THE IMPLEMENTATION OF SCIENTIFIC APPROACH FOR COOPERATIVE LEARNING MODEL TYPED INSIDE OUTSIDE CIRCLE (IOC) TOWARD THE SCIENCE LEARNING OUTCOMES OF THE SEVENTH GRADERS OF LAWANG PUBLIC ISLAMIC JHS MANDAHILING

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ABSTRACT

The science learning outcomes of grade VIII students at MTsN Lawang Mandahiling are still low. Students physics's learning outcomes are low because teachers still dominate physics learning, and the intensity of student involvement when learning is a little. This study aims to determine how to apply a scientific approach to the Inside-Outside Circle cooperative learning model for students' physics learning outcomes. This type of research is quasi-experimental research, with the research design used is posttest only control group design. Sampling used random sampling, resulting in two sample classes, namely class VIII.2 as the experimental and VIII.3 as the control class. The data collection used a test of student learning outcomes on knowledge competencies in a multiple-choice test of 20 items. The competency data of students' attitudes and skills used observation sheets which were analyzed qualitatively descriptive. The results of the final tests conducted in the study showed that the physics learning outcomes of students in the experimental class were better than the control class. The average final score of students for knowledge competence in the experimental class and control class, respectively, was 78.00 and 66.00. For attitudinal competence, the average scores obtained by the experimental class and control class were 68.98 and 65.34, respectively. For the competency skills, the average scores obtained by the experimental class and control class are 74.22 and 68.25, respectively. Hypothesis testing is done by using a t-test. From the calculation on knowledge competency, the result of t_{count} = 3.07 while t_{table} = 1.684; on attitude competence, the price of tcount = 2.29; on skills competency, the t_{count} = 4.26; while t_{table} = 1.684 while t table = 1.684 at the real level α = 0.05. It means that $t_{count} > t_{table}$ so that H_0 is rejected and H_1 is accepted. It can be concluded that the students' physics learning outcomes in applying the synthetic approach to the Inside-Outside Circle cooperative learning model are better than the physics learning outcomes of students who do not use the Inside-Outside Circle

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cooperative learning model in solar system subject matter in grade VIII MTsN Lawang Mandahiling.

INTISARI

Hasil belajar IPA siswa kelas VIII di MTsN Lawang Mandahilin**g** masih tergolong rendah. Rendahnya hasil belajar fisika siswa disebabkan karena pembelajaran fisika masih didominasi oleh guru dan intensitas keterlibatan siswa pada saat belajar sedikit. Penelitian ini bertujuan untuk mengetahui langkah-langkah pendekatan saintifik pada model pembelajaran kooperatif tipe Inside Outside Circle terhadap hasil belajar fisika siswa. Jenis penelitian ini adalah penelitian eksperimen semu, dengan rancangan penelitian yang digunakan adalah posttest only control group design. Pengambilan sampel menggunakan random sampling yang menghasilkan dua kelas sample yaitu kelas VIII.2 sebagai kelas eksperimen dan VIII.3 sebagai kelas kontrol. Pengumpulan data menggunakan teknik tes dan non-tes. Tes hasil belajar siswa pada kompetensi pengetahuan menggunakan tes pilihan ganda sebanyak 20 butir soal. Teknik non tes untuk memperoleh data kompetensi sikap dan keterampilan siswa menggunakan lembar observasi yang dianalisis secara deskriptif kualitatif. Uji hipotesis dilakukan dengan uji-t. Hasil tes akhir yang dilakukan pada penelitian menunjukkan bahwa hasil belajar fisika siswa pada kelas eksperimen lebih baik daripada kelas kontrol. Rata-rata nilai akhir siswa untuk kompetensi pengetahuan pada kelas eksperimen dan kelas kontrol masing-masing yaitu 78,00 dan 66,00. Nilai rata-rata pada kompetensi sikap yang diperoleh kelas eksperimen dan kelas kontrol masing-masing yaitu 68,98 dan 65,34. Sedangkan kompetensi keterampilan pada kelas eksperimen dan kelas kontrol diperoleh nilai rata-rata masing-masing 74,22 dan 68,25. Dari perhitungan pada kompetensi pengetahuan diperoleh harga t_{hitung} = 3,07 sedangkan t_{tabel} = 1,684; pada kompetensi sikap diperoleh harga t_{hitung} =2,29; pada kompetensi keterampilan diperoleh harga t_{hitung} = 4,26; sedangkan t_{tabel} =1,684 sedangkan t_{tabel} =1,684 pada taraf nyata α = 0,05. Berarti $t_{hitung} > t_{tabel}$ sehingga H_0 ditolak dan H_1 diterima, maka dapat disimpulkan bahwa hasil belajar fisika siswa pada penerapan pendekatan sintifik pada model pembelajaran kooperatif tipe Inside Outside Circle lebih baik daripada hasil belajar fisika siswa yang tidak menggunakan model pembelajaran kooperatif tipe Inside Outside Circle materi sistem tata surya di kelas VIII MTsN Lawang Mandahiling

I. Introduction

Education is an important part of human life. The Regulation Number 20 the Year 2003 about the National Education System, Article 1, Item 1 states that education

is a conscious and planned effort to realize learning situation and process for students actively by developing their potencies to have spiritual power, self-control, personality, intelligence, valuable characteristics, and needed skill by society, nation, and the country [1]. Then, the Ministerial Regulation Attachment of the Education and Cultural Minister of the Republic of Indonesia, Number 66 the Year 2013 about the educational assessment standard, Article 3, emphasizes that "the National Education has the function to develop skills and establish the dignified characters and civilization [2]. It is for the sake of realizing the brilliant national generation and developing their potentials to be a faithful human toward their God, the Almighty, to have excellent characters, proper health, science, reliability, creativity, autonomy, and to be democratic and responsible citizens. Education should consider some aspects, such as physics and mental, individualization, social, science, attitude, skill, concentric interaction, horizontal interaction, and vertical interaction toward their God [3].

The government, represented by the Education and Cultural Minister applied the 2013 curriculum as the educational curriculum to realize the national education objective. The 2013 curriculum requires both direct and indirect learning. Direct learning deals with science, thinking, and skill development to process the knowledge while having direct interaction with the learning resource. On the other hand, indirect learning in situated daily learning causes accompaniment impacts. The learning demanded by the curriculum requires a scientific approach or scientific process-based approach. It is mandatory of the curriculum. The approach is a learning experience organization with logical order. It starts by observing, inquiring, collecting information, reasoning or associating, and communicating. They promoted scientific approach with both direct or indirect learning model becomes the principle to apply various learning models and strategies based on the demanded core competence to achieve [4].

The scientific approach is relevant to all lessons especially physics that requires innovative stages to provide an attraction for the learners. Teachers have the task to make physics lessons interesting and enjoyed by learners. They also must carry out their roles as facilitators, managers, and learning consultants for the learners. Wina Sanjaya (2008, p. 95) explains that in this current era, the teacher's role shifts from the only learning resource to the instruction manager. Thus, both teachers and learners are learning and studying [5]. Therefore, teachers need various facilities and must create a conducive learning atmosphere so that the learning process could last effectively and efficiently.

The learning process will run properly if the teachers are wise to determine the relevant applied approach based on the materials to teach. One of the approaches is the scientific approach. The Education and Cultural Minister provides the specific concept that the scientific approach for learning includes observing, inquiring,

reasoning, attempting or creating, and presenting or communicating. Teachers should use appropriate learning models to encourage learners to participate in the scientific approach. It is by applying the cooperative learning model. A cooperative learning model is a learning model with a small-group system or categorization system. It should cover four to six participants with various academic, sex, racial, and tribal backgrounds.

The cooperative learning model could also encourage learners to understand complex concepts and to facilitate learners developing their cooperation and train their critical thinking skills. Thus, learners will understand the materials better. The most important part of this cooperative learning is to improve the learners' learning activity, learners' positive attitudes, learning motivation, self-confidence, and happiness to study at school, and compassion to the classroom peers. One of the cooperative learning models is the Inside-Outside Circle model. It requires the learners to work in groups of large and small groups. The group consists of 12 to 14 participants. It has the purpose to strengthen individual and group relationships. This model also needs excellent communication skills and an excellent group process. Besides the appropriate model selection, the ways of the learners' learning activities also influence their learning achievement. Learners with high learning activities can quickly act out to improve their learning achievement. However, learners with low learning activities tend to be lazy.

The interview results with the school physics teacher informed that learners had difficulties expressing ideas, notions, and opinions in the learning process. They also had low motivation to learn physics. They preferred accepting all materials from the teachers to completing the given problems related to the lesson. They argued that the problems were difficult for them. This learning atmosphere causes lower learning achievements. The observation informed the researchers that the learners, 123 individuals, obtained low physics midterm test scores in the academic year 2016/2017 with an average score of 65.07. More than 50% of learners did not pass the test because the scores were low and under the minimum mastery standard, 75.

The learning process requires teachers to apply new learning models to improve the spirit and learning atmosphere. By applying scientific learning with the Inside-Outside Circle model, learners are expected to achieve better learning outcomes. Thus, they will learn more seriously. This model is suitable because it allows researchers to obtain various information at the same time. The model also allows researchers to pair the learners, elicit more ideas, provide more tasks, and monitor the learners. The material for this research was the solar system. It was selected because it was suitable for the applied model and did not require any calculation. Thus, it made the researchers interested to reveal the implementation of a scientific approach for cooperative learning model typed Inside Outside Circle (Ioc) toward the Science learning outcomes of the seventh graders of Lawang Public Islamic JHS Mandahiling.

II. Research Method

This research is a quasi-experimental research with a posttest-only control group design. It involved the seventh graders of Lawang Public Islamic JHS Mandahiling. The applied sampling technique was the random sampling technique. It resulted in two groups, the experimental group from the VIII-2 learning group and the control group from the VIII-3 learning group. The Inside-Outside Circle (IOC) was applied for the experimental group while the conventional treatment was for the control group. Each learning group consisted of 24 learners with relatively equal skills.

The independent variable was the learning with Inside-Outside Circle type learning. The controlled variables were the teachers, time allotments, and the given materials for both groups. The primary data from the research consisted of the physics learning outcomes from both groups.

The applied research instruments were the competence-achievement test and observation sheet. The test covered the cognitive field while the observation was important to find out the learners' attitudes and skills. The researchers adjusted the learning materials with the 2013 curriculum. They also consulted the materials with the teachers and the supervisors. Before conducting the test, the researcher validated the test-instrument items. The validation involved the VIII-1 learning groups as a test-instrument validation sample. This validation test had the purpose to examine the validity and reliability of the research instrument. When the instrument did not meet the validity and reliability criteria, the researcher had to revise the instrument.

The analysis of the test results was done by determining the difficulty index, distinguishing power, test reliability, and question classification. The question item difficulty index analysis found seven difficult questions, twenty moderate difficulty questions, and six easy questions. The analysis result found the distinguishing power consisted of 9 excellent questions, 11 average questions, 3 unfit questions, and 10 inaccurate questions. The validity test found a reliability score of 0.61, categorized as high reliability. After calculating the difficulty index, the discrimination power, and test reliability, the researchers determined the question item selections. They also classified the questions into ready-to-use or removed questions. Based on the test item analysis, twenty question items were ready to use.

The obtained data supported the authentic assessment system. It covered cognitive, affective, and psychomotor aspects. The techniques of analysis and learning outcome data process were the final scores of the learners. The learning outcomes on the competencies were from the learners' test results. The final test results were analyzed in terms of their normalities, homogeneity, and hypotheses. The learners' skills were measured with the observational sheet. It consisted of five aspects: honesty, discipline, responsibility, politeness, and activeness. On the other hand, the assessed skills were from the observation results of the produced products by the learners while learning. It consisted of tidiness, cleanliness, creativity, and accuracy.

The affective and psychomotor learning outcomes were analyzed by finding out the mean score percentages. Then, they were converted into quality scores.

III. Results and Discussion

The Research Results

The selected physics material was the solar system. This research used a lesson plan, trial run question, observation sheet of affective competence, observation sheet of psychomotor competence, and final test questions. The researchers carried out the research on Wednesdays and Saturdays, from April 22 until May 6, 2017, at Lawang Public Islamic JHS Mandahiling.

The physics learning outcomes of cognitive competence were based on the final test. Forty-eight learners joined the test. They were from both experimental and control groups. Each of them consisted of 24 learners. The final test consisted of twenty multiple-choice items. The time duration to work on the questions was 80 minutes. The average scores of both groups were 78 and 66 consecutively. The highest score for both groups was 90. The lowest scores from both groups were 65 and 50. The average score, the highest score, and the lowest score of both groups are in Table 1.

Table 1. the average score, the lowest score, and the highest score of the sample class

No	Group	Scores Average	Scores Highest	Lowest
1	Experiment	78	90	65
2	Control	66	90	50

The physics learning outcomes of the affective competence were based on the observation sheet. The researchers observed three times, started from the first meeting until the third meeting. On the other hand, in the fourth meeting, the researcher did not take the data because learners took the final test. The final scores of the affective competence of each learner were based on the sum of the obtained scores from the first, second, and third meetings. Then, the researcher calculated the average score. The researchers converted the final scores into quality scores. Table 2 shows the scores of each indicator.

Table 2. the average score of affective competence indicator

Number	Group	The average score of each affective indicator aspect				
		Honesty	Discipline	Responsibility	Politeness	Activeness
1	Experiment	75.26	65.6	76.5	71.1	60.4
2	Control	66.87	67.23	70.83	70.5	54.3

Based on the affective competence analysis results of the experimental group, no learners obtained the A value. Twenty-three learners obtained a B value (95.8%). Only one learner obtained the C value (4.2%). No learners obtained the values of D and E. On the other hand, eighteen learners of the control group obtained a B score (75%). Six learners obtained a C score (25%). None learners obtained A, D, nor E scores. The data were proven by the average score of affective competence from both groups with $\bar{x}$. The effective average score of the experimental group was 68.98 while the control group was 65.34. Table 3 shows the average scores.

Table 3. The physics learning outcome average scores of the learners on affective competence

Group	The average score ($\bar{x}$)
Experiment	68.98
Control	65.34

The researchers obtained the average scores of physics learning outcomes based on the psychomotor competence of each aspect from the observation as shown in Table 4 The analysis results were converted into quality scores.

Table 4. The average score of each psychomotor competence indicator

Group	The average score of each indicator on psychomotor competence			
	Tidiness	Cleanliness	Creativeness	Accuracy
Experiment	75	83.3	72.92	67.71
Control	69.8	71.9	66.7	65.63

Four learners of the experimental group obtained the A score (16.7%). Six learners obtained a B score (83.3%). None learners obtained C, D, nor E scores. All control group learners obtained the B score (100%). None learners obtained A, D, nor E scores. The data were proven by the average score of psychomotor competence from both groups with $\bar{x}$. The average score of experimental group competence was 74.22 while the control group was 68.25. Table 5 shows the average scores.

Table 5. The physics learning outcome average scores of the learners on psychomotor competence

Group	The average score ($\bar{x}$)
Experiment	74.22
Control	68.25

The researchers analyzed the data with a normality test by checking the sample normality. The normality test results of each competence, cognition, affection, and psychomotor, indicated that the skills were normally distributed. Then, the researchers tested the homogeneity with F-test. It had the purpose to determine both sample homogeneities. The homogeneity test showed the f-counts were 0.54, 0.58, and 1.05.

The research compared the f-count with the f-table. It showed the data sample had normal distribution and homogeneous variance. variansi yang homogen.

Then, the researcher could promote a hypothetic test with a t-test. The test was done for each competence. The calculation results with the t-test obtained a tcount of cognitive aspect score 3.07 with the ttable score of 1.684. The value of tcount of affective competence was 2.29 with ttable = 1.684. The value of tcount of psychomotor competence was 4.26 with ttable= 1.684 under the significance of 0.05. It meant the tcount > ttable thus Ho was denied but Ha was accepted. Therefore, the physics learning outcome of the learners taught with IOC were better than those taught by the conventional model. The hypothetic test analysis of each competence could be seen in Tables 6, 7, and 8.

Table 6. The hypothetic test of cognitive competence

Group	$\bar{x}$	N	s^2	t_{hitung}	**Remarks**
Experiment	78	24	62.542	3.07	**Accepting the hypothesis**
Control	66	24	115.958		

Table 7. the hypothetic test of each affective competence

Group	$\bar{x}$	N	s^2	t_{hitung}	**Remarks**
Experiment	68.89	24	22.190	2.29	**Accepting the hypothesis**
Control	65.35	24	38.23		

Table 8. The hypothetic test of the psychomotor competence

Group	$\bar{x}$	N	s^2	t_{hitung}	**Remarks**
Experiment	74.22	24	23.80	4.26	**Accepting the hypothesis**
Control	68.25	24	22.5375		

Discussion

The physics learning outcomes of the cognitive competence

Based on the final test data, the learners' learning outcomes of the experimental group's cognitive competence were better than the control group. The highest, lowest, and average scores of the experimental group were higher than the control group. The highest experimental group's score was 90 with the lowest score of 65 and an average score of 78. The highest control group's score was 90 with the lowest score of 50 and an average score of 66.00

The highest score of both groups was 90. However, based on the frequency of the scores, the experimental group had four learners achieving the score while the control group only had a learner achieving the score.

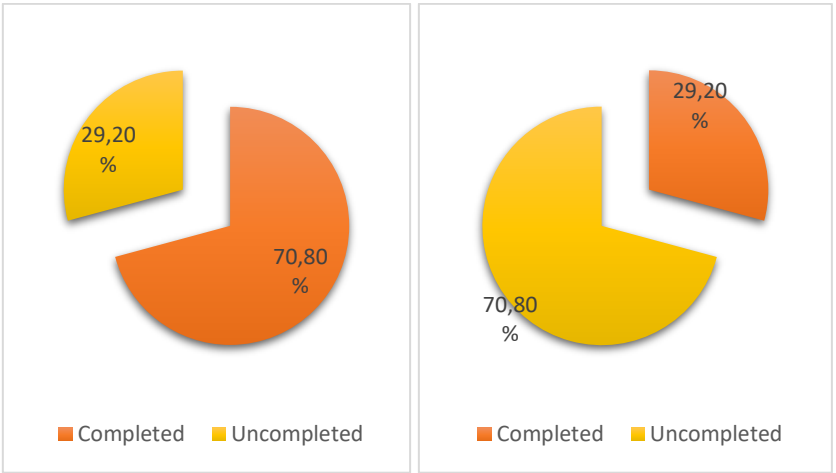

Figure 1. The physics learning outcome completion percentage on cognitive competence a) experimental group, b) control group

The figure shows the comparison of both groups' scores. The experimental group's completion percentage was 70.80%. The remaining percentage, 29.20%, indicated the uncompleted percentage. The control group had the contrast completion percentage from the experimental group. The control group's completion percentage was 29.20 %. The remaining percentage, 70.80%, indicated the uncompleted percentage. Some factors influenced both groups' completions. One of them was the Inside-Outside Circle-typed cooperative model. This model did not rely on the teachers but it allowed learners to find information from various resources and learning outcomes from other learners.

The applied cooperative model grouped the learners to learn. Grouping them to learn became the trick to give them the freedom to argue and share opinions. The learners argued that this method made them easier to learn. Kunandar (2007, p. 303) found that teaching with smaller groups allowed learners to cooperate and maximize their learning conditions to achieve the learning objectives [6]. Typical individuals learn more when they are interacting with their larger size of classmates. This situation leads to higher achievement compared to when the learners are learning alone.

The Inside-Outside Circle typed cooperative learning encouraged proper interaction among students and toward the teacher. Hartup (cited in Desmita, 2009. p. 224) explains the influential interaction deals with the psychological development of learners [7]. It refers to the interaction among learners that have a similar function as parents because learners of the same age could provide tranquility when their friends are feeling anxious. This excellent communication establishment among learners in a

group and toward their teachers would make them enjoy the learning. Then, once the learners felt joyful and happy with a certain material, they would improve their learning outcomes.

Besides that, the Inside-Outside Circle typed cooperative learning model could make learners understood the learned materials. The learners would get the chance to answer the teacher's questions. Thus, learners would be motivated to learn even before they started it. Then, the applied learning model could make learners active during the learning and prevent any monotonous learning.

The physics learning outcomes of affective competence

The affective competence deals with the values of an individual [5]. This research observed the affective competence, such as honesty, discipline, responsibility, politeness, and activeness. These aspects were assessed during the learning process. Each learner had to be active while joining the learning in each meeting. The teacher motivated the learners to cooperate in groups. Based on the data analysis, the average score of each affective competence indicator aspect showed changes. Table 2 eases the readers to understand the situation.

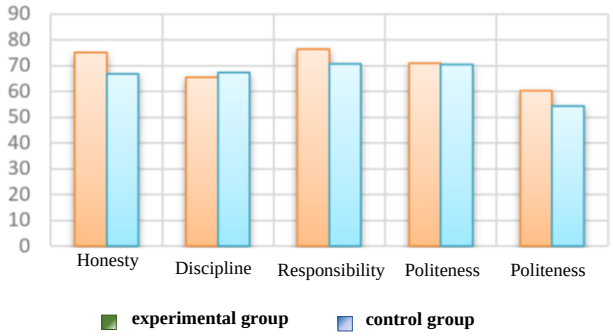

Figure 2. the average score of affective competence

Table 2 and Figure 2 show the average score of both groups' aspect changes. The changes were not very different, between 0.4% until 5.3%. However, the experimental group was better than the control group. Based on the observation, some factors influenced the affective competence differences, such as

Honesty: This aspect dealt with how learners could practice their honesty and integrate the aspect into a personal value system. In this aspect, the average score of the experimental group was 75.26 while the control group with 66.87. The average difference in this aspect was caused by the incapability of the learners. They could not express their argument based on what they thought.

Discipline: This aspect dealt with how learners could be discipline during the learning process. In this aspect, the experimental group obtained an average score of 65.6 while the control group was 67.23. These average differences were caused by

some learners in the control group who could not be discipline while learning, such as being punctual, obedient toward the lesson regulation, etc.

Responsibility: This aspect dealt with how learners respected a notion and could take responsibility for the notion. In this aspect, the experimental group obtained an average score of 76.5 while the control group was 70.83. The average scores of both groups were not very significant because some learners had carried out the instruction from the teachers. However, there were still some learners that did not do the tasks and carry out their responsibilities.

Politeness: This aspect dealt with how learners could respect each other. The obtained average score of 71.1 while the control group was 70.5. The average score differences were caused by some learners could not respect their friends' arguments or speeches.

Activeness: This aspect dealt with how the participants and their participation in the group and learning activities. In this aspect, the experimental group obtained an average score of 60.4 while the control group was 54.3. The average score differences were caused by some learners did not express their arguments although their arguments were correct.

The average scores of the whole physics learning outcomes in this affective competence showed that the experimental group had a higher score than the control group. The average score of the experimental group was 69.76 while the control group was 65.44. The physics learning outcomes of affective competence taught by IOC were higher than learning outcomes taught without IOC.

The physics learning outcomes on psychomotor competence

The physics learning outcomes on psychomotor competence were the continuity of the learners' physics learning outcomes on cognitive and affective competencies. The psychomotor competence consisted of muscular and neural behaviors. It was the learners' learning outcome in the forms of performance and trial activities [8].

The physics learning outcomes on psychomotor competence were from the learners' created products within a certain period. In this research, the products were made from simple props, such as solar system property. It was made from the surrounding materials. During the production, the teacher grouped the learners to work on it. The assessed activities were tidiness, cleanliness, creativity, and accuracy to create products.

Based on the psychomotor competence analysis results, the average score of the experimental group was higher than the control group. Some factors influenced the higher psychomotor competence scores. They were: First, the learners made the prop tidily and clean so the products were excellent.

Second, the learners exposed their creativity so the props were attractive. The learners cooperated while creating the products so they could finish the products in

time. The obtained psychomotor average skills from both groups were not significantly different. The experimental group obtained an average score of 74.22 while the control group was 68.25. The physics learning outcomes in this psychomotor competence showed that the experimental group had an excellent score than the control group.

IV. Conclusion

This research concluded that the scientific approach implementation with the Inside-Outside Circle typed cooperative learning toward the physics learning outcomes of the learners were higher than those without the proposed model. The evidence was the physics learning outcome average score of Lawang Public Islamic JHS learners in Mandahiling. The cognitive competence score of the experimental group was 78 while the control group was 66. The affective average score of the experimental group was 68.89 while the control group was 65.35. The psychomotor competence average score of the experimental group was 74.22 while the control group was 68.25.

Thus, with this Inside-Outside Circle typed cooperative learning model, the seventh graders of the school were more active to learn. This research recommends further research to apply the IOC learning model by considering some supporting factors that influenced the model learning success.

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