sample used was 15 class X students at Daarut Tauhid Girl's Boarding High School Bandung. The sample was obtained using a simple random sampling technique. The development stages in this research are using ADDIE steps that divided into the preparation stage and the implementation stage. The ADDIE development steps can be depicted in a flow as Figure 1 below.

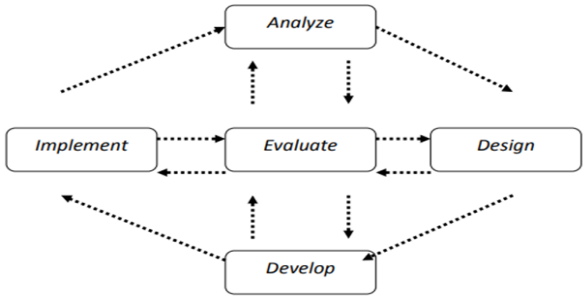

Figure 1. ADDIE development steps for developing scientific outbound

The preparatory stage includes: preliminary analysis; create a scientific outbound learning plan; assessment of activity design by experts; compiling research instrument grids and revising research instruments based on expert assessments. The next stage is the implementation of a small group trial of scientific outbound learning activities for class X students. The stage of scientific outbound development is clearly described in Table 1.

Table 1. The Development Stage of Scientific Outbound Activities

The Development Stage	Description
Analyze	Literature study about scientific outbound. Analysis of plant classification material. Analysis of learning outcomes in the curriculum. Analysis of the potential and relevance of the contents and facilities of the botanical garden. Analysis of abilities and character that can be built through scientific outbound activities on plant classification material.
Design	Designing scientific outbound learning activity designs according to the results of the initial analysis along with the guidebooks and research instruments. Output: The design of scientific outbound activities with the guidebooks and research instruments.
Development	Developing the design for scientific outbound activities, guidebooks, and research instruments then conducting limited trials of scientific outbound learning activities in small groups. Output: Revision of scientific outbound learning activities along with the guidebooks and research instruments.
Implementation	Implementation of scientific outbound learning activities to larger subjects involving 30 students of class X in high school. Output: The final result of scientific outbound learning activities on plant classification material along with the guidebooks and research instruments.
Evaluation	Evaluation of scientific outbound activities to see their effectiveness and ensure that each stage is carried out well and achieves the targeted learning objectives.

The assessment of the design of scientific outbound activities was carried out by a learning design expert, that is one of the biology education lecturers at the Indonesia University of Education. The data on students' classification and collaboration abilities were collected during the implementation of scientific outbound learning on plant classification material that had been prepared. The research instruments used were questionnaires for assessing the design of scientific outbound activities by experts, pretest and posttest questions on plant classification material, questionnaires and observation sheets of collaboration ability. The data analysis technique used is quantitative descriptive analysis to describe the implementation of scientific outbound learning on plant classification material to see students' classification and collaboration abilities using data obtained objectively.

Interpretation of student scores from the results of the pretest and posttest on plant classification material is seen based on achieving the minimum completeness criteria determined by the school. Each question answered correctly by the student is worth 1 and if the question is answered incorrectly, it is worth 0. The total score obtained by the student is calculated using the following formula.

$$\text{Score} = \frac{\text{Total score obtained}}{\text{Sum of scores for all items}} \times 100 \quad (1)$$

Next, data on students' collaboration abilities was analyzed by calculating the scores obtained in the learning process based on observer assessments via collaboration ability observation sheets and based on assessments from students' self-assessment and peer-assessment questionnaires on collaboration abilities. The results of the score calculation are interpreted as follows.

Table 2. Collaboration Ability Category Score Guide (Ofstedal & Dahlberg, 2009)

Score	Score Category
10-25	Collaboration skills are emerging
26-34	Collaboration skills are developing
35-44	Collaboration skills are established

Result and Discussion

Scientific outbound learning can be seen as an alternative in biology learning that creates a new and fun atmosphere compared to learning in the classroom. Natural science systematically not only understands its knowledge but also discovers the process and reconstruction of knowledge through scientific procedures. So learning will be more meaningful when students are actively involved in investigative activities and have direct contact with learning sources (Wahyuni et al., 2017). Science teachers must be able to design and implement learning methods, approaches and strategies that include scientific work competencies in the learning process.

Preparation Stage

In this research, a preliminary analysis was carried out based on a literature review regarding outbound activities, classification skills, collaboration skills, as well as the curriculum used in schools and plant classification material in class X SMA. Based on the analysis, it is known that outbound activities are usually used with

the aim of building trust, communication skills, developing leadership and teamwork which involves competition, collaboration, and strategy (Arachchige & Sathsara, 2020).

Scientific concepts are learning process that emphasizes students building concepts actively based on learning experiences through stages of scientific work, for example observing, hypothesizing, formulating problems, and others (Musfiqon & Nurdyansyah, 2015). A study by Kellert (2005), found that direct and continuous learning experiences are the main source for children's physical, emotional and intellectual development. This is in line with the interpretation that emerged from Kurt Hahn's idea of the term outbound, which includes the development of activities for educational purposes (Setiawati, 2021).

Based on the results of preliminary analysis, it is known that according to biology teachers at school, plant classification material is taught in class as usual and does not involve the surrounding environment, so students do not have the opportunity to make direct observations due to time efficiency at school. This is in line with the research of Ayotte-Beaudet et al. (2017), which reports that from a literature review of ten related articles that one of the obstacles in learning science outside the classroom is the teacher's lack of willingness to go out and teach in an outdoor environment. According to Maesaroh et al. (2022), the environment outside the school can be used as a source of factual learning because the learning materials that students learn can be found in the field. One form of outdoor learning that can be implemented is through outbound activities.

The essence of outbound learning is to direct students to learn directly and reflect. Walid et al. (2021) stated that the aim of outbound activities is to increase team collaboration and commitment for good results, build a team vision among participants, increase creativity and problem-solving skills. Therefore, researchers conducted this research to implement outbound scientific learning which integrates plant classification learning into outbound activities with the aim of encouraging character building in students.

Table 3. Design of Scientific Outbound Learning Activities Regarding Plant Classification Material

Learning Objectives	Scientific Outbound Activities	Character Built
Identifying general characteristics of plants. Determining plant classification based on similarities and differences in their characteristics. Knowing the role of various plants in the surrounding environment.	Introduction: preliminary material and pretest.	Building character of togetherness.
	"Berburu Tanaman" Activity.	Building leadership and collaboration character.
	“Temukan Kelompokku” Activity.	Building character of collaboration, self-confidence and decision making.
	“Wawasan Tumbuhan” Activity.	Building character of self-confidence, decision making, and collaboration.
	“Apakah Aku?” Activity.	Building character of collaboration and decision making.
	“Plant Master“ Activity.	Building character of collaboration, self-confidence and decision making.
	Closing: Posttest and filling out the questionnaire.	Building character of togetherness.

The curriculum used in class X at Daarut Tauhid Girl’s Boarding High School Bandung is the merdeka curriculum. The design of scientific outbound learning on plant classification material that will be carried out at the UPI botanical garden is prepared in accordance with the curriculum used by the school in phase E of the merdeka curriculum. The achievement of biology learning in phase E is that students have the ability to create solutions to problems based on local, national or global issues related to understanding the diversity of living things and their roles, viruses and their roles, biological technological innovation, ecosystem components and interactions between components and environmental changes. Apart from that, it is also adapted to the aims of plant classification learning to identifying the general characteristics of plants, to determining plant classification based on similarities and differences in their characteristics, and also knowing the role of various plants in the surrounding environment. In each activity, there is an assessment or task that students must complete in groups according to the activity steps prepared. The design of scientific outbound activities can be seen in the table 3.

Scientific outbound developed by researchers was carried out by inviting students directly to the botanical garden of the Indonesia University of Education as a learning resource for plant classification learning material. This is in accordance with research by Widiasworo (2017), which states that there are several things that must be considered in outdoor-based learning, including visits to objects directly, environmental objects in the form of open nature, learning experiences obtained from direct exploration of objects, and develop integrated learning between science, technology, environment and society in learning. The research by Mahyatun et al. (2020) also said that there was a positive effect from outbound

activities on the participants' leadership attitudes, personality and interpersonal relationships.

To support the process of scientific outbound activities, a learning guide was also created which contains instructions for scientific outbound activities, complete steps for scientific outbound activities, group worksheets, and additional information in the form of attached images of plant morphology which are needed for plant identification in the field. According to Suryani et al. (2015) the development of outdoor learning devices can improve learning outcomes through students' opportunities to explore various things and associate phenomena to objects that exist in nature. After preparing scientific outbound activities on plant classification material, a pre-assessment was carried out by a learning design expert on the activity design using a learning design assessment questionnaire. The learning design assessment questionnaire was prepared for qualitative assessment as can be seen in the Table 4.

Based on expert pre-assessment of the design of scientific outbound learning activities, it is known that the UPI botanical garden environment has suitable potential to be used as a learning resource, has sufficient area to accommodate participants, and has potential natural resources and facilities that can be used as learning resources biology. The designer of scientific outbound learning are in accordance with phase E learning achievements in biological elements and process skills. The design of scientific outbound activities also contains educational value and has a clear activity flow. Scientific outbound activities are also designed to build competencies such as intrapersonal and interpersonal skills as well as profile of pelajar Pancasila in participants. In scientific outbound learning activities, students are also supported by a learning guidebook, introductory material delivered via power point and the implementation of activities utilizing digital applications via smartphone to fulfill information needs. It can be concluded that the designed scientific outbound learning can be used without revision based on pre-assessment by experts.

Table 4. Assessment of the Design of Scientific Outbound Learning by Learning Design Experts

Aspects	Indicator	Assessment
Feasibility of botanical gardens	Suitability of environmental tone	√
	Sufficiency of area	√
	Content availability	√
	Facilities availability	√
Curriculum	Suitability of activities with phase E learning outcomes in elements of biological understanding	√
	Suitability of activities with phase E learning outcomes in process skills elements	√
Activity design	Educational value	√
	Activity flow	√
	Sufficiency of time	√
Competencies built	Build intrapersonal skills	√
	Build interpersonal skills	√
	Building the profile/character of Pancasila student	√
Activity device	Instructions/manual	√
	Media	√
	Implementation of digital applications	√

Researchers designed the steps for scientific outbound activities (Table 3) that encourage students to build characters such as leadership, collaboration, self-confidence, and decision making in accordance with research by Nubayati et al. (2018) who said that outbound can provide experiences for students to get to know their own character, social skills, communication with groups, and leadership. Outdoor learning can also provide opportunities for participants to interact with the surrounding environment independently or in groups (Nugroho & Hanik, 2016). Apart from that, scientific outbound learning is also prepared by researchers in accordance with the outbound principles contained in the game or adventure scheme in each step of the activity. This is in line with the statement from Nikmah (2016) that outbound activities which integrated into learning are carried out openly and the implementation of the activities is packaged in the form of games, simulations and discussions.

Next, an analysis of the research instrument grid used to measure students' classification and collaboration abilities was carried out. The classification ability indicators used refer to research of Kurniawan (2019) as a reference in developing plant classification material questions. Classification ability indicators include analyzing, classifying, explaining characteristics, formulating problems, and concluding. Plant classification questions are prepared in the form of multiple-choice questions.

Then students' collaboration abilities were observed during the learning process and data was collected from students also by self-assessment and peer-assessment through a collaboration questionnaire developed with a Likert scale. The indicators used are

adapted from research of Ofstedal et al. (2009) which was then modified to include assessment of students' social attitudes and scientific attitudes in the collaboration aspect. The collaboration aspects developed in the questionnaire consist of aspects of contribution, participation, quality of work, time management, group support, preparation, problem solving, group dynamics, interaction with others, role flexibility, and reflection.

After the research instruments were prepared according to the needs of the research, validation was carried out on the instruments regarding classification ability and collaboration ability questionnaires by expert lecturers. Then revisions or improvements were made to the classification ability questions and collaboration ability questionnaire according to expert advice.

Implementation Stage

A limited trial was carried out to test the implementation of scientific outbound learning on plant classification material that had been designed for research subjects totaling 15 class X high school students. Before the activity, students did a pretest on plant classification material, then students were given preliminary material on plant classification via power point. Continuing with this, students carried out scientific outbound learning activities in the botanical garden of the Indonesia University of Education. After the outbound scientific learning activities were completed, students returned to work on the posttest on plant classification and answering the questionnaires.

In implementing this learning activity, students are required to compete and develop strategies to complete five types of scientific outbound activities that raise the topic of plant classification quickly and accurately. Students of Daarut Tauhid Girl's Boarding High School feel more interested because this learning is something new for them who usually study in class. Pelima (2014) also said that one methodology that can be used to overcome student boredom in classroom learning is by using nature as a learning tool. This is supported by Maesaroh et al. (2022) research who states that learning which integrated with outbound activities that implement discussion, games, and practice activities can make learning material delivered in a more fun way.

During the process of implementing scientific outbound learning, all groups were able to complete the task in scientific outbound activities designed by researchers. All participants are competing to collect "a stars" if they succeed in becoming winners in each activity. Arachchige et al. (2020) stated that outbound activities involve strategy formation, collaboration and competition within them. Through this process students can develop their teamwork, self-confidence and leadership skills. This is supported by the research of Suryawan et al. (2020), that implementation of outbound includes character building that trains courage, self-confidence, builds balance and synergy, and trains collaboration between groups.

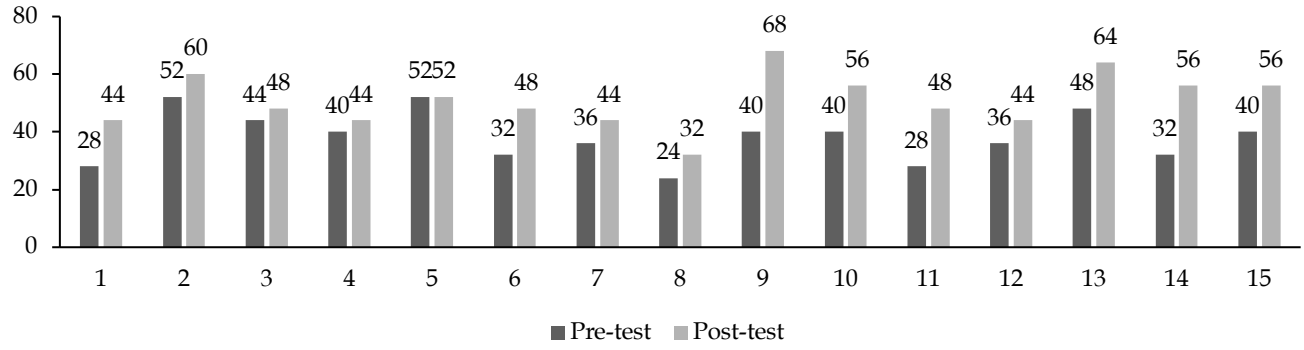

Figure 2. Obtained student pretest and posttest scores

This scientific outbound learning is designed to build students' classification abilities based on the pretest and posttest scores on the plant classification questions given. The results of student scores can be seen in the Figure 2.

The results of the average scores from the pretest and posttest to measure students' classification abilities can be seen in Table 5. Based on the research results, students' classification abilities as measured through pretest and posttest did not get optimal results because the scores did not reached the minimum completeness criteria yet which has been determined by the school on 76 as can be seen in Figure 2 and Table 5 above. There is no student's score has yet been able to exceed the minimum completeness criteria score. This result is very inversely proportional to the student's response during the scientific outbound learning process which occurs outside the classroom. In fact, when scientific outbound learning activities were carried out at the UPI botanical garden, students seemed successful in completing the activities and discussions in the scientific outbound

activity steps, but they were not optimal when working on plant classification questions in the class.

Table 5. Average Pretest and Posttest Scores for Students' Classification Abilities

Score	Total	Average	Minimum completeness criteria score
Pretest	572	38.13	76
Posttest	764	50.93	76

This can be caused by several factors such as a decrease in student focus and interest when learning activities in the botanical garden has finished. Outbound activities act as a medium of increasing insight through a series of experiences that can trigger students' enthusiasm for learning (Artobatama, 2018). So after they return back to the class to work on the posttest, students' interest in learning activities decreased. Apart from that, learning success is also supported by the motivation given to students. A research by Muhtadi (2023) states that the effectiveness of outdoor learning influences increasing student's interest and motivation. Another factor that can also cause low student pretest and posttest results is the lack of student motivation when working on questions because the implementation of activities is carried out outside teaching and learning hours so that students feel that the assignments given are only part of the research and have no connection with students' grades at school. Students are given less emphasis that the pretest and posttest carried out are part of the scientific outbound learning process. According to Maesaroh et al. (2022), learning motivation is an important thing that moves students in the learning process and encourages students to be more interested in learning. This is reinforced by research from Ricardo et al. (2017), which states that learning outcomes can be improved by paying attention to students' interests and learning motivation.

Apart from that, obstacles were also found in implementing scientific outbound learning, such as time exceeding the optimal limit that had been determined due to limited use of smartphones by Daarut Tauhid Girl's Boarding High School students. This is related to the school's background which is an Islamic boarding school-based so there are several regulations that are applied, one of which is limited use of smartphones. Meanwhile, in the scientific outbound learning that is implemented, there are steps to use digital applications that will support students to obtain more information that is useful for completing the activities. In research from Tondang et al. (2020), it is known that teachers believe that when students are directed to search for learning materials themselves from the internet, it can increase student activity in the learning process.

The result was that students took longer to complete activities because one group was only facilitated with one smartphone which hampered student movement. This could also be related as a factor that influences students' low pretest and posttest results because in biology learning at school, student's information is limited to only coming from their teacher explanations and books. In accordance with the statement from Subekti et al. (2017), learning that is adapted to developments in technology and information can accelerate the flow of scientific information. Furthermore, assessments of students' collaboration abilities in the dimensions of social attitudes and scientific attitudes were collected through self-assessment and peer-assessment questionnaires and observation sheets. The results of the student collaboration ability assessment can be seen in Table 6.

The learning design prepared by researchers also refers to learning that is able to build collaboration skills where students are required to be able to complete activities in groups. Collaboration skills allow someone to work together with colleagues who have different backgrounds and characters effectively to get quality results (Masruroh & Arif, 2021). Based on the research results, it is known that students' collaboration abilities have developed and some students even already have collaboration abilities. This can be seen from the results of the assessment of collaboration abilities in Table 6 through self-assessment, peer-assessment, and observer assessment. The average student score ranges between the numbers 26-34 which are included in the developing collaboration ability category and the numbers 35-44 which are included in the categories of collaboration abilities that established as can be interpreted from the score category at Table 2.

Table 6. Self-Assessment, Peer-Assessment, and Observer Assessment of Students' Collaboration Ability

No.	Social Attitudes			Scientific Attitudes		
Subject	S-A	P-A	O-A	S-A	P-A	O-A
1	34	40	36	36	40	38
2	34	44	36	35	44	38
3	43	44	46	44	44	46
4	40	44	38	38	44	40
5	43	44	38	44	44	39
6	41	37	29	38	35	30
7	42	33	36	42	33	31
8	32	44	31	29	44	30
9	41	38	33	40	40	34
10	44	44	36	44	44	32
11	43	44	34	44	44	33
12	32	32	34	33	33	32
13	40	34	38	36	33	39
14	34	44	35	34	44	32
15	33	30	29	31	30	34

Notes: S-A = Self-assessment; P-A = Peer-assessment; O-A = Observer assessment

These results are indeed more clearly visible in Daarut Tauhid Girls' Boarding High School students considering that the school is Islamic boarding school-

based so that more character-building activities are taught, such as leadership training for students and the application of the "Daarut Tauhid Culture Concept" which is related to social skills. This also has a positive impact because apart from knowledge, social skills also have an equally important need for students in life after school as in the world of work. Learning in groups is important to help students achieve certain goals and improve their collaboration abilities (Windayani & Pertiwi, 2023). A scientific attitude is also needed in a scientific process that built students' knowledge and attitudes as scientists (Suhendra et al., 2023). According to Artobatama (2018), learning activities must be able to equip students with the skills needed in the 21st century, such as the ability to collaborate as a life skill that is appropriate to the current environment and needs of students. Based on the English Skills Report, communication skills and team collaboration skills are considered to be the skills most needed in the world of work (Sari et al., 2017). Therefore, the necessary communication and collaboration skills are cultivated from an early age. Implementation of scientific outbound learning activities regarding plant classification material can trigger the emergence of collaboration abilities that already exist in students and also develop collaboration abilities that previously existed in students.

Conclusion

Based on research results from the implementation of scientific outbound learning on plant classification material, it can be concluded that the design of scientific outbound learning can be used in learning on plant classification material based on pre-assessment by experts. Students' classification abilities have not yet achieved optimal results seen from the average student pretest results of 38.13 and the average student posttest results of 50.93, which has not passed 76 as the school's KKM limit due to obstacles found in the process, such as decreased student interest after learning is completed, lack of motivation given to students, and limited use of smartphones in the learning process. Collaboration abilities in students were found to be around a score of 26-34 (developing ability category) and a score of 35-44 (existing ability category) which means that existing collaboration abilities in Daarut Tauhid Girl's Boarding High School students can emerge and be developed through outbound scientific learning activities.

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Author Contributions
Conceptualization, W. C, T. H, B. S.; methodology, W. C, T. H, B. S.; validation, T. H, B. S.; formal analysis, T. H, B. S.; investigation, W. C.; resources, W. C.; data curation, W. C.; writing-original draft preparation, W. C.; writing-review and editing, W. C, T. H, B. S. all authors have read and agreed the published version of the manuscript.

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Conflicts of Interest
The authors declare no conflict of interest.

References

Arachchige, U. S. P. R., & Sathsara, K. L. T. (2020). The Impact of Outbound Training (OBT). *International Journal of Scientific & Technology Research*, *9*(4), 377–380. Retrieved from https://www.ijstr.org/final-print/apr2020/The-Impact-Of-Outbound-Training-obt.pdf

Artobatama, I. (2018). Pembelajaran STEM Berbasis Outbound Permainan Tradisional. *Indonesian Journal of Primary Education*, *2*(2), 40–47. https://doi.org/10.17509/ijpe.v2i2.15099

Ayotte-Beaudet, J. P., Potvin, P., Lapierre, H. G., & Glackin, M. (2017). Teaching and Learning Science Outdoors in Schools' Immediate Surroundings at K-12 Levels: A Meta-Synthesis. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(8), 5343–5363. https://doi.org/10.12973/eurasia.2017.00833a

Hakim, A. R., & Kumala, F. N. (2016). Pengembangan Karakter melalui Kegiatan Outbound. *Jurnal Moral Kemasyarakatan*, *1*(2), 173–182. Retrieved from https://ejournal.unikama.ac.id/index.php/JMK

Handini, M. C., & Hasanah, L. N. (2017). The Enhancement Adversity Quotient through Outbound Play Activities. *Advances in Social Education and Humanities Research*, *58*. https://doi.org/10.2991/icece-16.2017.58

Hidayati, N., & Sugiharto, B. (2022). Reflection on Student Collaboration Skills Assessment by Biology Teachers. *Jurnal Penelitian Pendidikan IPA*, *8*(3), 1102–1107. https://doi.org/10.29303/jppipa.v8i3.1258

Kellert, S. R. (2005). Building for Life: Designing and Understanding the Human-Nature Connection. *Renewable Resources Journal*, *24*(2). Retrieved from https://www.researchgate.net/publication/40777405_Building_for_Life_Designing_and_Understanding_the_Human-Nature_Connection

Kurniawan, I. S. (2019). *Pengembangan Aplikasi i-Bird Pada Perkuliahan Zoologi Vertebrata untuk Meningkatkan Kemampuan Identifikasi, Kemampuan Klasifikasi dan Memunculkan Literasi Digital Mahasiswa Pada Kelas Aves*. Bandung: Universitas

Pendidikan Indonesia. Retrieved from http://repository.upi.edu/42063/

Le, H., Janssen, J., & Wubbels, T. (2018). Collaborative Learning Practices: Teacher and Student Perceived Obstacles to Effective Student Collaboration. *Cambridge Journal of Education*, *48*(1), 103–122. https://doi.org/10.1080/0305764X.2016.1259389

Maelasari, E. (2013). *Penerapan Model Pembelajaran Berbasis Praktikum sebagai Upaya Meningkatkan Kemampuan Klasifikasi Siswa Kelas X pada Konsep Spermatophyta*. Bandung: Universitas Pendidikan Indonesia. Retrieved from http://repository.upi.edu/4161/

Maesaroh, M., & Sriyanto, S. (2022). Outdoor Learning with Outbond Variations 21st Century Social Studies Learning Alternative. *Proceedings Series on Social Sciences & Humanities*, *3*, 283–287. https://doi.org/10.30595/pssh.v3i.391

Mahyatun, B., Nirwana, H., & Khaidir, A. (2020). Development of Outbound Learning Models to Improve Students' Caring Characters on the Social Environment. *Proceedings of the 2nd International Conference Innovation in Education (ICoIE 2020)*, 346–352. https://doi.org/10.2991/assehr.k.201209.247

Malik, A., & Ubaidillah, M. (2021). Multiple Skill Laboratory Activities: How to Improve Students' Scientific Communication and Collaboration Skills. *Jurnal Pendidikan IPA Indonesia*, *10*(4), 585–595. https://doi.org/10.15294/jpii.v10i4.31442

Marita, B., Jamaluddin, J., & Rasmi, D. A. C. (2023). Hubungan Kemampuan Kolaborasi dan Hasil Belajar Biologi Peserta Didik SMAN di Kota Mataram. *Jurnal Ilmiah Profesi Pendidikan*, *8*(3), 1850–1858. https://doi.org/10.29303/jipp.v8i3.1576

Marlina, M. E. (2013). Kurikulum 2013 yang Berkarakter. *Jupiis: Jurnal Pendidikan Ilmu-Ilmu Sosial*, *5*(2), 27–38. https://doi.org/10.24114/jupiis.v5i2.1112

Masruroh, L., & Arif, S. (2021). Efektivitas Model Problem Based Learning melalui Pendekatan Science Education for Sustainability dalam Meningkatkan Kemampuan Kolaborasi. *Jurnal Tadris IPA Indonesia*, *1*(2), 179–188. https://doi.org/10.21154/jtii.v1i2.171

Muhtadi, M. A. (2023). Pembelajaran Berbasis Outdoor Education sebagai Upaya Peningkatan Minat dan Motivasi Belajar Siswa SD di Kota Sukabumi. *Jurnal Pendidikan West Science*, *01*(06), 274–280. https://doi.org/10.58812/jpdws.v1i4.465

Muqit, A., & Djuwairiyah, D. (2017). Desain Strategi Pembelajaran Menuju Capaian Pembelajaran. *Jurnal Pendidikan Islam Indonesia*, *1*(2), 205–223. https://doi.org/10.35316/jpii.v1i2.50

Musfiqon, H., & Nurdyansyah, N. (2015). Pendekatan Pembelajaran Saintifik. *Nucl. Phys.*, *13*(1). Nizamia Learning Center. Retrieved from http://eprints.umsida.ac.id/id/eprint/306

Nikmah, A. (2016). Inovasi Pembelajaran Integratif PAI Berbasis Outbound Sains di Madrasah Ibtidaiyah. *Elementary*, *4*. https://doi.org/10.21043/elementary.v4i1.1974

Nubayati, N., & Adninda, G. B. (2018). Komunikasi Kelompok, Edukasi, dan Kreatifitas Siswa dalam Dinamika Outbond. *Prosiding Seminar Hasil Pengabdian Masyarakat: Implementasi Teknologi Tepat Guna Kepada Masyarakat*, 217–222. Retrieved from https://ojs.amikom.ac.id/index.php/semhasabdimas/article/view/2324/2126

Nugroho, A. A., & Hanik, N. R. (2016). Implementasi Outdoor Learning untuk Meningkatkan Hasil Belajar Kognitif Mahasiswa pada Mata Kuliah Sistematika Tumbuhan Tinggi. *Bioedukasi*, *9*(1), 41–44. https://doi.org/10.20961/bioedukasi-uns.v9i1.3884

Octaviana, F., Wahyuni, D., & Supeno, S. (2022). Pengembangan E-LKPD untuk Meningkatkan Keterampilan Kolaborasi Siswa SMP pada Pembelajaran IPA. *Edukatif: Jurnal Ilmu Pendidikan*, *4*(2), 2345–2353. https://doi.org/10.31004/edukatif.v4i2.2332

Ofstedal, K., & Dahlberg, K. (2009). Collaboration in Student Teaching: Introducing The Collaboration Self-Assessment Tool. *Journal of Early Childhood Teacher Education*, *30*(1), 37–48. https://doi.org/10.1080/10901020802668043

Pelima, J. N. (2014). Pendidikan Lingkungan Hidup dengan Metode Outbound untuk Anak Usia Dini: Kajian Pustaka. *Jurnal Akademia*, *1*(2). http://dx.doi.org/10.31227/osf.io/ekzd3

Ramadhani, W. S., Erman, E., & Indah, N. K. (2016). Penerapan Pembelajaran Outdoor Learning Process (OLP) melalui Pemanfaatan Taman Sekolah sebagai Sumber Belajar Materi Klasifikasi Tumbuhan untuk Meningkatkan Hasil Belajar Siswa SMP. *Jurnal Pendidikan Sains*, *4*(3), 1–7. Retrieved from https://ejournal.unesa.ac.id/index.php/pensa/article/view/15312/13870

Ricardo, R., & Meilani, R. I. (2017). Impak Minat dan Motivasi Belajar terhadap Hasil Belajar Siswa. *Jurnal Pendidikan Manajemen Perkantoran*, *2*(2), 79. https://doi.org/10.17509/jpm.v2i2.8108

Sari, K. A., Prasetyo, Z. K., & Wibowo, W. S. (2017). Development of Science Student Worksheet Based on Project Based Learning Model to Improve Collaboration and Communication Skills of Junior High School Student. *Journal of Science Education Research*, *1*(1). https://doi.org/10.21831/jser.v1i1.16178

Setiawati, N. A. (2021). Penerapan Metode Outbond pada Sekolah Alam untuk Menciptakan Pembentukan Leadership. *Journal of Education and Teaching Learning (JETL)*, *3*(2). https://doi.org/10.51178/jetl.v3i2.207

Subekti, I. M., & Muchtarom, M. (2017). Analisis Penerapan Media Pembelajaran Berbasis Internet Melalui Pemanfaatan Smartphone dalam Pembelajaran Pendidikan Pancasila dan Kewarganegaraan (PPKn) di SMA Negeri 1 Kertasura. *Educitizen*, *2*, 53–66. Retrieved from https://www.neliti.com/id/publications/242020/analisis-penerapan-media-pembelajaran-berbasis-internet-melalui-pemanfaatan-smar#cite

Suhendra, H., Yennita, Y., & Irawan, D. (2023). Students' Perception of Guided Inquiry Learning in Physics Viewed from Collaboration Skills and Scientific Attitude. *Jurnal Penelitian Pendidikan IPA*, *9*(8), 6707–6713. https://doi.org/10.29303/jppipa.v9i8.4068

Suryani, E., Jekti, D. S. D., & Ramdani, A. (2015). Pengembangan Perangkat Pembelajaran Model Belajar di Lingkungan (Outdoor Learning) untuk Mata Kuliah Morfologi Tumbuhan. *Jurnal Penelitian Pendidikan IPA*, *1*(2), 1–12. https://doi.org/10.29303/jppipa.v1i2.18

Suryawan, R. F., & Widyastuti, D. D. (2020). Dynamics of Character Education through The Outbound Training Activities for Students on The Campus. *Dinasti International Journal of Education Management and Social Science*, *1*(4), 525–534. https://doi.org/10.31933/dijemss.v1i4.246

Tondang, Y. S., & Arwita, W. (2020). Pemanfaatan Internet sebagai Sumber Pembelajaran Biologi. *Jurnal Pelita Pendidikan*, *8*(2), 151–159. https://doi.org/10.24114/jpp.v8i2.15298

Trinova, Z. (2016). Pembelajaran Outbound Sains yang Bermakna (Meaningful Learning) dan Inovatif di Madrasah Ibtidaiyah. *Ta'dib*, *13*(2). https://doi.org/10.31958/jt.v13i2.189

Wahyuni, S., Indrawati, I., Sudarti, S., & Suana, W. (2017). Developing Science Process Skills and Problem-Solving Abilities Based on Outdoor Learning in Junior High School. *Jurnal Pendidikan IPA Indonesia*, *6*(1), 165–169. https://doi.org/10.15294/jpii.v6i1.6849

Walid, A., Sasongko, R. N., Kristiawan, M., Kusumah, R. G. T., & Andaria, M. (2021). ICARE (Introduction, Connection, Application, Reflection, and Extension): Analysis of Effectiveness in Improving Student's Communication and Collaboration Ability. *Jurnal Penelitian Pendidikan IPA*, *7*(3), 305–309. https://doi.org/10.29303/jppipa.v7i3.685

Widiasworo, E. (2017). *Strategi dan Metode Mengajar Siswa di Luar Kelas-Outdoor Learning*. Yogyakarta: Ar Ruzz Media. Retrieved from http://library.fe.uny.ac.id/index.php?p=show_detail&id=2432

Windayani, F., & Pertiwi, K. R. (2023). Development of Scientific Inquiry-Based LKPD to Improve Students Critical Thinking Ability and Collaboration Skills. *Jurnal Penelitian Pendidikan IPA*, *9*(9), 7203–7209. https://doi.org/10.29303/jppipa.v9i9.4453

Zulfah, Z., Akbar, B., & Abdullah, S. (2021). Pengaruh Penggunaan Metode Observasi terhadap Kemampuan Klasifikasi Siswa Kelas X SMAN 7 Bekasi. *Al-Nafis: Jurnal Biologi dan Pendidikan Biologi*, *1*(1), 1–9. https://doi.org/10.46339/al-nafis.v1i1.579