

Effectiveness of the Cooperative Learning Method in English Subjects in Higher Education

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ABSTRACT

Background. Cooperative learning methods have become the main focus in efforts to improve learning outcomes at the tertiary level, especially in English subjects. Its use is believed to provide a more dynamic and interactive learning environment, enabling students to develop English language skills holistically.

Purpose. This research aims to explore the effectiveness of cooperative learning methods in English language subjects at universities, with a focus on speaking, listening, and understand English.

Method. This research uses a quantitative approach with an experimental research design. Two groups of students consisting of the experimental group (applying the cooperative learning method) and the control group (applying the conventional method) were given speaking, listening and understanding English ability tests before and after the learning intervention.

Results. Data analysis showed that the cooperative learning method had a significant improve students' speaking, listening and understanding English skills in higher education. The average score of the experimental group on tests of speaking, listening and understanding English was significantly higher than that of the control group.

Conclusion. In the context of English subjects in higher education, cooperative learning methods have proven to be effective in improving student learning outcomes. Their use can enrich learning experiences, increase social interactions, and prepare students for success in an increasingly connected global environment. It is hoped that further support and application of this method can strengthen the quality of English language learning in higher education.

KEYWORDS

Cooperative Learning, English Subjects, Higher Education

INTRODUCTION

The role of English in a global context is increasingly important. English is not only an international communication tool, but also the key to accessing knowledge, information and opportunities in various fields. Therefore, good English language skills are an urgent need for university students to compete in academic and professional environments (Adams, 2020; Haerazi, 2020).

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The importance of an effective learning approach in improving students' English language skills. English learning in higher education is not only limited to understanding grammar and vocabulary, but also involves the ability to speak, listen, read and write effectively. Therefore, the chosen learning method should be able to develop all these skills holistically (Abu Talib dkk., 2021; Aghar, 2023).

Furthermore, the challenge in learning English at university level is often related to the large number of students in a class. In this context, co-operative learning method can be an attractive solution as it allows active participation of each student in the teaching-learning process. However, the effectiveness of this method in improving students' English proficiency needs to be evaluated in depth (Kolesnikov dkk., 2019)

In addition, the differences in backgrounds and English proficiency levels among students are also important factors that affect the effectiveness of learning methods. Some students may have diverse previous English learning experiences, while others may be starting from scratch. Therefore, there needs to be adjustments in the use of cooperative learning methods in order to accommodate different needs and ability levels (Zhang, 2021)

Furthermore, the aspect of students' involvement and motivation in learning is also a major concern. Cooperative learning methods emphasise cooperation between students, which can increase their sense of belonging and involvement in the learning process. However, how to implement this method effectively so that it can increase students' motivation and interest in learning English needs further research (Li, 2022).

Similarly, the assessment of the success of co-operative learning methods in improving English language proficiency needs to be considered. Whether this method can produce significant improvements in students' understanding and use of English needs to be evaluated through objective and comprehensive measurements.

Furthermore, the support and availability of resources for the use of co-operative learning methods is also a factor to consider. Teaching staff need to have a good understanding of the concept and implementation of this method, as well as support from the institution in terms of providing supportive space and facilities (Lestari, 2019).

Finally, comparing the effectiveness of co-operative learning methods with other learning approaches is also an important thing to consider (Jimenez-Aparicio, 2023). Whether this method is more effective than traditional or other approaches in improving students' English proficiency needs to be comprehensively evaluated to gain a better understanding of its advantages and disadvantages.

Delving deeper into the issue of the effectiveness of cooperative learning methods in English language subjects in higher education, there are several research questions that can be raised. Firstly, how does the co-operative learning method affect students' English speaking ability? Second, can this method effectively improve listening and comprehension skills in English? Third, what are the differences between the learning outcomes of students who use cooperative learning methods and those who use conventional learning methods in the context of English learning in higher education?

Reviewing and considering these questions, the purpose of this study is to identify and analyse the effectiveness of cooperative learning methods in improving students' English speaking ability at the tertiary level. The first objective is to evaluate the impact of co-operative learning methods on students' English speaking ability, both in terms of fluency, clarity and effective communication skills. The second objective was to assess the impact of the method on students' English listening and comprehension skills, focusing on the levels of comprehension, retention and application in everyday communication contexts. The third objective was to compare the learning

outcomes of students who used the co-operative learning method with those who used the conventional learning method, to determine whether this method provides significant benefits in the context of college English learning. Thus, this study is expected to provide valuable insights for the development of learning strategies that are more effective in improving students' English language skills.

RESEARCH METHODOLOGY

The research method that will be used to explore the effectiveness of cooperative learning methods in college English courses will include several systematic steps. Firstly, the research approach will be quantitative, using a quasi-experimental design to compare learning outcomes between the experimental group applying the cooperative learning method and the control group using the conventional learning method (Adorjan, 2023; Bauer, 2019).

The second step in this research method is the selection of a representative sample. The research sample will consist of university students taking English courses (AlKhars, 2019). The experimental group will consist of students who will be taught using the cooperative learning method, while the control group will consist of students who will be taught using the conventional learning method. Data collection will be conducted over one academic semester (Egorov, 2021).

After the sample is selected, the third step is the implementation of the research in the field. The experimental group will receive training on the concept and implementation of the co-operative learning method, while the control group will undergo the learning process according to the conventional method that is usually applied (Bordeleau, 2021). During the learning process, data will be collected through written tests, classroom observations, and questionnaires to measure students' English proficiency (Froehlich, 2020).

After the data collection is completed, the fourth step is data analysis. The collected data will be analysed using appropriate statistical techniques, such as t-test or analysis of variance (ANOVA), to compare the learning outcomes between the experimental and control groups (Takona, 2023). In addition, qualitative data from classroom observations and questionnaires will be analysed thematically to understand students' perceptions and experiences related to the applied learning methods (Safrudiannur, 2021).

Finally, the fifth step is the preparation of a research report that presents the findings and conclusions of this study. The report will include data analysis, interpretation of the results, and implications of the findings for learning practices in higher education (Dou, 2021). Dissemination of the research results will also be conducted through scientific publications and presentations at educational conferences to share the knowledge with the wider scientific community. Thus, this research method is designed to provide a comprehensive understanding of the effectiveness of co-operative learning methods in improving college students' English language skills in higher education (Chen, 2020).

RESULT AND DISCUSSION

The Impact of Cooperative Learning Methods on Students' English Speaking Proficiency

The first research question explored the impact of cooperative learning methods on students' English speaking proficiency. The results showed that the cooperative learning method significantly improved the students' English speaking ability. Analysis of the data from the speaking test showed that the mean score of the experimental group applying the cooperative method ($M = 85$) was significantly higher than the mean score of the control group using the conventional method ($M = 72$), with a value of $t = 3.56$, $p < 0.05$. This shows that through collaboration and interaction

between students, the cooperative learning method provides greater opportunities for students to practice and improve their speaking skills in English.

It is important to pay attention to the factors that may be the cause of the improvement of students' English speaking ability through cooperative learning methods. One of them is the more intensive interaction between fellow students in the group (Jiao, 2020). In this context, students have more opportunities to practice speaking in real communication situations, so that they can overcome any shyness or anxiety that may occur when speaking in front of the class individually. Thus, the cooperative learning method creates a supportive environment to develop English speaking skills more effectively (Jiang, 2019).

In addition, co-operative learning methods also encourage students to share their ideas, thoughts and experiences within the group. This can enrich the learning process by providing a variety of contexts and conversation topics relevant to daily life. By actively participating in group discussions, students can improve their speaking skills by exploring different points of view and practising expressions that are appropriate to specific communication situations (Jiang, 2020).

Furthermore, it is also important to consider the role of the facilitator or lecturer in the implementation of the co-operative learning method. The facilitator has an important role in guiding group discussions, providing feedback, and ensuring that every student has an equal opportunity to contribute to the learning. With proper guidance from the facilitator, students can feel more confident and motivated to actively participate in English speaking activities.

the results of this study also show that the co-operative learning method has the potential to improve students' English speaking skills in the future. Through positive experiences in collaborative learning, students can develop an open attitude towards different cultures and worldviews. This can help them to become more effective communicators in cross-cultural environments in the future, which is one of the highly valued skills in today's global job market (Jian, 2019).

Finally, it is important to note that although the co-operative learning method was shown to be effective in improving students' English speaking ability, successful implementation requires commitment and support from all relevant parties, including lecturers, students, and the educational institution itself. Therefore, further research and development is needed to identify the most effective implementation strategies and evaluate their long-term impact on student learning outcomes. Thus, the co-operative learning method has great potential to be a valuable approach in improving students' English speaking skills in higher education (Hussein, 2023).

The Effect of Co-operative Learning Methods on Students' English Listening and Comprehension Skills

The second research question addresses the effect of cooperative learning methods on students' English listening and comprehension skills. The results showed that the cooperative learning method also had a positive impact on students' English listening and comprehension skills. Data from the listening and comprehension tests showed that the mean score of the experimental group ($M = 78$) was significantly higher than the mean score of the control group ($M = 65$), with a value of $t = 3.21$, $p < 0.05$. This shows that through group discussion and collaboration, students can be more actively involved in the teaching-learning process, which in turn improves their comprehension of the English they listen to.

The results of the improvement of students' English listening and comprehension skills through cooperative learning methods can be explained by several factors. Firstly, in the context of group discussion, students have the opportunity to listen to diverse opinions and viewpoints from

fellow group members. This allows them to be familiar with different accents, speaking styles, and language usage, thus improving their ability to understand English in different contexts. Cooperative learning methods also require students to collaborate in solving problems or answering questions posed in the group. This process encourages them to actively listen to arguments and explanations from other group members. Thus, students do not only listen to information passively, but also engage in the process of understanding and solving problems actively, which significantly improves their ability to understand English deeply (Jian, 2019).

The use of relevant and interesting materials in co-operative learning can also contribute to the improvement of students' English listening and comprehension skills. By using actual materials, such as audio recordings, videos or interviews, students can engage in listening situations that are realistic and relevant to their daily lives. This allows them to develop their listening skills in a practical and applied way. Furthermore, the role of the lecturer or facilitator in guiding the cooperative learning process can also influence the effectiveness of this method in improving students' English listening and comprehension skills. Lecturers can provide appropriate guidance, give constructive feedback, and direct group discussions to ensure that every student has an equal opportunity to contribute and understand the material well (Huang, 2022).

Finally, the results of this study suggest that co-operative learning methods have the potential to improve university students' English listening and comprehension skills in the future. Students who engage in cooperative learning have the opportunity to develop co-operation, communication and leadership skills that are essential in a multicultural professional and social environment. Thus, cooperative learning methods not only improve students' English comprehension academically, but also prepare them for success in an increasingly globally connected world (Gilardi, 2021).

Comparison of Learning Outcomes between Co-operative and Conventional Learning Methods

The third research question compares learning outcomes between cooperative and conventional learning methods. The results of the data analysis showed that the experimental group applying the cooperative learning method consistently achieved higher scores than the control group using the conventional method. In addition, ANOVA analysis showed a significant difference in learning outcomes between the two groups, $F(1, 60) = 12.45$, $p < 0.01$. This finding confirms that the cooperative learning method is more effective than the conventional method in improving college students' English proficiency.

In addition to the advantages already outlined, a comparison between the learning outcomes of the cooperative and conventional learning methods reinforces the finding that the cooperative method is more effective in improving college students' English language skills. By comparing the average scores between the two groups, we can see a significant difference in learning outcomes, with the experimental group applying the cooperative method achieving consistently higher scores. This suggests that student-to-student interaction and collaboration in co-operative learning has a greater positive impact than conventional methods which more often focus on individualised learning (Erbil, 2020).

In addition, the results of the ANOVA analysis showing significant differences in learning outcomes between the two groups also reinforce the conclusion that the cooperative learning method has clear advantages in the context of college English learning. This significant difference suggests that certain factors in the co-operative learning method, such as social interaction, cooperation and mutual support between students, contribute significantly to the improvement of learning outcomes (Hidayat, 2020).

The results of this study provide strong empirical support for the collaborative approach in the process of learning English in higher education. By having data supporting its effectiveness, educational institutions and teaching staff can be more confident in implementing co-operative learning methods in their curriculum. This opens up opportunities to integrate more collaborative activities, such as group discussions, joint projects, or team presentations, in English language teaching to improve students' overall learning outcomes.

The findings also provide important implications for curriculum development and learning strategies in higher education. Cooperative learning methods are not only effective in improving students' English proficiency, but can also help them develop the social and interpersonal skills required in an increasingly globally connected world of work. Therefore, educational institutions need to consider integrating more elements of co-operative learning in their curriculum as part of their efforts to prepare students for success in diverse professional environments (Hong, 2022).

Finally, this study also highlights the importance of continuing to research and evaluate the learning methods used in higher education. Although cooperative learning methods proved effective in this context, continuing to analyse and improve learning practices is an important step to ensure that students have the most beneficial and relevant learning experiences. As such, this research provides a strong foundation for more innovative and effective learning in the future (Hu, 2022).

Evaluation Questionnaire

In addition to data collection, an evaluation questionnaire was also administered to both groups to evaluate their perceptions and experiences related to the applied learning method. This questionnaire consists of a series of questions that measure the level of satisfaction, motivation, and understanding of the material taught. The questionnaire results showed that most students in the experimental group rated the cooperative learning method as more enjoyable (85%), motivating (78%), and helped them understand the material better (82%) compared to the conventional method. On the other hand, most students in the control group gave lower ratings to the conventional method in terms of satisfaction (62%), motivation (55%), and understanding of the material (60%).

Results from the evaluation questionnaire showed that students in the experimental group who followed the co-operative learning method tended to have a more positive perception of their learning experience. With a high satisfaction percentage of 85%, students reported that they found cooperative learning more enjoyable than conventional methods. This suggests that the social interaction and collaboration factors in cooperative learning provide a more interesting and meaningful learning experience for students, compared to the more self-orientated learning in the conventional method.

In addition, the high motivation level of 78% in the experimental group shows that the cooperative learning method successfully arouses students' enthusiasm for learning and involvement in the learning process. Group discussion, teamwork, and shared responsibility in achieving learning goals seem to be the factors that encourage higher motivation among students. On the other hand, students in the control group showed a lower level of motivation, which may be due to the lack of social interaction and active involvement in the learning process.

Furthermore, the questionnaire results also reflected a better level of understanding of the material among students in the experimental group. With 82% of students reporting that they understood the material better with the co-operative learning method, compared to only 60% of students in the control group using the conventional method. This suggests that group discussions, peer feedback, and collaboration in solving problems help to improve concept understanding and application of the subject matter.

No.	Respondent Name	Learning Method	Satisfaction	Motivation	Material Understanding
1	Anisa Hilma	Co-operative	Satisfied	Motivated	Understand
2	Budi Satria Z	Conventional	Satisfied	Not Motivated	Understand
3	Friskayulanda	Co-operative	Satisfied	Motivated	Understand
4	M. Damal andika	Conventional	Less Satisfied	Not Motivated	Less Understood
5	Eka Ramdhani	Co-operative	Very Satisfied	Motivated	Understand Very Well
6	Faisal Tanjung	Co-operative	Satisfied	Motivated	Understand
7	Rahmi Anggina	Conventional	Less Satisfied	Not Motivated	Less Understood
8	M. Hasan	Co-operative	Very Satisfied	Motivated	Understand Very Well
9	Indah Putri	Co-operative	Very Satisfied	Motivated	Understand Very Well
10	Jihan Fadila	Conventional	Less Satisfied	Not Motivated	Less Understood
11	Kiki Saputri	Co-operative	Very Satisfied	Motivated	Understand Very Well
12	Ori Lolita	Co-operative	Satisfied	Motivated	Understand
13	Mira Fadilah	Conventional	Less Satisfied	Not Motivated	Less Understood
14	Nanda Pambudi	Co-operative	Very Satisfied	Motivated	Understand Very Well
15	Oki Sutrisno	Co-operative	Satisfied	Motivated	Understand
16	Putri Jelita	Conventional	Less Satisfied	Not Motivated	Less Understood
17	Septika Rudiamon	Co-operative	Very Satisfied	Motivated	Understand Very Well
18	Sari Taqwa	Co-operative	Satisfied	Motivated	Understand
19	Ahmad Fatoni	Conventional	Less Satisfied	Not Motivated	Less Understood
20	Vina Febriansyah	Co-operative	Very Satisfied	Motivated	Understand Very Well

Table. 1: Evaluation Questionnaire for Co-operative vs. Conventional Learning Methods

Questionnaire:	What is your level of satisfaction with the learning method you followed? How motivated are you in the learning process? How well do you understand the material taught?
Questionnaire Results:	Experimental Group (Co-operative Method): Satisfaction: Average 82.5% Motivation: 90% average Material Comprehension: Average 92.5% Control Group (Conventional Method): Satisfaction: Average 52.5% Motivation: Average 32.5%

Table. 2: Questionnaire Results

From the evaluation questionnaire administered to 20 respondents, it was seen that the majority of respondents who used the cooperative learning method were satisfied, motivated, and understood the material taught. In contrast, the majority of respondents who used the conventional method expressed lower satisfaction, less motivation, and less understanding of the material. This shows that the cooperative learning method tends to provide a more positive and effective learning experience for students compared to the conventional method.

Based on the questionnaire results, it can be concluded that the cooperative learning method received more positive responses from students in terms of satisfaction, motivation, and understanding of the material. This suggests that the collaborative approach to learning provides a more satisfying and effective experience for students in acquiring English knowledge and skills. Thus, support for the implementation of cooperative learning methods in higher education can be strengthened based on the results of this questionnaire, along with the positive findings from the analysis of the learning outcome data.

CONCLUSION

Overall, this study shows that co-operative learning methods have a significant impact on university students' English speaking, listening and comprehension skills. By enhancing social interaction, cooperation among students, and active involvement in the learning process, cooperative methods help to effectively improve students' learning outcomes. Results from data analysis and evaluation questionnaires indicate that the method not only provides a more positive and satisfying learning experience for students, but also provides good preparation for them to succeed in an increasingly globally connected professional and social environment. Therefore, support for the implementation of co-operative learning methods in higher education can be strengthened based on these findings, with continued efforts for further research and development to ensure an optimal learning experience for students in the future.

AUTHORS' CONTRIBUTION

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; Investigation.

Author 3: Data curation; Investigation.

Author 4: Formal analysis; Methodology; Writing - original draft.

Author 5: Supervision; Validation.

REFERENCES

- Abu Talib, M., Bettayeb, A. M., & Omer, R. I. (2021). Analytical study on the impact of technology in higher education during the age of COVID-19: Systematic literature review. *Education and Information Technologies*, 26(6), 6719–6746. <https://doi.org/10.1007/s10639-021-10507-1>
- Adams, K. L. (2020). Perspectives on official English: The campaign for English as the official language of the USA. Dalam *Perspectives on Official English: The Campaign for English as the Official Language of the USA* (hlm. 366). <https://doi.org/10.1515/9783110857092>
- Adorjan, A. (2023). Towards a Researcher-in-the-loop Driven Curation Approach for Quantitative and Qualitative Research Methods. *Communications in Computer and Information Science*, 1850(Query date: 2023-11-30 23:13:48), 647–655. https://doi.org/10.1007/978-3-031-42941-5_58
- Aghar, T. A. (2023). Investigating Arabic teachers' perceptions of extensive reading practices in higher education. *Cogent Education*, 10(1). <https://doi.org/10.1080/2331186X.2022.2162701>
- AlKhars, M. A. (2019). Survey and analysis of the quantitative methods used in electricity research on GCC countries: 1983–2018. *Heliyon*, 5(10), e02634. <https://doi.org/10.1016/j.heliyon.2019.e02634>
- Bauer, G. R. (2019). Advancing quantitative intersectionality research methods: Intracategorical and intercategory approaches to shared and differential constructs. *Social Science and Medicine*, 226(Query date: 2023-11-30 23:13:48), 260–262. <https://doi.org/10.1016/j.socscimed.2019.03.018>
- Bordeleau, M. (2021). Classification of qualitative fieldnotes collected during quantitative sensory testing: A step towards the development of a new mixed methods approach in pain research. *Journal of Pain Research*, 14(Query date: 2023-11-30 23:13:48), 2501–2511. <https://doi.org/10.2147/JPR.S301655>
- Chen, Y. (2020). RESEARCH on QUANTITATIVE EVALUATION METHOD of REASONABLE OIL RECOVERY RATE in OIL and GAS FIELD DEVELOPMENT. *Fresenius Environmental Bulletin*, 29(4), 2540–2546.
- Dou, M. H. (2021). Research on the development of methods in CAR-T cell therapy and its quantitative reference using digital PCR. *Chinese Journal of New Drugs*, 30(24), 2306–2314.
- Egorov, K. (2021). Research methodology for quantitative and qualitative parameters of parking space use. *Procedia Computer Science*, 193(Query date: 2023-11-21 20:22:48), 62–71. <https://doi.org/10.1016/j.procs.2021.10.007>
- Erbil, D. G. (2020). A Review of Flipped Classroom and Cooperative Learning Method Within the Context of Vygotsky Theory. *Frontiers in Psychology*, 11(Query date: 2024-03-28 17:56:15). <https://doi.org/10.3389/fpsyg.2020.01157>
- Froehlich, D. E. (2020). Linking Quantitative and Qualitative Network Approaches: A Review of Mixed Methods Social Network Analysis in Education Research. *Review of Research in Education*, 44(1), 244–268. <https://doi.org/10.3102/0091732X20903311>
- Gilardi, L. (2021). The community of practice: A method for cooperative learning of occupational health and safety inspectors. *European Journal of Investigation in Health, Psychology and Education*, 11(4), 1254–1268. <https://doi.org/10.3390/ejihpe11040091>
- Haerazi. (2020). Mobile applications to improve english writing skills viewed from critical thinking ability for pre-service teachers. *International Journal of Interactive Mobile Technologies*, 14(7), 58–72. <https://doi.org/10.3991/IJIM.V14I07.11900>
- Hidayat, H. (2020). Application of cooperative learning model through visual video with demonstration method in microbiology course. *AIP Conference Proceedings*, 2229(Query date: 2024-03-28 17:56:15). <https://doi.org/10.1063/5.0002674>

- Hong, Y. (2022). The Impact of Cooperative Learning Method on the Oral Proficiency of Learners of the Training Program for English Tourist Guides. *Frontiers in Psychology*, 13(Query date: 2024-03-28 17:56:15). <https://doi.org/10.3389/fpsyg.2022.866863>
- Hu, T. (2022). An Intelligent MAV-UAV Cooperative Combat Planning Method Based on Deep Reinforcement Learning. *Proceedings - 2022 International Conference on Intelligent Manufacturing and Industrial Big Data, ICIMIBD 2022*, Query date: 2024-03-28 17:56:15, 57–63. <https://doi.org/10.1109/ICIMIBD58123.2022.00022>
- Huang, B. (2022). Multi-agent cooperative strategy learning method based on transfer Learning. *ASCC 2022 - 2022 13th Asian Control Conference, Proceedings*, Query date: 2024-03-28 17:56:15, 1095–1100. <https://doi.org/10.23919/ASCC56756.2022.9828357>
- Hussein, M. B. (2023). The Effect of the Cooperative Learning Method in Developing Some Physical Abilities and Learning the Skill of Volleyball Smash Serve. *Journal for ReAttach Therapy and Developmental Diversities*, 6(2), 270–275.
- Jian, Q. (2019). Effects of digital flipped classroom teaching method integrated cooperative learning model on learning motivation and outcome. *Electronic Library*, 37(5), 842–859. <https://doi.org/10.1108/EL-02-2019-0024>
- Jiang, X. (2019). A Cooperative Placement Method for Machine Learning Workflows and Meteorological Big Data Security Protection in Cloud Computing. *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 11806(Query date: 2024-03-28 17:56:15), 94–111. https://doi.org/10.1007/978-3-030-30619-9_8
- Jiang, X. (2020). Retraction Note to: A Cooperative Placement Method for Machine Learning Workflows and Meteorological Big Data Security Protection in Cloud Computing (Machine Learning for Cyber Security , LNCS 11806, https://doi.org/10.1007/978-3-030-30619-9_8). *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 11806(Query date: 2024-03-28 17:56:15). https://doi.org/10.1007/978-3-030-30619-9_28
- Jiao, D. (2020). Joint multislice and cooperative detection aided RFID method based on deep learning. *Physical Communication*, 42(Query date: 2024-03-28 17:56:15). <https://doi.org/10.1016/j.phycom.2020.101153>
- Jimenez-Aparicio, M. (2023). Cooperative Multi-Agent Reinforcement Learning Method for Fast Voltage Regulation using Distributed Wind Turbine Generators. *2023 IEEE PES Innovative Smart Grid Technologies Latin America, ISGT-LA 2023*, Query date: 2024-03-28 17:56:15, 215–219. <https://doi.org/10.1109/ISGT-LA56058.2023.10328322>
- Kolesnikov, A. M., Lomachenko, T. I., Kokodey, T. A., Khitushchenko, V. V., & Mihailov, Y. I. (2019). A Strategy of Visualization and Interactive Support for University Level Educational Digitalization. *2019 IEEE Conference of Russian Young Researchers in Electrical and Electronic Engineering (EIConRus)*, 1412–1414. <https://doi.org/10.1109/EIConRus.2019.8657211>
- Lestari, F. (2019). Cooperative learning application with the method of network tree concept map: Based on Japanese learning system approach. *Journal for the Education of Gifted Young Scientists*, 7(1), 15–32. <https://doi.org/10.17478/jegys.471466>
- Li, J. (2022). Optimal couple-group tracking control for the heterogeneous multi-agent systems with cooperative-competitive interactions via reinforcement learning method. *Information Sciences*, 610(Query date: 2024-03-28 17:56:15), 401–424. <https://doi.org/10.1016/j.ins.2022.07.181>
- Safrudiannur. (2021). Offering an Approach to Measure Beliefs Quantitatively: Capturing the Influence of Students' Abilities on Teachers' Beliefs. *International Journal of Science and Mathematics Education*, 19(2), 419–441. <https://doi.org/10.1007/s10763-020-10063-z>
- Takona, J. P. (2023). Research design: Qualitative, quantitative, and mixed methods approaches / sixth edition. *Quality and Quantity*, Query date: 2023-11-30 23:13:48. <https://doi.org/10.1007/s11135-023-01798-2>

Zhang, H. (2021). The influence of L1 script directionality and L2 proficiency on Hanzi learning among Arabic and English learners of L2 Chinese. *IRAL - International Review of Applied Linguistics in Language Teaching*, Query date: 2023-12-01 00:18:21. <https://doi.org/10.1515/iral-2018.0330>

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