RESEARCH ARTICLE

Implementation of free inquiry approach based on blended learning on creative thinking and student collaboration skills

E. Ernawati[a,1]*, Tri Maniarta Sari[a,2]

[a]Department of Biology Education, Faculty of Teacher Training and Education, Sembilanbelas November Kolaka University, Jl. Pemuda, Kolaka, Southeast Sulawesi 93517, Indonesia

[1]ernaern3012@gmail.com; [2]trimaniarta@gmail.com

Abstract: The free inquiry approach based on blended learning is a learning approach that is carried out by combining face-to-face and online lectures which gives students the freedom to find problems and solve problems independently, design procedures or steps collaboratively by sharing and discussing with friends. Hence, this learning approach is potentially effective in developing critical thinking and students' creativity in solving problems and students' collaborative skills. Based on this, the aim of this research is to see the effect of the free inquiry approach based on blended learning on creative thinking skills and collaboration skills of Biology Education students, Sembilanbelas November Kolaka University. This research uses quasi-experimental Non-equivalent Control Group Design Pretest-Postest Design method. In this design, both the experimental group and the control group were compared where the experimental group was treated with a blended learning-based free inquiry approach, while the control group used a conventional approach (online discussion). The research data were analyzed by descriptive statistics and inferential statistical analysis (t-test) to determine whether there was a difference between the two sample groups studied with a significant level of 0.05. Based on the data analysis, it was found that the free inquiry approach based on blended learning had a better effect on students' creative thinking skills and collaboration skills.

Keywords: blended learning; collaboration skills; creative thinking skills; free inquiry

For correspondence:
ernaern3012@gmail.com

Article history:
Received: 10 August 2022
Revised: 3 November 2022
Accepted: 12 November 2022
Published: 24 November 2022

10.22219/jpbi.v8i3.22254

p-ISSN: 2442-3750
e-ISSN: 2537-6204

Introduction

One of the skills needed for the development of nation and state is 21st Century Skills. The National Educational Association categorizes 21st century skills as: critical thinking, creative, communication and collaboration (Arifin, 2017). The development of 21st century skills can be carried out in all disciplines, one of which is in learning biology education in universities. Lecturers here are facilitators who are expected to design learning and facilitate students to develop and master 21st century learning skills (Septikasari & Frasandy, 2018), so that they are ready to face increasingly complex challenges in the future.

The Biology Education Study Program at Sembilanbelas November Kolaka University is one of the study programs that aims to produce graduates who will later become biology teachers. Consequently, students (prospective teachers) are expected to master 21st century skills, two of which are creative thinking skills and collaboration skills. In the biology learning strategy course, students as prospective teachers are required to think creatively in determining the right strategy in biology learning both in junior high and high school, more precisely for each biology material to be taught where each material has different characteristics and goals. This is implemented so that when they become teachers, they will be able to find problems and think of ways to solve problems in the form of new ideas that can improve the quality of their learning. Creativity and innovation will develop if students have the opportunity to think divergently. Students must be triggered to think outside their existing habits, involve new ways of thinking, have the opportunity to convey new ideas and solutions, ask unusual questions, and try to propose possible answers. Individual success will be obtained by students who have creative

skills (Zubaidah, 2016).

While collaboration is the ability to work together in synergy and adapt in various roles and responsibilities. Working productively with others puts empathy in place and respects different perspectives. With collaboration, each party involved can complement each other's strengths and weaknesses (Prihadi, 2018). More knowledge and skills will be available collectively to achieve maximum results. The technology available today makes the opportunities for students to collaborate wide open without having to be limited by distance. In the biology learning strategy course, collaboration skills are needed to instill an attitude of cooperation, mutual respect and play a productive role in improving the quality of learning in particular, and in general improving the quality of education in Indonesia.

Based on the researcher's initial observations, learning at the Biology Education Study Program of USN Kolaka is currently not specifically designed to develop 21st century skills (including creative thinking skills and collaboration skills). This leads to a few impacts in the form of: low critical and creative thinking skills of the students in solving problems, and low ability to collaborate. This is shown by the assignments given by the lecturers as well as the questions for the mid-semester and final semester exams for 2021-2022, the indicators included in students' critical and creative thinking skills in solving problems are still lacking (results of interviews with biology education lecturers at USN Kolaka). In addition, the results of the observations of researchers in 2021-2022 in lectures/study collaboration skills of students during assignments or during lectures are still low, there is no visible optimal collaboration and very less active role in groups, and a lack of respect for friends opinion. To overcome these problems, it is necessary to have an appropriate approach or learning strategy in the lecture process. The free inquiry approach is one of the learning strategies that can be applied in learning by integrating 21st century skills into it. The free inquiry approach is a learning approach that gives students the freedom to determine problems to investigate, find and solve problems independently (Mudalara, 2012), design procedures or necessary steps (Shofiyah, 2017). The characteristic of free inquiry learning is that students formulate their own problems, connect their learning with prior knowledge, and work collaboratively by sharing and discussing with peers so that students are intrinsically motivated to learn (Sweca, 2012; Wardani & Firdaus, 2019). Hence in this learning process, students learn more independently, develop critical and creative thinking, and have many opportunities to collaborate in solving problems.

Furthermore, to support the integration of 21st century skills in biology learning, of course, it cannot be separated from the role of information technology. Thus, a free inquiry approach based on blended learning needs to be applied in learning. Blended learning refers to learning that combines face-to-face learning and online learning (Ramang, 2019). Blended learning provides opportunities for students to have independent and sustainable learning (Kirna et al., 2015) thus providing more opportunities for students to practice their creative thinking and collaboration skills. Blended learning also is an effective solution to adjust according to current conditions after the Covid-19 pandemic.

Method

The research method used is Quasi Experimental Design with the type of Non-equivalent Control Group Design Pretest-Postest Design. In this design, both the experimental group and the control group are compared, although these groups are selected and assigned without going through randomness. The two existing groups were given a pretest, treatment, and finally a post-test. Explanation A is experiment class, B is control class, X is treatment/application of free inquiry approach based on blended learning, – is conventional learning, O1 is pre test, and O2 is post test (Tabel 1).

Tabel 1. The two existing groups

	Pre-test	Group	Post-test
A	O_1	X	O_2
B	O_1	-	O_2

The population in this study are all students of the Biology Education Study Program, Universities Sembilanbelas November Kolaka of the Academic Year 2020/2021, totaling 130 people. The sampling technique used was the Non-Probability Sampling method with the Purposive Sampling technique where the 4th semester biology education students who took the biology learning strategy course were selected, totaling 28 people as samples which later were divided into two groups, namely the experimental group and the control group. The experimental group was given free inquiry treatment, while the control group used a conventional approach (online discussion). The experimental group was given free inquiry based on blended learning, while the control group used a conventional approach (class discussions based on the topics of lecture material that had been determined for each group). This study consists of two variables, namely the implementation of the free inquiry approach based on blended learning as the independent variable and 21st century learning skills consisting of creative

thinking skills and collaboration skills as the dependent variable.
The instruments used in this study are as follows 1) Creative Thinking Skills Test: The test is given in the form of essay questions where each item of the question is adjusted to the indicators of students' creative thinking skills which are revised by taking input or suggestions from the validator into account prior to use; 2) Assessment of Creative Thinking through Assignments/Products: This measurement rubric is prepared and used to measure students' creative thinking skills in writing through student work; 3) Student Observation Sheets: Observation sheets are prepared and used to assess students' collaboration skills during lectures. The lecture activities include face-to-face activities (according to health protocols) and online (online). The data collection techniques used in this research consist of: 1) Data on the results of students' creative thinking skills: obtained from tests in the form of essay questions and task/performance assessments; 2) Data on student collaboration skills: obtained through performance observation sheets and student presentations.
Analysis of students' creative thinking skills: descriptive statistics were used with data presentation while inferential statistical analysis (t-test) was conducted to determine whether there was a difference between the two samples studied with a significant level of 0.05. The calculation of the t-test in this study was carried out with the help of the IBM SPSS Statistics 20 program with the Analyze-Compare Means-Independent T-Test formula. Analysis of student collaboration skills: descriptive statistics are used by calculating the average score of each indicator from the data from the observation sheet using the Formula 1 (∑X is the total score obtained by students, and n is the total of students).

$$\overline{X} = \frac{\sum X}{n} \quad (1)$$

Results and Discussion

Equivalence Test Results of Experiment Class and Control Class: Descriptive analysis and inferential statistical analysis (t-test) students' creative thinking skills through an essay test given at the beginning of the study (pretest) aimed to knowing the equality of students' initial abilities between the experimental class and the control class. The results of the analysis are presented in the diagram in Figure 1.

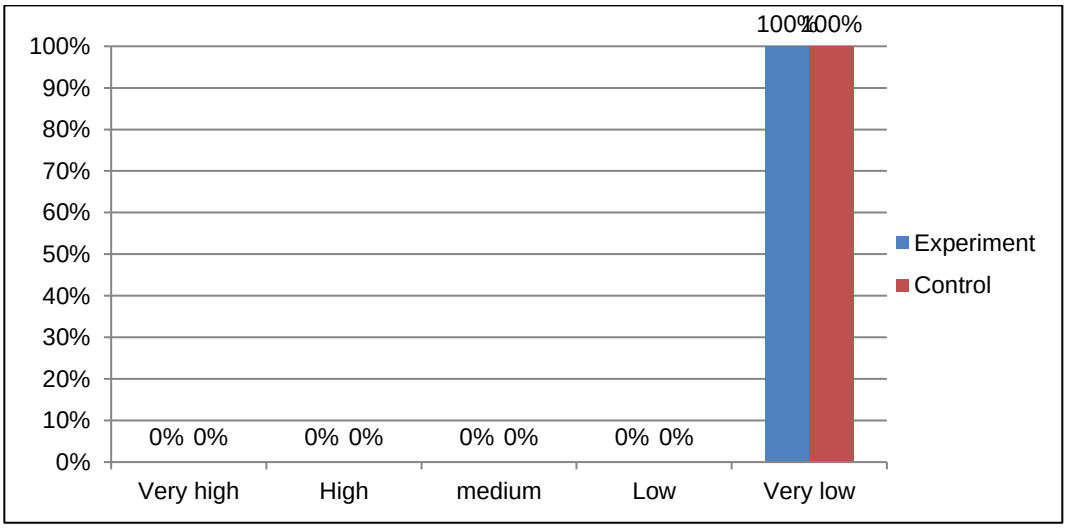

Figure 1. Results of students' creative thinking skills in the experimental class and control class on the pretest

The descriptive analysis in Figure 1 shows that the students' creative thinking skills both in the experimental class and in the control class are in the very low category (100%). Furthermore, the average difference test (independent Sample t-test) obtained a significance level (p) of 0.71 which is greater than 0.05 (p> 0.05) or the t-count value is smaller than t-table (0.379 < 2.056), thus there is no significant difference in students' creative thinking skills scores between the control class and the experimental class. Results of Analysis of Students' Creative Thinking Skills: The results of the descriptive analysis of students' critical thinking skills in the post-test (via essay test) are presented in Figure 2.

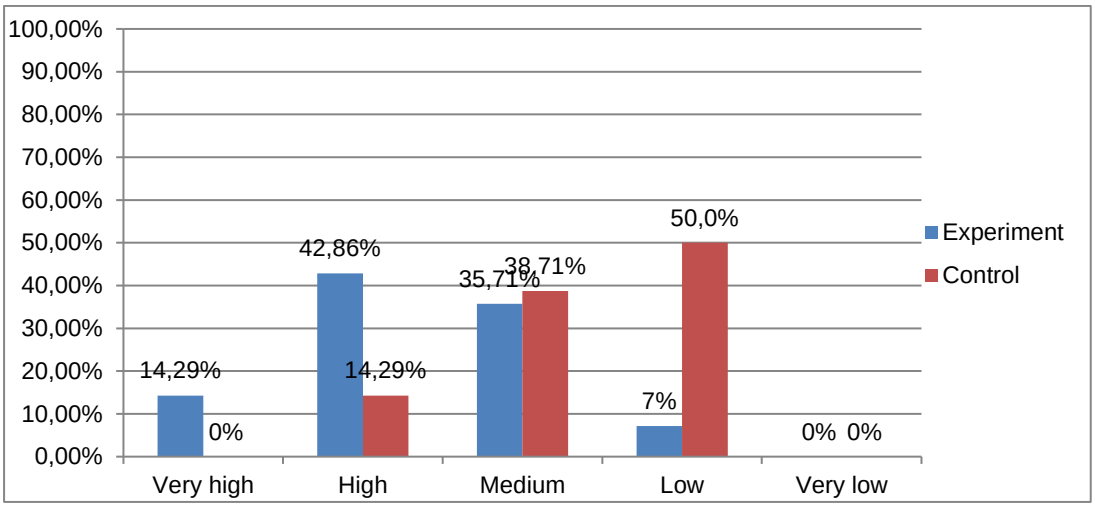

Figure 2. The results of students' creative thinking skills in the experimental class and control class in the post-test

Based on Figure 2, it is known that the free inquiry approach learning based on blended learning (experimental class) has a better effect than the control class (conventional learning) by obtaining the average value of students' creative thinking skills in the experimental class of 71.73 in the high category and in the control class of 62.80 in the medium category.
Furthermore, based on the results of statistical analysis using the Independent Sample t-test, a significance level (p) of 0.01 is obtained which is smaller than 0.05 ($p < 0.05$) or the t-count value is greater than t table ($2.798 > 2.056$). Ha is accepted and H0 is rejected, meaning that there is a difference in the effect of applying the free inquiry approach based on blended learning with conventional learning (online discussion) on students' creative thinking skills. The results of the descriptive analysis of students' creative thinking skills through task (product) assessment are presented in Figure 3.

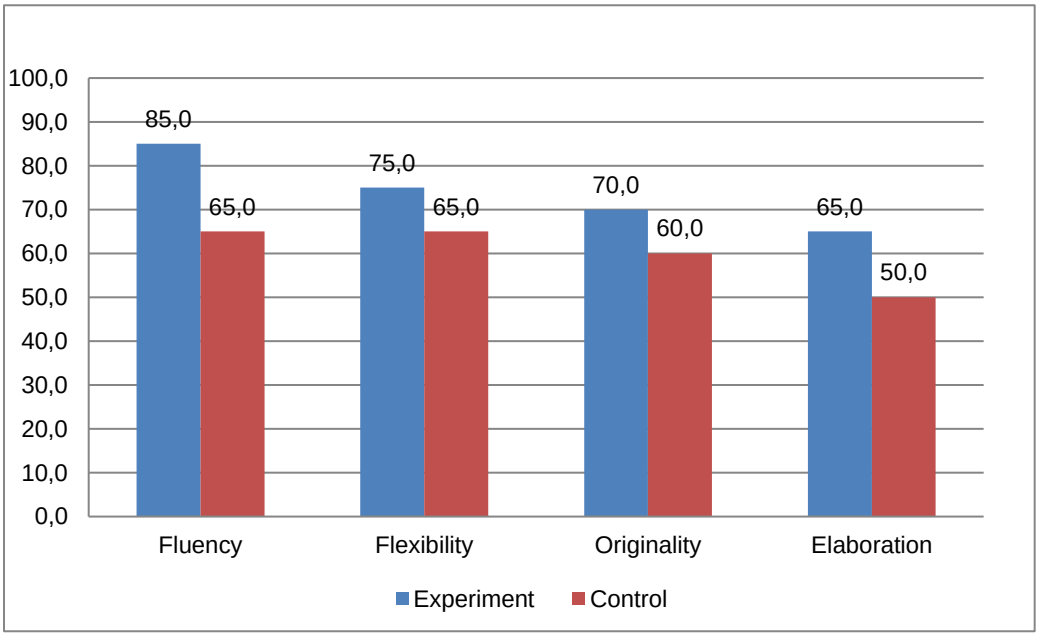

Figure 3. The results of students' creative thinking skills through assessment of assignments (projects) in the experimental class and the control class

Based on Figure 3, the results of students' creative thinking skills through a task assessment (product) which consists of 4 indicators of creative thinking skills (fluency indicator by writing down many ideas/alternative answers, flexibility indicator by expressing various ideas, answers, or questions, and

obtained from various different points of view, indicators of authenticity by finding unique combinations of answers and indicators of elaboration by enriching and developing an idea) in the experimental class are in the very high, high, and medium categories, while in the control class are in the medium and low categories. The average score of students' creative thinking skills through the assessment of assignments (products) in the experimental class is 73.8 in the high category and in the control class is 60.0 in the low category. This means that students' creative thinking skills based on the assessment of task (product) assessments that follow the free inquiry approach based on blended learning are better than those who follow conventional learning.

Results of Student Collaboration Skills Analysis: The results of data analysis of student collaboration skills consisting of 4 aspects of skills (each with 2 indicators) either through lectures by applying a free inquiry approach based on blended learning (experimental class) or through conventional learning models (classroom).

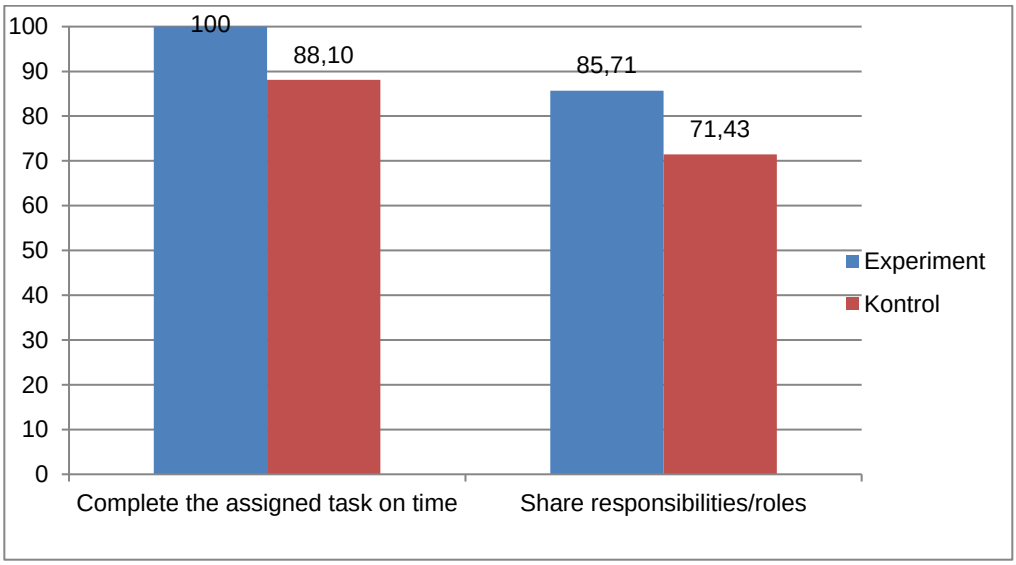

Figure 4. Observations of commitment/responsibility aspects in the experimental class and control class

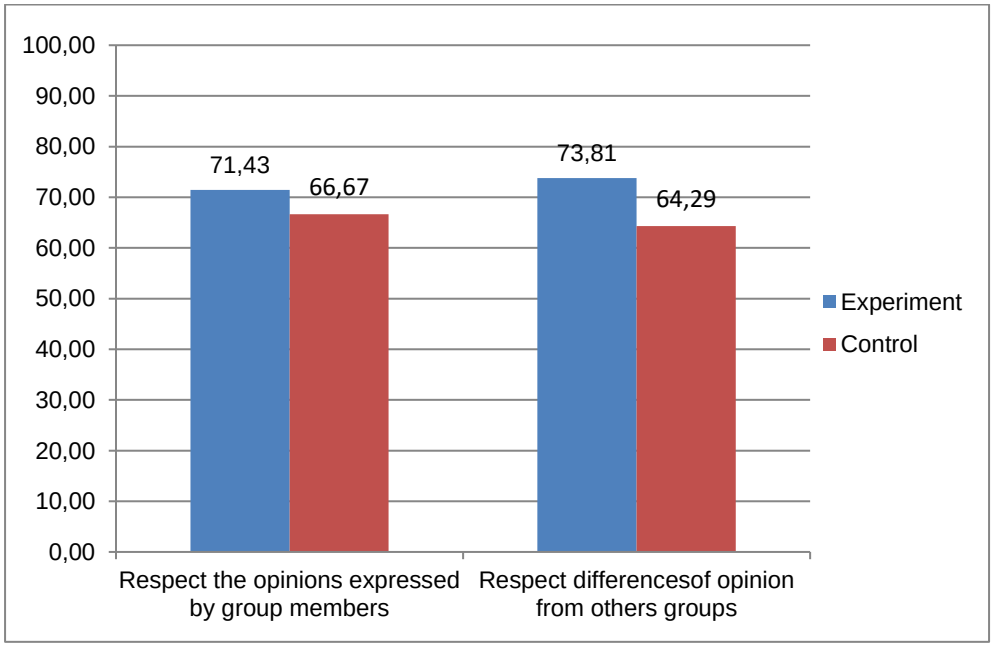

Figure 5. Observations of respect for each other in the experimental class and control class

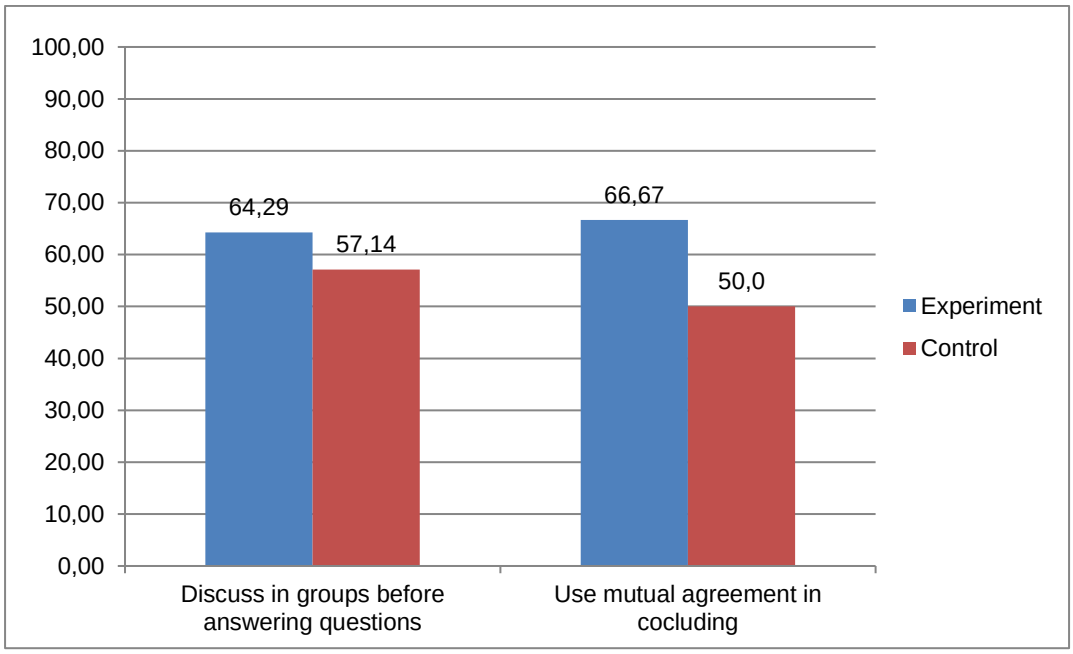

Figure 6. The results of the observation of the deliberation aspect in the experimental class and control class

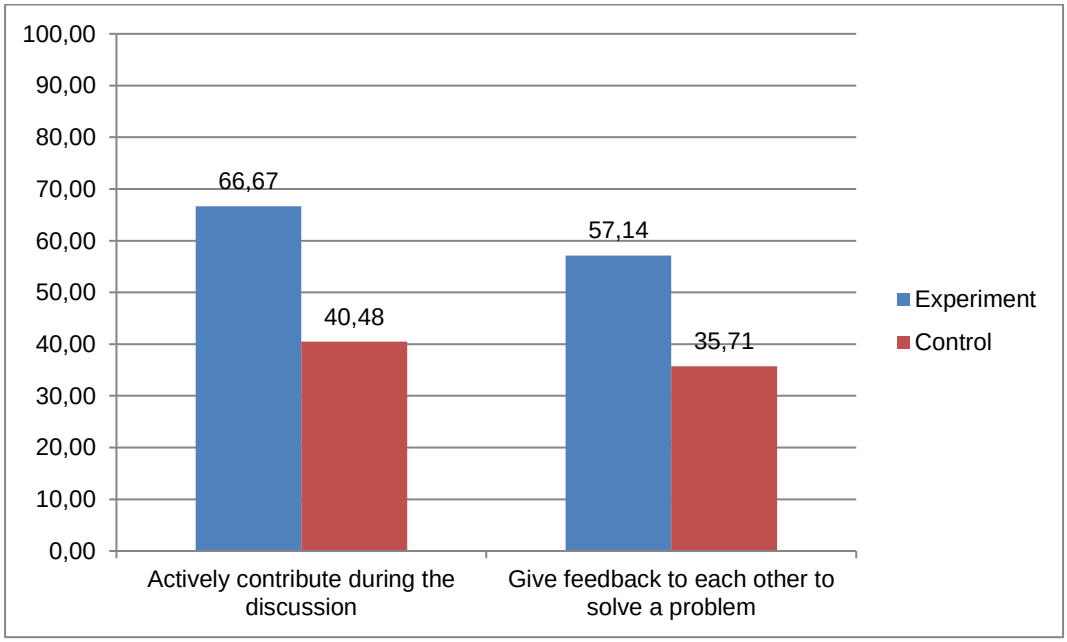

Figure 7. The results of the observation of participation in the experimental class and control class

Based on Figure 4, Figure 5, Figure 6 and Figure 7, the results of the data analysis of student collaboration skills as one of the 21st century learning skills consisting of 4 aspects of skills (each with 2 indicators) show that the score of each indicator in the experimental class is better than the score in the control class. Where the average score of collaboration skills on the aspect of commitment/responsibility in the experimental class is 94.05 in the very good category and in the control class is 79.76 in the good category, the average score on the aspect of mutual respect in the experimental class is 72.62 and 65.48 in the control class, each with a good category, the aspect of deliberation in the experimental class is 65.48 with a good category and 53.57 in the control class with a medium category, and on the participation aspect in the experimental class of 61.91 in the good category and 38.09 in the control class with the less category. Furthermore, from the overall indicators of student collaboration skills observed, the average score in the experimental class is 73.21 in the good category and in the control class was 59.23 in the medium category. Thus, student collaboration

skills in blended learning-based free inquiry approach learning are better than conventional learning.

The results of descriptive analysis and inferential statistical analysis (independent Sample t-test) on the pre-test, showed that prior to lectures/learning in the biology teaching and learning strategy course on various biology learning models, students had a very low level of knowledge/understanding of the material to be studied. Taught both in the experimental class and in the control class, the level of student material mastery tends to be or is relatively the same between the control class and the experimental class. Thus, the level of creative thinking skills of students in the experimental class and control class is considered to be equivalent (relatively the same) before the implementation of the lecture/learning by applying a free inquiry approach based on blended learning in the experimental class and the application of conventional learning (online discussion) in the control class.

Based on the results of descriptive analysis of student assignment (product) assessments and statistical analysis of Independent Sample t-test, it was found that there was a difference in the effect of applying the free inquiry approach based on blended learning with conventional learning (online discussion) on students' creative thinking skills where creative thinking skills of the students who take free inquiry approach based on blended learning do better than those who take conventional learning.

Based on the results of this study, the free inquiry approach based on blended learning is considered to be able to train students' creative thinking skills where this learning model is based on problems (the same as critical thinking skills training) in which the students are directed to formulate and understand their own problems, make guesses. Hypotheses about the problem, seek answers, and propose evidence, students are challenged to determine different ways of solving problems by looking at the problem from various perspectives and trying to create new ideas. And in the stages of the free inquiry learning activity, it certainly requires knowledge, in-depth understanding of the material, and more time so that the combination of online and face-to-face learning (blended learning) will provide adequate space and time for students to conduct free inquiry.

Each indicator of creative thinking skills that is evaluated and analyzed shows the characteristics of creative thinking skills, namely fluency of thinking, flexibility of thinking (flexibility), elaboration (elaboration), and originality through blended learning-based free inquiry approach learning. This appears to be better than those taught conventionally (group discussions). Classes are taught conventionally by providing opportunities for students to cooperate with their group friends in finding material descriptions according to material topics that have been determined by the lecturer which will then be discussed in class discussions. While classes taught with a free inquiry approach based on blended learning, students are given the freedom in biology learning strategy course to determine problems related to the suitability of the material with the learning strategies used by teachers in learning biology at school to be investigated, then they collect data and information in solving problems systematically and independently, and designing the necessary procedures or steps. Thus, they solve problems in an open-ended way and have alternative problem solving in more than one way because it depends on how they construct their own answers. In addition, problem solving activities carried out through an experimental process unconsciously include fluency in generating a number of ideas, flexibility, using more flexible time to access information, processing information, communicating with each other and collaborating in producing various types of solutions, and novelty of ideas or the resulting solution. This is in line with the opinion of Haryanti and Saputra, (2019) that to train and develop creative thinking skills, students must go through a process, and the process is passed by students during blended learning-based free inquiry learning.

The results of this study are in line with the research results of Ketut and narhaeni (2015) that through inquiry learning, students get direct experience in constructing the knowledge they already have. In this learning, students are encouraged to be actively involved in seeking as much information as possible through research. So that learning becomes meaningful, they discover and can create new things according to research by Haka et al. (2020) and Agustiono et al. (2020). In the research, it was concluded that there was an effect of the blended learning model on the creative thinking ability of students. Hence, it can be stated that the free inquiry approach based on blended learning can train and develop students' creative thinking skills (Shih et al., 2010; Anwar et al., 2012).

The results of the implementation of the free inquiry approach based on blended learning also have a good influence on student collaboration skills as one of the 21^{s}t century learning skills where the score of each indicator in the experimental class is better than the score in the control class. The results of this study indicate that the application of a blended learning-based free inquiry approach makes students work together effectively with a high sense of responsibility, shows respect for diverse team members, trains them to deliberation, and is willing to make decisions needed to achieve common goals and improve their participation in solving problems. That collaborating skills means being able to work effectively and respecting different team members, showing flexibility and a desire to be useful in making compromises to achieve common goals, taking responsibility in collaborative and collaborative work, and appreciating the contribution of each team member (Redhana, 2019). Free inquiry learning with blended learning will be more effective where online lectures allow everyone to learn anything without being limited by space and time because access is available anytime and anywhere. Communication and collaboration can be done at any time, while face-to-face lectures involve direct

interaction between lecturers and students and students with other students. This interaction creates stronger feelings and can confirm all forms of information/knowledge obtained online that require direct clarification, so that the collaboration that occurs in free inquiry becomes more flexible and meaningful (Sugiarti & Dwikoranto, 2021).

The results of this study are in line with Prasetyorini et al. (2017) that the combination of online and face-to-face learning (blended learning) facilitates good and flexible interactions between students, students and lecturers, and with learning resources. In online learning, these interactions can increase learning motivation, learning commitment, and skills to work together and collaborate between students. According to Shofiyah (2017) blended classes also provide a better atmosphere than face-to-face classes and online classes in generating higher participation rates from students.

Based on the results of research conducted at the Biology Education Study Program of Sembilanbelas November Kolaka University, the free inquiry approach based on blended learning is a learning model that has a good influence on the development of 21st century learning skills, especially creative thinking skills and student collaboration skills. Free inquiry can invite students to be able to develop their higher thinking skills including critical thinking to find and identify a problem, be creative in solving problems, be able to analyze and make decisions or conclusions that are supported by data and facts which in this series of activities will train students to be able to communicate and collaborate well. Blended learning optimizes free inquiry learning where through online learning students are more flexible in accessing and processing information, communicating, and collaborating in completing assigned tasks. Then, direct interaction through face-to-face learning will provide reinforcement and confirmation, so that each stage of free inquiry learning will be more meaningful and optimal to improve 21st century learning skills that must be mastered by students (Aji, 2019; Sipayung et al., 2019).

The results of this study are also in line with the results of Adi et al. (2017) that free inquiry learning which combines face-to-face learning and online learning can create independent, interactive, and meaningful learning, and can be used as a medium for discussion, asking questions, providing feedback, information sharing, and evaluation. This course has the opportunity to provide students with more flexible time and assignments. Adi et al. (2017) stated that blended learning can be applied at every stage of free inquiry learning and can create effective and efficient meaningful learning.

Conclusion

Based on the results of the research obtained, it can be concluded that the free inquiry approach based on blended learning has a better influence on students' creative thinking skills and collaboration skills in the biology learning strategy course because through the free inquiry approach based on blended learning, students are able to determine problems, collect data in solving problems independently, designing the necessary procedures, being able to solve problems with several alternative ideas, and communicating and collaborating with each other in producing various types of solutions as well as the novelty of ideas or solutions produced.

Based on the research results obtained, there is a need for further research on improving 21st century student learning skills by using other learning models or developing a blended learning-based 21st century student learning skills assessment needed for the current lecture process for the future. Hence, the procedure will be effective and efficient in measuring students' 21st century learning skills.

Acknowledgment

The author would like to thank fellow lecturers and students of the Biology Education Study Program, Faculty of Teacher Training and Education, Sembilanbelas November Kolaka University who have contributed to this research.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Author Contributions

E.E.: Methodology, Analysis, and review; T. M. S.: review and editing.

References

Adi, W. C., Suwono, H., & Suarsini, E. (2017). Pengaruh guided inquiry - blended learning. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, *2*(10), 1369–1376. http://journal.um.ac.id/index.php/jptpp/article/view/10084/4805

Agustiono, M., Ahman, E., Machmud, A., & Waspada, I. (2020). Penerapan blended learning berbasis google classroom terhadap keterampilan berpikir kreatif &kemandirian belajar peserta didik. *Jurnal Pendidikan Ekonomi UM Metro*, *8*(2), 14–20. https://ojs.fkip.ummetro.ac.id/index.php/ekonomi/article/view/3305

Aji, M. Q. W. (2019). Mengembangkan kecakapan abad 21 mahasiswa melalui model pembelajaran inkuiri. *Teknodika*, *17*(2), 70. https://doi.org/10.20961/teknodika.v17i2.35281

Anwar, M. N., Aness, M., Khizar, A., Naseer, M., & Muhammad, G. (2012). Relationship of creative thinking with the academic achievements of secondary school students. *International Interdisciplinary Journal of Education*, *1*(3), 44–47. https://www.researchgate.net/publication/338549060_Relationship_of_Creative_Thinking_with_the_Academic_Achievements_of_Secondary_School_Students

Arifin, Z. (2017). Mengembangkan instrumen pengukur critical thinking skills siswa pada pembelajaran matematika abad 21. *Jurnal THEOREMS (The Original Research of Mathematics)*, *1*(2), 92–100. https://jurnal.unma.ac.id/index.php/th/article/view/383/362

Haka, N. B., Anggita, L., Anggoro, B. S., & Hamid, A. (2020). Pengaruh blended learning berbantukan google classroom terhadap keterampilan berpikir kreatif dan kemandirian belajar peserta didik. *Edu Sains Jurnal Pendidikan Sains & Matematika*, *8*(1), 1–12. https://doi.org/10.23971/eds.v8i1.1806

Haryanti, D. Y., Saputra, S. D. (2019). Instrumen penilaian berpikir kreatif pada pendidikan abad 21. *Jurnal Cakrawala Pendas*, *5*(2), 58–64. http://doi.org/10.31949/jcp.v5i2.1350

Kirna, I. M., Sudria, I. B. N., & Tegeh, I. M. (2015). Apa respons dan harapan siswa sma tentang blended learning? *Jurnal Pendidikan Dan Pengajaran*, *48*(1–3), 15–25. https://doi.org/10.23887/jppundiksha.v48i1-3.6914

Mudalara, I. P. (2012). Pengaruh model pembelajaran inkuiri bebas terhadap hasil belajar kimia siswa kelas XI IPA. *Jurnal Pendidikan Dan Pembelajaran IPA Indonesia*, *2*(2). https://ejournal-pasca.undiksha.ac.id/index.php/jurnal_ipa/article/view/443/235

Ketut, N. I., Marhaeni, N. M., & Suastra, W. I. (2015). Pengaruh model pembelajaran inkuiri terbimbing berbasis lingkungan terhadap keterampilan berpikir kreatif dan penguasaan konsep IPA Kelas V SD Gugus VIII Kecamatan Abang. *E-Journal Program Pascasarjana Universitas Pendidikan Ganesha Program Studi Pendidikan Dasar*, *5*(1), 1–11. https://www.neliti.com/id/publications/124383/pengaruh-model-pembelajaran-inkuiri-terbimbing-berbasis-lingkungan-terhadap-kete

Prasetyorini, H. M., & Bachri, B. S. (2017). Pengembangan Materi pada mata pelajaran IPA dalam platform course networking sebagai media pembelajaran secara blended learning untuk meningkatkan hasil belajar dan keterampilan kolaborasi peserta didik kelas VII SMP. *Jurnal Pendidikan (Teori Dan Praktik)*, *1*(1), 50. https://doi.org/10.26740/jp.v1n1.p50-58

Prihadi, E. (2018). Pengembangan keterampilan 4C melalui Metode poster comment pada mata pelajaran PAI dan budi pekerti. *Rabbani*, *5*, 464–479. https://journal.unsika.ac.id/index.php/rabbani/article/view/1745

Ramang (2019). Efektivitas dan efisiensi pembelajaran berbasis blended learning di Madrasah Tsanawiyah Negeri Model Palu. *Paedagogia: Jurnal Pendidikan*, *7*(2), 1–22. https://doi.org/10.24239/pdg.vol7.iss2.16

Redhana, I. W. (2019). Mengembangkan keterampilan abad ke-21 dalam pembelajaran kimia. *Jurnal Inovasi Pendidikan Kimia*, *13*(1). https://journal.unnes.ac.id/nju/index.php/JIPK/article/view/17824

Septikasari, R., & Frasandy, N. R. (2018). Virtual learning during the COVID-19 pandemic: A Disruptive technology in graduate medical education. *Jurnal Tarbiyah Al-Awlad*, *VIII*(02), 112–122. https://doi.org/10.15548/alawlad.v8i2.1597

Shih, J., Chuang, C., & Hwang, G. (2010). An inquiry-based mobile learning approach to enhancing social science learning effectiveness. *Journal of Educational Technology & Society*, *13*(4), 50–62. http://www.learntechlib.org/p/52308/

Shofiyah, N. (2017). Penerapan model pembelajaran modified free inquiry untuk mereduksi miskonsepsi mahasiswa pada materi fluida. *SEJ (Science Education Journal)*, *1*(1), 19–28. https://doi.org/10.21070/sej.v1i1.836

Sipayung, H. D., Rahmatsyah, S. R. A., Bunawan, W., & Lubis, R. H. (2019). Pengaruh model pembelajaran collaborative inquiry terhadap keterampilan 4C siswa Di SMA. *Jurnal Pendidikan Fisika*, *8*(1), 29–38. https://jurnal.unimed.ac.id/2012/index.php/jpf/article/view/10639/0

Sugiarti, M. I., & Dwikoranto, D. (2021). Peningkatan kemampuan berpikir kritis peserta didik melalui pembelajaran blended inquiry learning berbantuan schoology pada pembelajaran fisika: Literature review. *Quantum: Jurnal Inovasi Pendidikan Sains*, *12*(1), 49.

https://doi.org/10.20527/quantum.v12i1.10262

Sweca, I. (2012). Pengaruh model pembelajaran inkuiri bebas terhadap penguasaan materi dan kinerja ilmiah siswa kelas X SMA Negeri 4 Denpasar. *Jurnal Pendidikan Dan Pembelajaran IPA Indonesia*, *2*(1), 1–20. https://ejournal-pasca.undiksha.ac.id/index.php/jurnal_ipa/article/view/409

Wardani, S., & Firdaus, L. (2019). Pengaruh model inkuiri terbimbing berbasis blended learning terhadap kemampuan kognitif-psikomotor pada materi larutan penyangga. *JTK (Jurnal Tadris Kimiya)*, *4*(2), 189–201. https://doi.org/10.15575/jtk.v4i2.5404

Zubaidah, S. (2016). Keterampilan abad Ke-21: Keterampilan yang Diajarkan melalui pembelajaran. *Seminar Nasional Pendidikan Dengan Tema "Isu-Isu Strategis Pembelajaran MIPA Abad 21, Tanggal 10 Desember 2016 Di Program Studi Pendidikan Biologi STKIP Persada Khatulistiwa Sintang–Kalimantan Barat 1*, 1–17. https://www.researchgate.net/publication/318013627_KETERAMPILAN_ABAD_KE-