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Improving the Effectiveness of Hybrid Learning Through the Computer-Supported Collaborative Learning Model Facing Pandemic Covid-19

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Abstract

Hybrid Learning using Computer Supported Collaboration Learning (CSCL) is an effort to maximize learning during the Covid-19 pandemic. This study aims to increase the effectiveness of implementing hybrid learning using CSCL in dealing with COVID-19. The research method uses qualitative case studies, and the data is processed using interactive data analysis from Miles and Huberman. The results showed: 1) CSCL learning is a very appropriate model applied to blended learning during the Covid-19 pandemic, this model is able to improve student learning outcomes, students study harder, active, focused, learn quickly, discuss and cooperate in groups, have confidence, manage learning time and help each other in their groups; 2) The CSCL model is more effective compared to conventional learning models because it can create a more active, creative and innovative learning atmosphere; 3) CSCL learning during face-to-face classes is better able to improve student performance and creativity and innovation in learning compared to implementing CSCL in online learning, because students can discuss and cooperate directly; 4) CSCL learning is able to improve student learning outcomes, this condition can be seen from the assignment scores and midle test and final test grades; 5) CSCL learning is able to improve students' ability to discuss and collaborate in groups; 6) CSCL learning is able to overcome the limited internet network in Higher Education.

Keywords: Hybrid learning, blended learning, student learning outcome, computer-supported collaborative learning (CSCL), vocational, pandemic covid.

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Introduction

Hybrid Learning is an effort to maximize learning carried out during the Covid-19 pandemic. Hybrid learning combines distance and in-class learning during school reopening and prepares for a potential resurgence (https://en.unesco.org/sites/default/files/unesco-covid-19-response-toolkit-hybrid-learning.pdf). Hybrid's teaching and learning approach became dominant during the Covid-19 pandemic (Verhoef et al., 2022). Blended learning is a hybrid approach that combines online learning and traditional classroom approaches (Iqbal et al., 2022). Many universities are implementing hybrid learning because the covid-19 pandemic has not disappeared. Hybrid learning is the choice of a very appropriate learning model today. Hybrid learning, a blend of distance and face-to-face learning, is already the rule in most universities today (Kanetaki et al., 2022). Blended learning is a hybrid approach combining online learning opportunities and traditional classroom approaches (Iqbal et al., 2022). Students and teachers begin to apply hybrid learning (Wut et al., 2022)

Even though the condition of the spread of the virus has been reduced, people must remain cautious and vigilant about this virus. Online learning support is important to society. All communities must be protected by their health to avoid the number of victims of the covid-19 virus. One of them is by staying at home and maintaining social distancing. The government still restricts activities in schools, offices, industries, and hospitals, by alternately dividing the hours of WFH or WFO activities. Activities at school and learning activities are carried out online. This protection has been going on for more than 2 years. The problem is that online learning that has been carried out for a relatively long time is feared to hurt students. Although the goal is to prevent students and teachers from being infected with covid 19 and reduce the spread of the virus, online learning makes students passive and not credible in their learning.

CSCL is very appropriate to be used for learning activities during the COVID-19 pandemic. The rapid development of computer technology allows individuals in different locations to work together in online learning activities. So CSCL makes learning easier through collaborative interaction and social construction of knowledge through information technology (IT) (Allaymoun, 2021). The implementation of CSCL uses small groups where students study in groups. Group members are generally 3 -5 people who interact with each other to solve complex problems or design projects. CSCL is an emerging branch of learning science that studies how people learn together with the help of computation (Liang et al., 2021)

Web-based learning using the CSCL model provides an advantage because it carries out collaborative learning activities with a computer

network, where students and educators do not need to meet each other in one location. The purpose of CSCL is to encourage students and teachers to communicate ideas, information, assignments, and discussions and provide feedback during learning activities effectively online due to conditions that make communication unable to be done face-to-face. This learning model dramatically saves time, effort, and costs and only requires computers and internet networks as learning media.

Students and teachers face many problems in conducting online learning. In addition to too many tasks being imposed on students, students also have difficulty understanding the material or assignments given. Online learning conditions are less conducive, causing many students to need physical teacher assistance. The real challenges faced by the Indonesian nation in dealing with online learning are: (1) technological inequality between schools in big cities and regions, (2) limited teacher competence in the use of learning applications, (3) limited resources for the use of educational technology such as the internet and quotas, (4) teacher-student-parent relationships in online learning that are not integral, learning outcomes are not optimal (timesindonesia.co.id.2020). To overcome this problem, learning the CSCL model of hybrid learning is the best way to overcome these challenges. Students studying online at home are also learning face-to-face in the classroom. Face-to-face learning further enhances learning collaboration between students.

1. Computer Supported Collaborative Learning (CSCL)

Computer Support Collaborative learning (CSCL) is a combination of cooperative learning models whose implementation uses computers and the internet as learning media. Collaborative learning in the form of group work is becoming increasingly significant in education as it applies interpersonal skills in modern society (Liang et al., 2021). In implementing the CSCL model learning, students as group members are in different locations but join virtually in one study group and collaborate online. Students can interact in their groups indefinitely in time and place or city. The results showed that the CSCL model could form learning independence, increase students' sense of responsibility in learning, and learning motivation, and form the ability to understand and think critically in solving problems (Satria, Eri. 2009)

CSCL reviewed educational psychology as a constructivist understanding. Students build their knowledge in groups, and the results of group discussions are reconstructed into independent knowledge. This autonomous construction of knowledge is reported as an individual task. (CSCL) focuses on shaping interaction models (Hernández-Sellés et al., n.d.). In CSCL, individuals are encouraged or needed in negotiate and share meanings to solve problems encountered in groups or organizations with the help of modern

information and communication technologies (Huang, 2018). The benefits of using the CSCL model are explained by Panitz in Robert's (2005) discussions (Satria, Eri. 2009) and can be seen from an academic, social and psychological point of view. From a theoretical point of view, the benefits of CSCL are: improving students' critical thinking skills, being more active in the learning process, improving learning outcomes, and being a problem-solving learning model for students. The benefits from a social point of view are: generating social attitudes because students help each other in study groups, building togetherness and understanding the differences between group members, forming a positive atmosphere of togetherness, help each other between students. The psychological benefits are: improving students' learning ability and developing a positive attitude towards teachers. In addition to the benefits mentioned above, other benefits are that the CSCL model does not require a classroom as the main requirement face-to-face, learning time is looser, students do not need to be present on time because they adjust the set study time, students can discuss anytime and anywhere according to the agreement of group members, submit assignments can be done at any time adjusting the time to complete the assigned task (Satria, Eri. 2009). CSCL's challenge is to design the process of group member interaction. Although the ability to work together is applied to personal, learning, and professional contexts, effective interaction should not be taken for granted when a group of people comes together to achieve a common goal (Hernández-Sellés et al., n.d.).

Computer Supported Collaborative Learning (CSCL) provides students with learning through collaborative interaction and the social construction of knowledge through the use of information technology (IT) (Allaymoun, 2021). CSCL framework interactions identify positive and significant influences, including 1) teacher-student interaction and student interaction within its working groups; 2) student interaction in working groups and emotional support between groups; 3) student interaction in collaborative working groups and learning; and 4) tools used in online collaborative and student interactions in their groups (Hernández-Sellés et al., n.d.)

2. Collaborative learning

Collaborative learning is becoming increasingly high in educational activities because it combines cognitive knowledge and interpersonal skills such as critical thinking, problem-solving, and reasoning in modern society. In collaborative learning, students are trained to work together to complete team tasks (Liang et al., 2021). Collaborative learning is the instructional use of small groups so that students work together to maximize their learning with each other. Cooperation is working together to achieve common goals (Johnson et al., 1998), (Malan, 2021). Cooperative learning provides a learning

environment that creates an active learning community where students can develop their skills in transferring knowledge to group members (Malan, 2021). In Cooperation, students look for beneficial results for themselves and all other group members. Collaborative learning can evaluate group work by using groups to solve conflicting problems (Thanudca, 2021).

The collaborative learning framework can be seen in Figure 1. The picture shows a circle consisting of group formation, group work orchestra, group work evaluation, and reflection. For successful collaborative learning in the classroom, group formation is a fundamental component that determines the quality of group work (Wessner and Pfister, 2001 discussion Liang et al., 2021).

Figure-1. Group Learning Orchestration Based on Evidence (GLOBE)

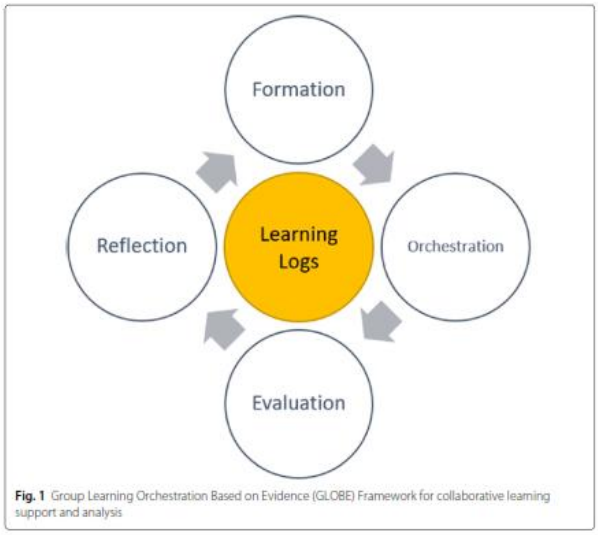

Fig. 1 Group Learning Orchestration Based on Evidence (GLOBE) Framework for collaborative learning support and analysis

Framework for Collaborative Learning Support and Analysis (Liang et al., 2021).

Collaborative learning is very appropriate to be applied as a learning model. This model is very helpful for students during the learning process, discussing material and understanding references, overcoming learning difficulties, and doing tasks that are charged to them. Not all students have the same intelligence. With Cooperation learning, students can work together in their groups and synergize in their tasks to survive while attending lectures. Students become successful because of their ability to apply their abilities to each other in study groups, helping each other towards successful learning together.

Method

This research uses qualitative case study methods. The research subjects are students in semesters I-VII who take courses in Basic Mathematics, Introduction to Education, Learning and Learning, Wood Practice, Learning Program Strategies, and Micro teaching. The object of research is the implementation of CSCL on blended learning. Data collection was carried out for 18 months, from February 2021 - September 2022. Qualitative data collection using interviews, in-depth observations, and documentation. The quantitative method uses the average daily scores of students, assignments, middle tests, and final tests. Data collection is grouped into two: when students complete online learning and during face-to-face learning in class. Qualitative data analysis using interactive data analysis from Miles and Huberman, namely data collection, data reduction, data display, and conclusion drawing (Miles, M.B. and Huberman, A.M. 2007). Quantitative data analysis is analyzed using statistics.

Research Result

Implementation of CSCL learning

Students study in their respective areas in the first semester because of the covid-19 pandemic. The second and third semesters of students have done blended learning because the campus has started accepting students for limited face-to-face learning. Students are asked to study in small groups of 4 people during online and blended learning. Students research and discuss in their respective groups. Students can create study groups based on emotional closeness, proximity to residence, differences in abilities, study friends, and others. Each group is asked to determine its leader who is in charge of leading the group discussion.

In online learning, students learn from their respective regions, with locations far apart and between islands. Different demographic conditions cause not all areas to have a good internet network, and not all students have data packages to study. Students with difficulty networking should look for the best spots to receive subject matter and submit assignments or exams properly. Due to many obstacles in online lectures, students are required to hold virtual discussion forums in their respective groups. The discussion discusses the material that has been taught, and if students have learning difficulties, they can be helped by other group members.

In face-to-face learning, students are asked to take lectures by sitting in their respective groups. The goal is to make it easier to have discussions and questions and answers as well as do assignments. A picture of the student's sitting position can be seen in figure 2 below.

If a small group of students experiences difficulties, they can have discussions between groups until the problem can be overcome. The relationship of each group to the other can be seen in figure-3.

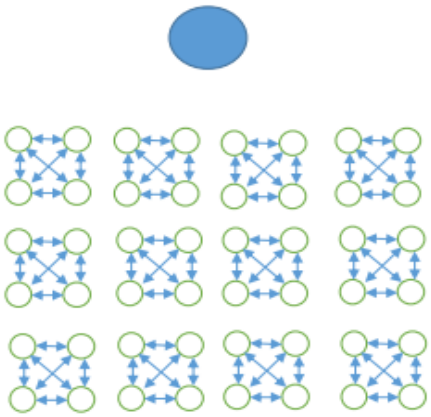

Figure -2. The sitting position of students in their groups

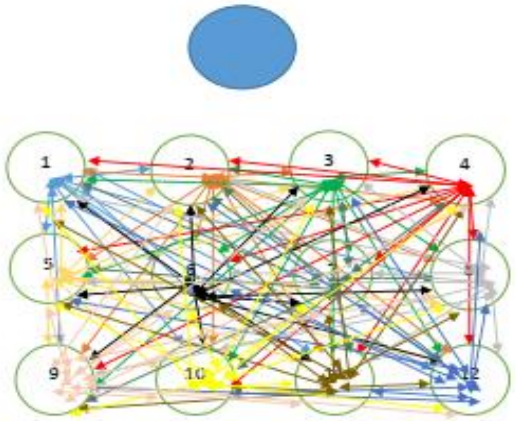

Figure-3. The relationship between the student group and other student groups

CSCL Assessment

CSCL assessment is carried out by assessing performance, creativity, innovation, and the value of portfolio tasks (theoretical learning) and practical lessons (practical knowledge). The final value is taken from the average of the three values. Performance is to observe student activities during the learning process. The observations are learning training, participation in discussions, problem-solving ability in groups, actively asking questions, actively expressing opinions, answering questions, interactions in other groups, responsibilities, group cooperation, being active in article presentations, etc. Observation of student creativity and innovation is carried out by observing student activities. The activity area is planning answers to tasks, collecting information, references, books, journals, and data sources, applying various communication networks, processing data/information to understand specific fields, and presenting data or written reports by informing data. Assignment of a portfolio is carried out by assessing students' registered works, assessing students' ability to solve problems, increasing competence, the correctness of answers, ability to analyze, the collapse of solutions, and the level of development of learning progress. Assessment of practical tasks is seen from the suitability of the drawings with production, work steps, the correctness of construction, and production results. The final grade is the value taken from the average performance value, creativity, portfolio task value or practical task value, and assignment value.

The results showed that student's ability to receive subject matter through the CSCL model was much better than conventional methods, namely lectures, discussions, and problem-solving methods. Learning using CSCL makes students more creative, innovative, active in forums, and faster to find supporting materials using a computer. Students help each other in their learning, and if there are students who have difficulty receiving knowledge, it can be explained by their group. CSCL helps students work together in solving problems and leading discussions. CSCL when online learning is carried out using a discussion forum provided by LMS Undana. Students conduct face-to-face or video meetings outside the discussion forum with their groups. The implementation of CSCL in online lessons can be monitored through class discussion forums provided in the learning management system (LSM). In contrast, face-to-face can be directly observed in class.

Implementation of CSCL at the time of online learning

East Nusa Tenggara consists of an archipelago area. While studying online, most students return to their home areas and attend lectures from places far from Kupang city, the provincial capital. Students' locations are far from each other and between islands, so students live on the coastline, in mountainous areas, remote areas far from the center of the crowd. Students who live in unfavorable geographical conditions experience signal interference during online lectures. To get a good signal, students get closer to the best spots in their area.

Students' awareness of the importance of staying at home and maintaining social distancing to avoid contracting the COVID-19 virus is excellent. This condition can be seen from daily monitoring of student learning, carried out through discussion forums in LMS Undana, watch-up group courses, and wa small group groups. Students actively do assignments according to course indicators every week to fill the time. Students' awareness of personal and environmental health against the COVID-19 virus is very high time and is widely used to do college assignments. Students who live far from internet signals have difficulty participating in discussion forums because the network is always on and off. The condition is overcome by discussions with video calls or telephones with their groups. Many students who experience network difficulties choose to return to Kupang and live around campus because the internet signal around campus is powerful. A strong network is beneficial for students in taking online lectures, participating in discussion forums, looking for references, doing assignments and exams, and submitting assignments and submitting exams.

Lecturers provide 1-2 files in the form of PPT and pdf according to the subject matter every week, and one file of course assignments. Do the work; students are asked to complete with at least three supporting references in the form of books, articles, or related journal articles

with a precise URL address. The time to do assignments is minimal, namely, 3-4 days of tasks submitted in the Undana LMS. If students experience problems submitting assignments, they will be added 2 hours according to the previous agreement.

Monitoring discussions on the implementation of online CSCL are carried out by monitoring and assessing the performance of discussion forums in the LMS. In the discussion forum, students will be seen actively conducting discussions. The discussion forum in LMS is open for 24 hours, and the student discussion time is self-regulated. In addition to online conversations, meetings are carried out through video calls, telephone, or chats using wa groups or online. Communication is carried out openly as long as students work on their assignments. Motivation and monitoring of student assignment progress are carried out through online face-to-face or video calls. Reinforcements are always given to motivate students further to learn and do assignments. The results of learning using CSCL online can be seen in the following figure.

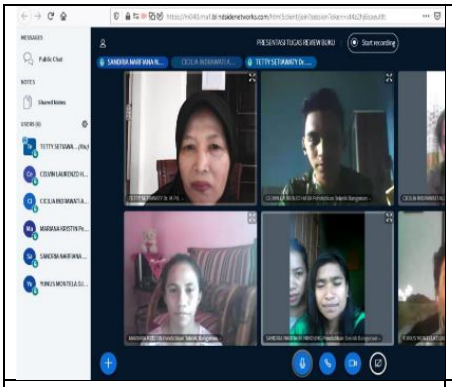

Figure-4. Teaching and discussion online

Figure-5. Create teaching videos

Implementation of CSCL during face-to-face learning

Implementing CSCL in face-to-face learning is more accessible because students can meet directly with their group members in the classroom. During the learning process, students sit in their respective groups. Cooperation and discussion are now carried out in and outside the classroom. After they understand the assignment material, students do independent assignments. When UTS and UAS students are given time to discuss exam questions and outlines of question answers, after which students answer exam questions independently, this method can improve student learning outcomes. Exam assignments and questions are generally given with problem-solving materials. Students are asked to analyze the given problem and look for the answer through various books or references that can be searched on the internet. The results of monitoring during the learning and discussion process can be seen in the following figure.

		
Figure-6. Students discuss in each group	Figure – 7. Students discuss in each group	Figure -8. Student paper presentations

CSCL implementation challenges

The obstacles or challenges faced during online CSCL learning are: First, the Undana learning network is not ready to conduct online education in the face of COVID-19. The network capacity does not match the number of users, namely lecturers and students, causing the network to be too busy and often dead. Repairing dead tissue takes a long time, so online learning is forced to stop due to unprepared networks. Second. Students' technological literacy skills have not been maximized. Third, Not all students get an online learning package from the Ministry of Education and Culture. Students who get data packages from the government do not experience problems in online lectures. Still, students who do not get data packages from the government may experience financial difficulties due to the high price of data packages for online lessons. How to solve the problem of data packages: Students who struggle financially to buy data packages can study using one smartphone or computer for two people if the location is close. They can share data packages during online lectures or have discussions. During the exam, students are still asked to use one computer or smartphone for one person because students are monitored during the exam process until submitting the exam results to LMS Undana.

The obstacles or challenges encountered during face-to-face CSCL learning are minimal. During face-to-face students, they only need a computer or smartphone to fill out the attendance list, download materials and submit assignments or exam results at LMS Undana. The need for data packages is not as much as when studying online, and students are on campus with a fast and smooth internet signal. Pandemic conditions have decreased, and campuses have carried out face-to-face learning. The government does not provide online data packages so that students buy their own.

CSCL Implementation Results

The CSCL assessment was conducted from the second meeting to the 14th. The first meeting was not assessed as the first meeting because it was still a lecture contract, and the introduction of materials and meetings 8 and 16 because students carried out in the middle and final test. The results of the implementation of CSCL were excellent, improving from the second to the last meeting. The results of the CSCL implementation can be seen in the following figure:

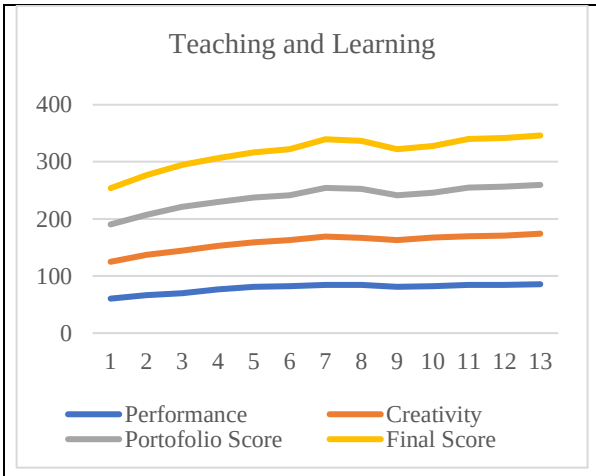

Figure-9. CSCL Teaching and Learning Outcomes

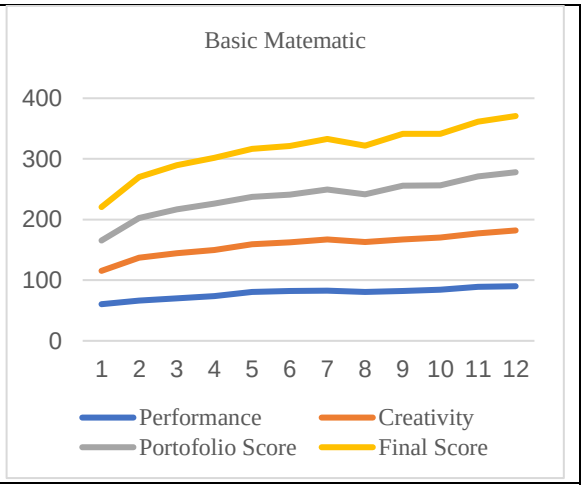

Figure-10. CSCL Basic Matimatic Results

Conclusion

1. Students learn online and hybrid learning to avoid the spread of COVID-19 attacks. CSCL model is one of the learning models that are very appropriate to be applied during the Covid-19 pandemic because it motivates students to learn more actively, creatively, and innovatively in their groups. CSCL model can improve student learning outcomes because it forces students to study harder, be active, focus, learn fast, discuss and cooperate in groups, have confidence, manage study time, and help each other in their groups.

2. The CSCL model is more effective compared to conventional learning models because it can create a more vibrant, creative, and innovative learning atmosphere. Activeness because students learn, discuss, and cooperate in completing tasks in their respective groups. Creative because credible students use their computers to find reference sources from the internet as study material for the subject matter and material for completing assignments. Innovative because students can be creative with theories of materials for practice.

3. CSCL learning during face-to-face classes can improve student performance and creativity compared to implementing CSCL during

online learning because students can discuss and collaborate directly. Students who experience learning can overcome in their group, and if the group has difficulties, they can ask other groups.

4. CSCL learning can improve student learning outcomes. An Increase in learning outcomes can be seen from the increase in performance, creativity, cognitive and psychomotor abilities, middle test, and final test scores

5. CSCL learning can improve students' ability to discuss. Students who use passive voices are forced to actively speak or have opinions and give ideas to their group.

6. Learning outcomes using CSCL in hybrid learning are increasing. Students present assignments very confidently and can answer various questions. It is necessary to advance innovation in CSCL to improve student learning outcomes.

7. CSCL learning can overcome the limited internet network in Undana. Discussions in class can overcome the minimal number of a bench for online meetings.

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