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The Implementation of "Guru Penggerak" (Organizer Teachers) Concept to Innovation of The Discussion Methods in Thermodynamics Course

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Abstract

The thermodynamics lecture process in odd semester 2019/2020 at the Physics Education Department of FKIP Unsyiah is divided into three stages based on the lecture method used, namely; (1) lecture method, virtual experiments, and discussions, (2) assignments and group presentations, and (3) innovative discussions inspired by the idea of a "Guru Penggerak." Modification from the innovation of the discussion method is carried out by the strategy of (a) not limiting the topic of discussion, (b) online discussion using WhatsApp (WA) group lectures. The study was conducted to determine the response of students to the innovations carried out. The research results are used to develop lecture method innovations, to improve the quality of the lecture process. Students' perceptions of the ability of lecturers, the activeness of learning, the environment of learning, and the absorption of lecture material are the problems examined in this study. The research method used was quasi-experimental, and the student perception data were obtained using a questionnaire given to 20 students as respondents. In addition, qualitative methods are used to analyze student perception data. The analysis results used a score on a scale of 1-4, obtained an average score of students' perceptions of the ability of lecturers by 3.78, learning activeness 3.15, learning environment 3.43, and absorption of lecture material 3.49. The conclusion is that lecturers' ability to manage lectures is excellent, students are active in lectures, the learning environment is pleasant, and absorption of higher lecture material. Therefore, discussion method innovation can be developed to enrich the learning method to improve the quality of the Thermodynamics lecture process.

Keywords: organizer teachers concept, discussion method, thermodynamics course

INTRODUCTION

The learning method is a unity of activity management to achieve predetermined goals based on the curriculum. The method is seen as a tool to achieve the objectives of lectures that are designed in such a way so that the implementation of lectures is active, interesting, not boring, increasing student interest and activeness, facilitating lecturers in the lecturing process (Hamalik 2012), and optimizing the achievement of learning outcomes (Serivenia and Muliati 2015). In general, Thermodynamics lectures discuss the relationship between heat energy and the response of matter/substance (Ouldridge 2018), both through a review of contextual concepts and theoretical concepts. The topic has a variety ranging from abstract to real (Liana, Linuwih and Suhaldi 2020), can be observed, felt, and practiced in real terms. The material was discussed in 16 (sixteen) face-to-face lectures with structured and independent assignments. Thermodynamics lectures at the Department of Physics Education FKIP Unsyiah in the

odd semester 2019/2020 were conducted using lecture methods, discussions, virtual experiments, projects, group presentations, and innovative discussions. The innovation of learning methods in lecture activities with abstract material is essential to improve student's critical thinking skills to improve their learning outcomes (Rahmati, Yusrizal and Hasan 2017; Utami and Sundari 2019). Besides, the innovation of problem-based learning models with multimedia can improve students' critical thinking skills (Nulhakim, Setiawan and Saefullah 2020). The various discussion methods used in the learning process can improve students' critical thinking.

The innovation in this lecture is limited to modifying the discussion method during face-to-face classes and online discussions with smartphones using the WhatsApp (WA) application. Innovation is made to renew the implementation of discussion activities in face-to-face lectures so that new experiences are obtained to improve pedagogical competence (Johar 2016). The idea of innovation was obtained from the concept of organizer teacher, which the Minister of Education and Culture discussed, Republic of Indonesia, Cabinet Work Volume II. Explicitly, ministerial regulations related to the technical implementation of the discourse have not yet been issued, so that the detailed implementation rules as guidelines have not been obtained. This problem is one of the obstacles that has caused the implementation of the organizer teacher concept not yet seen (Sulastri 2020).

Teachers need high creativity or the courage to do trial and error in producing positive changes from their tasks. Teachers who are brave and capable of innovating in implementing out their functions, even the smallest, they called organizer teachers, and the key to the success of innovation lies in the willingness to conduct experiments (Makarim 2019). The severe challenge faced today is the government's ability to provide teaching staff who have high pedagogical competence to innovate to improve the quality of the learning process (Chearuman 2019). The Minister of Education, as the policyholder, provides broad opportunities for educators to implement the idea of an organizer teacher through the concept of "Merdeka Belajar." Innovations that organizer teacher can make include (1) inviting students to discuss, (2) allowing students to become peer tutors, (3) designing cooperation projects, (4) discovering student talents, and (5) helping teachers who experience difficulties (Makarim, 2020). As has been done in Bandung, the "driving teacher" has played its primary role as an innovator in encouraging and managing the teacher learning community so that the learning process develops well from the aspect of implementing the values, building a learning atmosphere, and implementing an effective learning process (Prawitasari and Suharto 2020).

The innovation of the discussion method as an effort to implement the idea of an organizer teacher in Thermodynamics lectures is done by using strategies (1) not to limit the topic of discussion; students are free to choose the topic of discussion that they want to explore but following the scope of the lecture material, and (2) incomplete material discussed in face-to-face lectures, the material was followed by online discussions using WhatsApp (WA) group lectures. Related to innovation point (1), there are risks in managing face-to-face lectures. The risks that can occur can change students' perceptions of (1) the ability of lecturers to carry out lectures, (2) reduce student learning activities, (3) the learning environment becomes unpleasant, and (4) reduce the ability of material absorption lecture by students. The risks that may occur, causing personal doubts in implementing this innovation so that when the beginning of the idea of innovation is obtained, it becomes a significant obstacle. Answering these doubts, it is interesting if research is conducted to reveal problems related to students' perceptions of (1) lecturers' abilities, (2) absorption of lecture material, (3) activity, and (4) environment of learning in conducting lectures with innovative discussion methods. The purpose of the study was to determine the students' responses to the innovation of the discussion methods. The information obtained helps develop discussion methods and improve the quality of the lecture process in the future.

METHODS

The study was conducted using quasi-experimental methods with samples/respondents not randomized and did not use a control group (Directorate of Education Personnel 2018). The Department of Physics Education FKIP Unsyiah, who took the Thermodynamics lecture in odd semester 2019/2020, was 20 students used as samples/respondents. Student perception data obtained through written interviews using a questionnaire. The questionnaire was composed of four groups of

questions as follows (1) The ability of lecturers to conduct lectures totaling 11 questions, (2) absorption of lecture material by students as many as three questions, (3) activeness of students four questions, and (4) environment of learning as much as six questions. Each question is given four answer choices and is measured using a score of 1-4 (Hermawan, 2018).

Lectures are carried out in three stages, which are distinguished based on the learning method used, namely (Phase I) lectures with lecture method, virtual experiments, and limited discussion of eight meetings, (Phase II) group presentations, and limited discussion of 4 meetings, and (Phase III) innovative discussions four times. Student perception scores are recapitulated in two categories, namely (1) for lectures without innovation methods in Phase I and II and (2) for lectures with innovative discussion methods in Phase III. The interpretation of the results of data analysis is made qualitatively, based on the criteria of TABLE 1.

TABLE 1. Qualitative Interpretation Criteria for Research Data Analysis Results (Nana, 2007)

No.	Interval	Criteria
1	$3.50 \leq \text{Score} < 4.50$	Excellent
2	$2.50 \leq \text{Score} < 3.50$	Good
3	$1.50 \leq \text{Score} < 2.50$	Satisfactory
4	$1.00 \leq \text{Score} < 1.50$	Poor

The response results from the questionnaire are then averaged and analyzed according to the criteria table above. Furthermore, the data collected is analyzed qualitatively with the conditions faced in the class.

Student learning outcomes adopted for phase I & II are obtained from the midterm and Phase III results obtained from the results of the final exams. Learning outcomes in phase III used a scale of 0-100. Then the quantitative value is converted into qualitative criteria based on the Universitas Syiah Kuala Benchmark Reference Assessment (TABLE 2). Following the results of the decision of the teaching staff of the Department of Physics Education, FKIP Unsyiah, the score is lower than the Poor (BC) criteria.

TABLE 2. Benchmark Reference Assesment Universitas Syiah Kuala (Universitas Syiah Kuala, 2016)

No.	Score	Nilai Huruf	Criteria
1	≥ 87	A	Excellent
2	78 - 86	AB	Good
3	69 - 77	B	Satisfactory
4	60 - 68	BC	Poor

RESULTS AND DISCUSSION

Data on the recapitulation of students' perceptions in lecture activities is included in Appendix 1. Lectures conducted using the method without innovation take place in Phase I and II. Data on students' perceptions at these two stages were averaged, and their results were included in Phase I & II columns. Student perception data on lectures carried out using the innovation discussion method is included in the Phase III column.

1. Students' Perception of Lecturers' Ability in Conducting Face-to-face Lectures

Students give the same perception of the ability of lecturers in the management of face-to-face lectures, both of the classes using the method without innovation or by using the technique of innovation discussion (Appendix 1). The average score of students' perceptions of the ability of lecturers to manage lectures in Phase I & II was 3.68, and Phase III was 3.78. The average score of students' perceptions of classes in Phase III is slightly higher than in Phase I & II lectures. Based on qualitative criteria (TABLE 1), both values have the same category. All students consider the ability of lecturers to be excellent at managing lectures, both for the stage of not using innovative methods or for classes using innovative techniques. Based on this, concerns about the possibility of a decrease in students' perceptions of the ability of lecturers to manage lectures as a result of discussion themes that are not limited to the scope of the material do not occur.

Due to lectures on the 13-16 meeting (using innovative discussion methods), the high perception of students was high. All questions from students can be answered through discussion activities. Material questions asked by students are generally related to the application of Thermodynamics (contextual concepts). Students who are given the freedom to ask about any material they want to know related to the science of Thermodynamics ask many questions beyond the lecturer's expectation. However, the material in question is still controlled by the supporting lecturer to be adequately answered. The ability of lecturers is an essential factor in the teaching and learning process. The knowledge of lecturers is high, convincing students to learn (Suryana 2013).

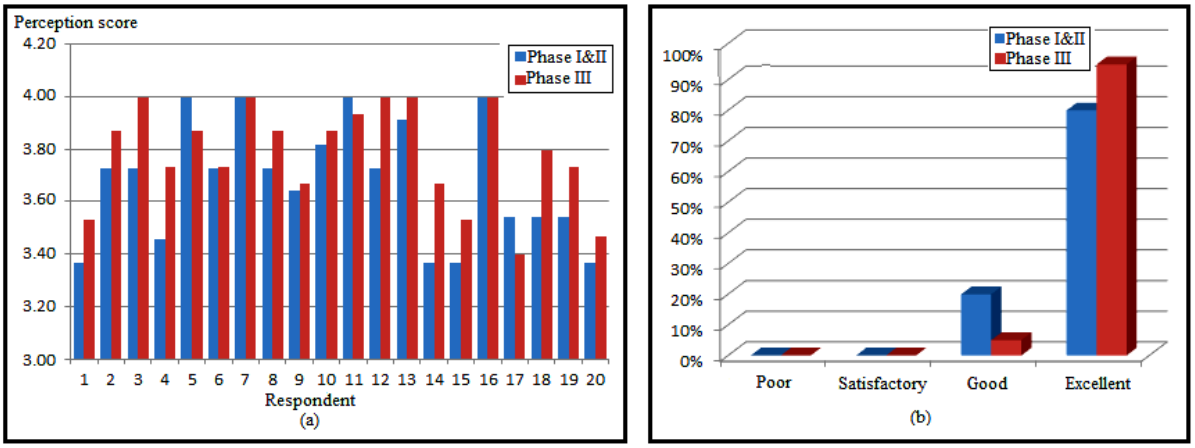

FIGURE 1. Illustration of students' perceptions to the ability of lecturers in managing Thermodynamics lectures in odd semester of 2019/2020 school year; (a) distribution of students' answers to each question, and (b) percentage of criteria according to students' answers

In the review of the distribution of individual student perception scores (FIGURE 1.a); 2 students (respondents 5 and 11) rated the ability of lecturers to manage face-to-face lectures better in Phase I & II, three students (respondents 6, 7 and 16) assessed the ability of lecturers to manage lectures face-to-face between lectures in Phase I & II and Phase III , 15 students rated the ability of lecturers to be better in Phase III. No students rated the lecturers' abilities in lectures to be unsatisfactory and satisfactory (FIGURE 1.b). 80% of students think that the knowledge of lecturers is excellent in lecturing the I & II cycle. The percentage of students who rated the ability of lecturers with ideal criteria in managing lectures increased to 95% in Phase III lectures. So, based on individual analysis, students' perceptions of the ability of lecturers to manage classes with innovative discussion methods are relatively increased. Freedom of discussion themes gives higher satisfaction to students. The questions raised by students in creative discussions may be their long-standing curiosity. The answer to these problems makes students satisfied to assess lecturers' ability in lectures with innovative discussion methods better than the methods without innovation (Ruslan 2010). However, Time constraints cause not all students to ask questions and opinions.

2. Student Perceptions of Activities in Discussion

The average score of students' perceptions for phase I & II was 2.90, and phase III was 3.15 (Appendix 1). Students are active in lectures both in lectures without innovation methods and in classes with innovative discussion methods. When viewed from the distribution of student activity scores (FIGURE 2.a), we can see the diversity of student activeness in lectures. In Phase I & II lecture activities, there were still three students whose active criteria were quite functional. In Phase III classes, all students had reached operational measures. Students who are pretty busy in Phase I & II lectures are 15%, and all students have achieved the applicable standards in Phase III lectures (FIGURE 2.b). Students who were engaged in lectures Phase I & II and Phase III are equal in 70%. The number of students who were very active in discussion activities in Phase I & II to Phase III increased from 15% to 30%.

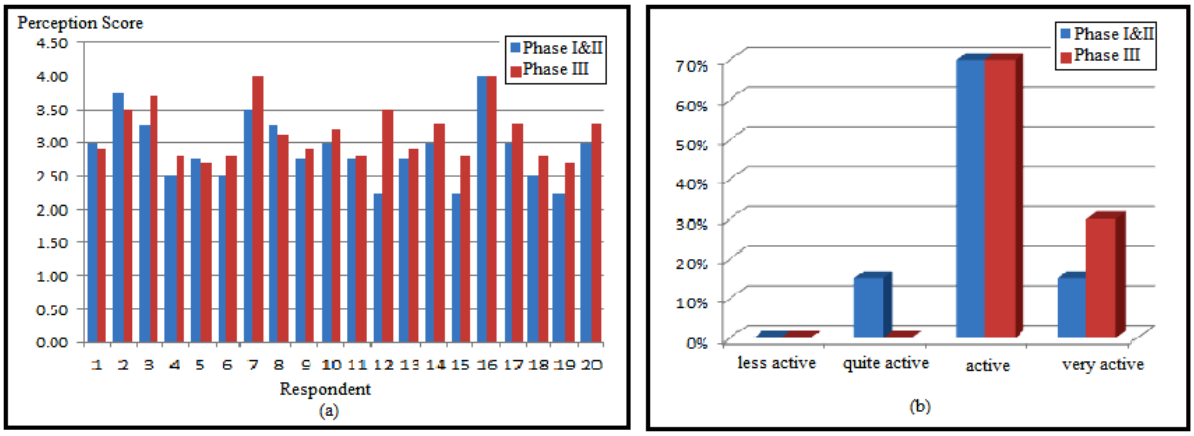

FIGURE 2. Description of students' activeness perceptions in Thermodynamics Lectures Phase I & II and III in odd semester 2019/2020 academic year; (a) distribution of students' answers to each question, and (b) percentage of students' activeness perceptions

Lecturer observation data on student activities in the discussion are listed in TABLE 3. This data is recorded based on observations of the number of times students ask or answer face-to-face lecture-discussion activities and then add them up. The average score of student activeness and criteria at Phase I & II was 1.55 (quite active), and Phase III was 2.75 (active). That data shows the innovative discussion method can increase the activeness of students in their lectures. This activity criterion is different from the results of the data analysis of student perceptions. The possibility of these differences occur from the data collection method; Student data is obtained by survey method while lecturer data is obtained based on direct observation.

TABLE 3. Student Activity Based on Lecturer Observation Data at Thermodynamics Class

Respondent	**Number of Activeness**		**State of Activity**
	Phase		
	I & II	**III**	
1	2.00	1.00	Decrease
2	0.00	2.00	Increase
3	1.00	5.00	Increase
4	1.00	1.00	Constant
5	1.00	2.00	Increase
6	3.00	7.00	Increase
7	2.00	5.00	Increase
8	2.00	3.00	Increase
9	1.00	1.00	Constant
10	1.00	3.00	Increase
11	1.00	1.00	Constant
12	4.00	4.00	Constant
13	0.00	1.00	Increase
14	2.00	5.00	Increase
15	3.00	1.00	Decrease
16	0.00	3.00	Increase
17	2.00	3.00	Increase
18	1.00	1.00	Constant
19	3.00	3.00	Constant
20	1.00	3.00	Increase
Average	**1.55**	**2.75**	

Two students did not ask or answer in Phase I & II lectures to review individual student activity distribution. However, in Phase III lectures, all students showed questions or answers. Comparison of student activities between lectures phase I & II with Phase III as follows; 10% of students experienced decreased, 30% of students were constant, and 60% experienced increased learning activities. The large percentage of students participating in increased activity in lectures with innovative discussion methods reinforces the belief that implementing the "Guru Penggerak" idea needs to be developed in classes in the future. The activeness of students in the lecture process is one crucial factor in improving learning outcomes.

3. Student's Perception of Lecture Environment

The average score of students' perceptions of the learning environment in lecturing activities, Phase I & II, were obtained at 3.24 and Phase III at 3.43 (Appendix 1). Based on the criteria of TABLE 1, then in both of the lecture phases, students feel a pleasant learning environment. All students have an excellent perception with an average score higher than 2.5 (FIGURE 3.a). No students think the lecture is less pleasant or quite enjoyable in Phase I & II lectures and Phase III. In terms of individual student perceptions, in Phase I & II lectures, 80% of students felt a pleasant environment, and 20% felt a pleasant climate (FIGURE 3.b). In Phase III lectures, students who felt a pleasant environment were reduced from 80% to 50%. Conversely, students who find the environment enjoyable increased from 20% to 50%. The learning environment is an essential factor in the lecture process. Lectures that take place in fun or enjoyable ways can increase student interest in learning so that their learning outcomes will also increase.

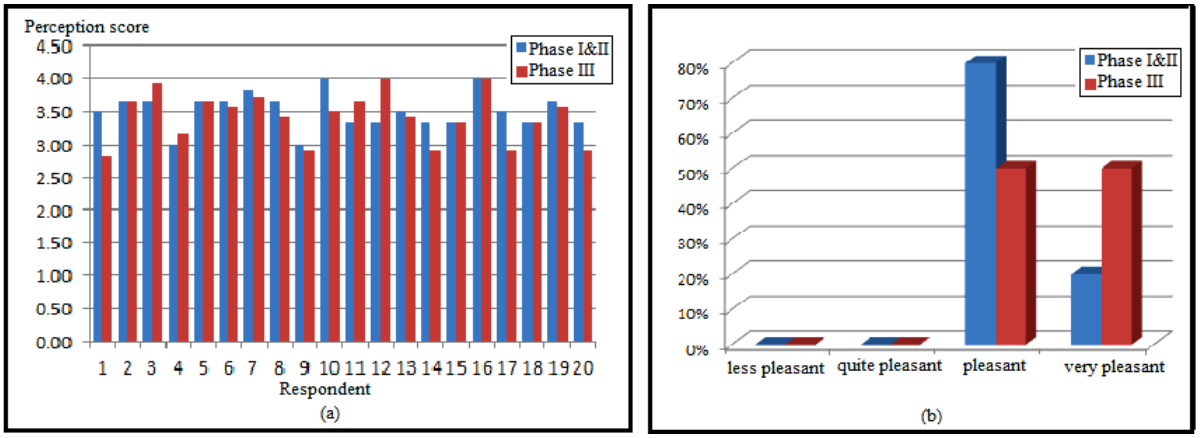

FIGURE 3. Students' perception of the environment of Thermodynamics lectures in phase I & II and III of the odd semester of 2019/2020 school year; (a) the distribution of students based on the average score of each question, and (b) the percentage of student's perceptions of the lecture environment

4. The Lecture Environment online Discussion

Online discussions are conducted using WhatsApp (WA) social media. This tool is used because all students are accustomed to using this application. In addition, the application can be used even though the internet network is slow and the costs required are also relatively cheap. So, the use of WA in discussion activities is not constrained by the network and is approved by all students.

The purpose of holding online discussions is to overcome the lack of innovative discussion time in face-to-face lectures. The time for online discussion is not limited. The discussion took place from the completion of the face-to-face course to the start of the following face-to-face lecture. So, the time available for online discussion is one week. Interaction between students takes place without limits. Students can discuss every day for 24 hours without being limited by holidays. Lecturers only join in incidental to check the state of the discussion. The topic of student discussion extends to other themes but is still within the scope of Thermodynamics material. The lecturer gives direction to the students' answers. The focus is given by clarifying the wrong answers and providing reinforcement to the correct

answers. Short answers are given by typing messages in WA, while long explanations require in-depth understanding, and the lecturer sends a reading reference or an animated video to learn.

TABLE 4. Student activity in online discussion activities

Respondent	Week			
	1	**2**	**3**	**4**
1	3.00	3.00	2.00	3.00
2	3.00	4.00	2.00	4.00
3	3.00	4.00	4.00	2.00
4	2.00	3.00	2.00	4.00
5	3.00	3.00	2.00	3.00
6	2.00	3.00	5.00	2.00
7	3.00	4.00	4.00	2.00
8	3.00	3.00	3.00	4.00
9	3.00	3.00	2.00	3.00
10	3.00	3.00	3.00	3.00
11	3.00	3.00	1.00	2.00
12	2.00	4.00	4.00	5.00
13	3.00	4.00	1.00	2.00
14	3.00	3.00	4.00	3.00
15	2.00	3.00	1.00	3.00
16	4.00	4.00	3.00	2.00
17	3.00	3.00	3.00	4.00
18	3.00	3.00	1.00	1.00
19	3.00	3.00	2.00	3.00
20	3.00	3.00	3.00	2.00
Avarage	**2.85**	**3.30**	**2.60**	**2.85**

The students' discussion activity was quite active (TABLE 4). The average student interaction in the first week's discussion was 2.85, the second week was 3.30, the third week was 2.60, and the fourth week was 2.85. In general, discussions took place very intensively on the first and second day. The intensity of the discussion is reduced in the third week. On the seventh day each week, almost no students are discussing online. However, the discussion resumed every first day of the following week. Enthusiasm for online discussions is relatively high. Students do not submit complaints in online discussion activities both on the condition of the internet network and in terms of cost.

Contrary to the opinion that online learning is more detrimental to students, not all students have electronic devices as online learning tools (Ali 2020). Based on the reasons stated, the condition of students with students in Indonesia is generally different. Students have electronic media, and internet signal quality for WA applications is also adequate because they are domiciled in urban areas.

The results of this study serve as the basis for conducting WA-based online lectures on the Magnet Electric lecture on the even semester of the 2019/2020 school year. Classes in the semester took place during the COVID 19 pandemic period. Online learning took place well and supported the protocol set by the government, such as physical distancing, social distancing, and self-quarantine (Abidah, Hidayatullaah, Simamora, Fehabutar and Mutakinati 2020). Online learning slowly supports increasing teacher competence in the 4.0 revolution era (Priatmoko and Dzakiyya 2020). Students will experience an increase in independent learning abilities, and lecturers experience an increase in pedagogical skills. The learning system will slowly focus on students so that an active learning climate will be created following the era of the industrial revolution 4.0. If this learning system can be strengthened, it will give birth to Indonesian people who are reliable and independent in the current era of the golden generation (Chearuman 2019).

5. Student Perception About the absorption of lecture material by students

The average score of ability to absorb lecture material based on students' perceptions for Phase I & II lectures was 3.17, and Phase III was 3.49 (Appendix 1). Students' perceptions at both stages of the course are the same. Students generally assume that they can absorb lecture material with suitable criteria. Based on individual data in stages I & II (FIGURE 4.a), one student (1st respondent) who felt the ability to absorb lecture material was poor, and one student (13th respondent) who felt the ability to absorb lecture material was quite good (satisfactory). In Phase III, all students perceive that they can absorb lecture material well (sound). When reviewed individually, there is an increase in the ability to absorb lecture material by students, so that an innovative discussion method is expected to improve student achievement (Erni 2015).

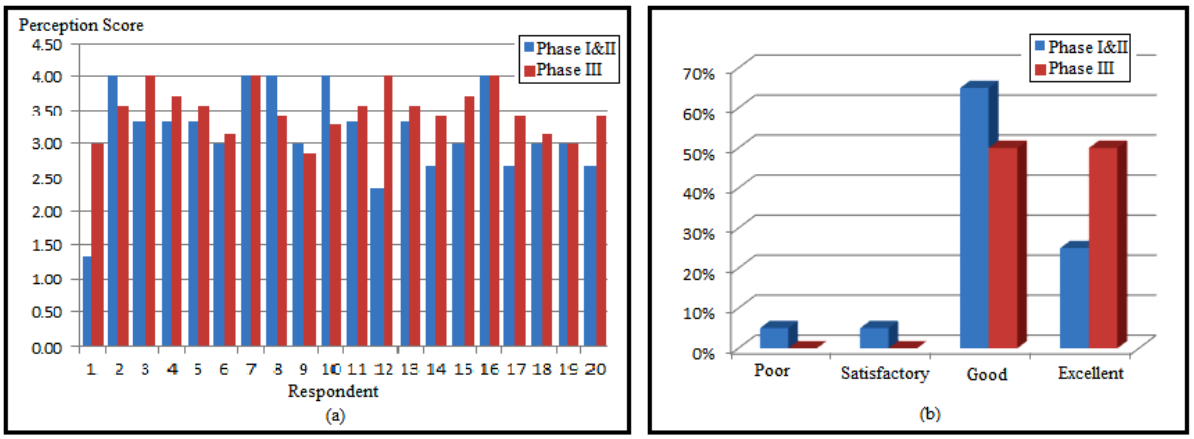

FIGURE 4. Illustration of students' ability to absorb Thermodynamic lecture material in odd semester 2019/2020 school year; (a) the distribution of students in phase I & II and III, (b) the percentage of students' ability to absorb lecture material

The percentage of students who were able to absorb lecture material in phase I & II, with poor criteria of 5%, satisfactory criteria of 5%, good criteria 65%, and excellent criteria 25% (FIGURE 4.b). In Phase III, there are no students who think that the ability to absorb lecture material is poor or satisfactory. On the contrary, students perceive their ability to absorb lecture material, 50% good, and 50% excellent. When reviewed individually, innovative discussion methods can increase students who can absorb lecture material with better criteria. Increased ability to absorb the material in lectures using innovative methods due to changes in attitude and service-learning strategies of lecturers (Suryana 2013). Classes are centered on students. They become more active and more responsible for their learning, so that it has a positive effect on improving cognitive abilities (Widianingtiyas, Siswoyo and Bakri 2015). Learning methods also occur in aspects of students' problem-solving abilities, learning with cooperative models, effectively improving students' problem-solving skills compared to lecture methods (Z Putri, Jumadi, Ariswan, Ratnasari and Oktasari 2019) so that learning outcomes also increase (Minarni 2016).

6. Outcomes Learning of Students

The absorption of course material obtained is based on student perception data (questionnaires) compared with learning outcomes. The learning outcome data at phases I & II were obtained from the results of the midterm exam and the results of the Phase III study from the results of the final exam (Appendix 1). A total of 16 students experienced an increase in learning outcomes in the Phase III learning process. However, four students experienced the opposite situation (FIGURE 5.a). This fact is contrary to the results of students' perceptions of material absorption. This is because all students perceive that phase III absorption in phase III is better than in phase I & II (FIGURE 4.b). This phenomenon was not expected beforehand, so the data that could explain it were not recorded. There may be other internal and external influences that affect students' physical and psychological condition when they take the final exam. However, the percentage of students who experience a decline in

learning achievement in the Phase III lecture process is low (20%). This phenomenon is interesting to study in subsequent research activities by adding independent variables that affect learning outcomes.

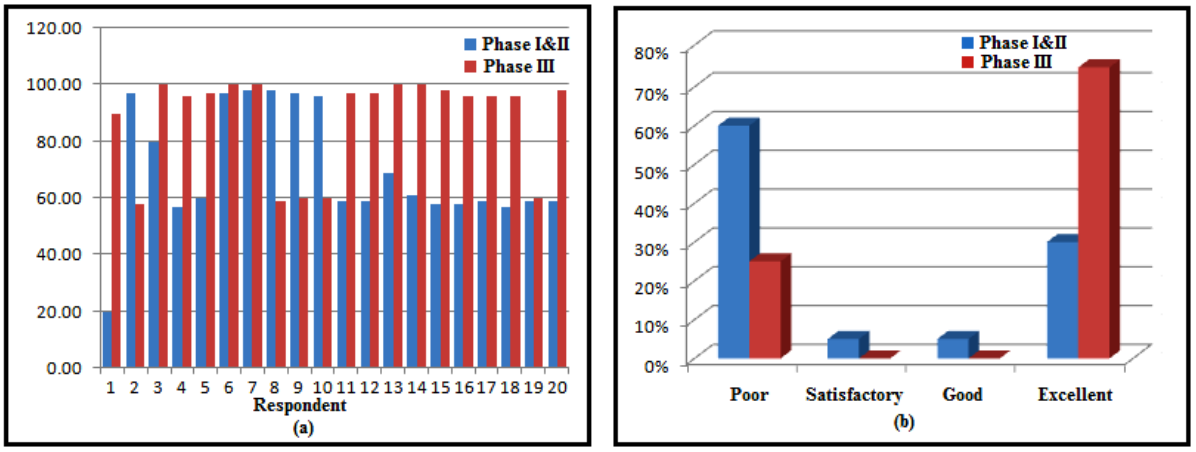

FIGURE 5. Student learning outcomes in the Thermodynamics course in Phase I & II and Phase III; (a) distribution of numerical values (quantitative) for each student, (b) the percentage of achieved learning outcomes students based on qualitative criteria.

In general, the Phase III learning process can improve learning outcomes (FIGURE 5.b). The percentage of students who achieved learning achievement in the excellent category at Stage III was more significant than in Stage I & II. Compared with students' perceptions of material absorption during lectures at phases I & II and phase III (FIGURE 4.b), the learning outcomes have the same tendency. Lecture materials that students can absorb and learn outcomes increase in the Phase III lecture process. Based on data on perceptions of material uptake by students and learning outcomes, the lecture process with an innovative discussion method (Phase III lecture process) can achieve better student learning outcomes than the lecture method in Phase I & II lecture process. The results of this study are following the results of other studies, which have been discussed in the results and discussion of section 5.

CONCLUSION

The results of research on the discussion method innovation to implement the idea of a "Guru Penggerak" in the Thermodynamics lectures in the odd semester of 2019/2020 school year at the Department of Physics Education FKIP Unsyiah obtained an average score of students' perceptions of:

1. The ability of lecturers is 3.78; Qualitatively, lecturers' ability to manage face-to-face lectures is excellent.
2. Student activeness of 3.15 means students are active in face-to-face lecture activities and enthusiastic in online discussions.
3. The lecture environment is 3.43; this means students feel a pleasant environment of lectures.
4. The absorption of lecture material is 3.49; Students can absorb lecture material well (good).
5. Based on data from the results of midterm and final exams, the learning outcomes achieved by students are better in the lecture process with innovative discussion methods.

Students' perceptions are higher than the scores obtained in lectures using the learning method without innovation. However, based on qualitative criteria, these values have the same criteria. So, it can be concluded that the quality of lecturers' ability in managing lectures, student activeness, learning environment, and the ability to absorb lecture material by students in Thermodynamics lectures odd semester 2019/2020 in the Department of Physics Education FKIP Unsyiah both lectures using the method without innovation or using innovative discussion methods no different. Therefore, the innovation of the discussion method in studies did not reduce the quality of the review variables. Even those variables seem to increase so that the innovation of the learning method, especially the discussion method, can be continued for the same course or other subjects. In addition, the implementation of the organizer teacher idea can be expanded, and its quality can be improved. It is expected that the results

of this study can motivate lecturers to use this method in implementing the concept of organizing teachers for other subjects.

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REFERENCES

Abidah, A, Hidayatullaah, HN, Simamora, RM, Fehabutar, D, & Mutakinati, L 2020, 'The impact of covid-19 to indonesian education and its relation to the philosophy of "merdeka belajar"', *Studies in Philosophy of Science and Education (SiPoSE),* vol. 1, no. 1, pp. 38-49.

Ali, U 2020, 'Belajar Online Banyak Sisi Ruginya Daripada Untungnya, Ungkap Dosen UIN Mataram', *Threechannel (E-Artikel),* edisi 7 Juni.

Chearuman, UA 2019, 'Memaknai Kemerdekaan Belajar Mas Mendikbud Nadiem Makarim', Kompasnia.com (E-Artikel), edisi 21 Desember.

Direktorat Tenaga Kependidikan 2018, 'Pendekatan, Jenis dan Metode Penelitian Pendidikan', Depdiknas, Jakarta.

Erni, N 2015, 'Penggunaan metode diskusi untuk meningkatkan hasil belajar materi perubahan sosial pada siswa kelas xii sma negeri 4 pekanbaru', *Jurnal SOROT,* vol. 10, no. 2, pp. 155-68.

Hamalik, O 2012, 'Kurikulum dan pembelajaran', Bumi Aksara, Jakarta.

Hermawan, H 2018, 'Metode kuantitatif untuk riset bidang kepariwisataan', Open Sciene Framework, Yogyakarta.

Johar, R 2016, 'Inovasi pembejaran dalam praktik perkuliahan', Lembaga Pengembangan Pembelajaran dan Penjaminan Mutu Universitas Syiah Kuala, Banda Aceh.

Liana, YR Linuwih, S, & Sulhadi, S 2020, 'The Development of Thermodynamics Law Experiment Media Based on IoT: Laboratory Activities Through Science Problem Solving for Gifted Young Scientists', *Jurnal Penelitian & Pengembangan Pendidikan Fisika,* vol. 6, no. 1, pp. 51-64.

Makarim, N 2019, 'Guru penggerak Indonesia maju', *Mediaindonesia.com (E-artikel),* edisi 25 November.

Makarim, N 2019, 'Upacara hari guru nasional, Nadiem bicara soal merdeka belajar dan guru penggerak', *Kompas.com (E-artikel*), edisi 25 November.

Minarni 2016, 'Penerapan metode diskusi dapat meningkatkan hasil belajar siswa pada kelas iv sdn 1 Tonggolobibi mata pelajaran IPS', *Jurnal Kreatif Online,* vol. 4, no. 1, pp. 139-49.

Nana, SS 2017, 'Metode penelitian pendidikan', Remaja Rosdakarya, Bandung.

Nulhakim, L, Setiawan, FR, & Saefullah, A 2020, 'Improving students' creative thinking skills using problem-based learning (pbl) models assisted by interactive multimedia', *Jurnal Penelitian & Pengembangan Pendidikan Fisika*, vol. 6, no. 1, pp. 9-15.

Ouldridge, TE 2018, 'The importance of thermodynamics for molecular systems, and the importance of molecular systems for thermodynamics', *Nat Comput,* vol. 17, pp. 3-29.

Prawitasari, B, & Suharto, N 2020, 'The Role of Guru Penggerak (Organizer Teacher) in Komunitas Guru Belajar (Teacher Learning Community)', *3rd International Conference on Research of Educational Administration and Management (ICREAM 2019),* pp. 86-9, Atlantis Press.

Priatmoko, S, & Dzakiyya, NI 2020, 'Relevansi kampus merdeka terhadap kompetensi guru era 4.0 dalam perspektif experiential learning theory', *Jurnal Pendidikan Guru Madrasah Ibtidaiyah*, vol. 4, no. 1, pp. 1-15.

Putri, Z, Jumadi, R, Ariswan, Ratnasari, & Oktasari, D 2019, 'The effectiveness of teachers 'use of lecture model combined with cooperative learning method for enhancing students' problem-solving skills in physics', *Jurnal Penelitian & Pengembangan Pendidikan Fisika*, vol. 5, no. 2, pp. 83-90.

Rahmati, Yusrizal, & Hasan, M 2017, 'Critical thinking skills enhancement of students through inquiry learning model laboratory based on reflection of the light', *Jurnal Pembelajaran IPA*, vol. 1, no. 1, pp. 34-41.

Rohani 2016, 'Meningkatkan kemampuan berfikir kritis mahasiswa melalui metode diskusi bervariasi', *Untira Civic Education Journal*, vol. 1, no. 2, pp. 173-84.

Ruslan 2010, 'Kepuasan mahasiswa terhadap kinerja dosen', *Jurnal Ilmu Pendidikan*, vol. 17, no. 3, pp. 230-37.

Serevina, V & Muliyati, D 2015, 'Peningkatan hasil belajar siswa pada materi dinamika gerak partikel dengan menerapkan model pembelajaran project based learning', *Jurnal Penelitian & Pengembangan Pendidikan Fisika*, vol. 1, no. 1, pp. 61-8.

Sulastri, T 2020, 'Implementasi Kebijakan Mendikbud Soal "Merdeka Belajar" Belum Terlihat', Threechannel (E-artikel), edisi 7 Juni.

Suryana, D 2013, 'Pengetahuan tentang strategi pembelajaran, sikap, dan motivasi guru', *Jurnal Ilmu Pendidikan*, vol. 19, no. 2, pp. 196-201.

Universitas Syiah Kuala 2016, 'Paduan akademik program diploma, sarjana, profesi magister/spesialis dan doktor/subspesialis', Universitas Syiah Kuala, Banda Aceh.

Utami, S & Sundari, S 2019, 'Inquiry-Based Learning for Improving Student Learning Outcomes: Literature Review', *Jurnal Penelitian & Pengembangan Pendidikan Fisika*, vol 5, no 1, pp. 49-62.

Widianingtiyas, L, Siswoyo, & Bakri, F 2015, 'Pengaruh pendekatan multi representasi dalam pembelajaran fisika terhadap kemampuan kognitif siswa sma', *Jurnal Penelitian & Pengembangan Pendidikan Fisika*, vol. 1, no. 1, pp. 31-7.

APPENDIX 1. Recapitulation of the Average Questionnaire Score of Students' Perceptions at the Faculty of Physics Education FKIP Unsyiah in Odd Semester Thermodynamics Lectures in 2019/2020

Respondent	The ability of Lecturer*)		Students' activeness *)		Learning Environment*)		The absorption of lectures material*)		Outcomes Learning**)	
	Phase		Phase		Phase		Phase		Phase	
	I & II	III	I & II	III	I & II	III	I & II	III	I & II	III
1	3.36	3.53	3.00	2.90	3.20	2.83	1.33	3.00	20.00	90.00
2	3.73	3.87	3.75	3.50	3.30	3.67	4.00	3.57	97.00	58.00
3	3.73	4.00	3.25	3.70	2.50	3.92	3.33	4.00	80.00	100.00
4	3.45	3.73	2.50	2.80	2.90	3.17	3.33	3.71	57.00	96.00
5	4.00	3.87	2.75	2.70	3.20	3.67	3.33	3.57	60.00	97.00
6	3.73	3.73	2.50	2.80	3.10	3.58	3.00	3.14	97.00	100.00
7	4.00	4.00	3.50	4.00	3.70	3.75	4.00	4.00	98.00	100.00
8	3.73	3.87	3.25	3.10	3.40	3.42	4.00	3.43	98.00	59.00
9	3.64	3.67	2.75	2.90	3.30	2.92	3.00	2.86	97.00	60.00
10	3.82	3.87	3.00	3.20	3.40	3.50	4.00	3.29	96.00	60.00
11	4.00	3.93	2.75	2.80	3.60	3.67	3.33	3.57	59.00	97.00
12	3.73	4.00	2.25	3.50	3.80	4.00	2.33	4.00	59.00	97.00
13	3.91	4.00	2.75	2.90	3.30	3.42	3.33	3.57	69.00	100.00
14	3.36	3.67	3.00	3.30	2.70	2.92	2.67	3.43	61.00	100.00
15	3.36	3.53	2.25	2.80	3.10	3.33	3.00	3.71	58.00	98.00
16	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	58.00	96.00
17	3.55	3.40	3.00	3.30	2.70	2.92	2.67	3.43	59.00	96.00
18	3.55	3.80	2.50	2.80	3.30	3.33	3.00	3.14	57.00	96.00
19	3.55	3.73	2.25	2.70	3.30	3.58	3.00	3.00	59.00	60.00
20	3.36	3.47	3.00	3.30	2.90	2.92	2.67	3.43	59.00	98.00
Average	**3.68**	**3.78**	**2.90**	**3.15**	**3.24**	**3.43**	**3.17**	**3.49**	**69.90**	**87.90**

*) data based on students' perceptions (respondents) obtained by questionnaire

**) data obtained from the results of mid-semester and final exam