

The 1st International STEM House (iSTEMhouse)



Jalan Kalimantan No.37, Kampus Tegalboto, Jember, Jawa Timur, 68121, Indonesia

Dear Nur Ahmad

(Affiliation: University of Jember)

It is our pleasure to inform that your manuscript with the title "Understanding Motorcycle Combustion Engine Work as the Application of Carnot Cycle" has been accepted as free registration fee of an oral presentation for the 1st International Conference on Science, Technology, Engineering, and Mathematics Education (ICoSTEM-Ed) in iSTEMhouse at University of Jember, indonesia.

The theme of the ICoSTEM-Ed 2019 is "iSTEMhouse: Progressive in Science and Technology to Challenge the Future." At this conference, we hope to find innovative ways to bring our science education to growth by linking science teaching with out-of-school education. You will enjoy all strands covering this theme during the ICoSTEM-Ed.

All manuscript has reviewed and you are recommended to register for publication on Journal of Physic through iSTEMhouse website, for more information, please visit our homepage of iSTEMhouse 2019 <http://istemhouse.fkip.unej.ac.id> or contact executive office: istemhouse.fkip@unej.ac.id

Congratulations on the acceptance of your manuscript. We look forward to see you at iSTEMhouse. The event will provide opportunities for discussing the latest research, making professional connections, and fostering friendships.

Sincerely,

Erlia Narulita, Ph. D.

Chair of the iSTEMhouse Committee

Asisstant Professor in Dept. of Biology Education, University of Jember

Email: erlia.fkip@unej.ac.id

handbook

ICoSTEM-Ed2019

FKIP University of Jember

**ICoSTEM-Ed2019: Learning Innovation in Science and
Technology to Challenge the Future**

September-October 2019





ICoSTEM-ED2019 JEMBER

*The 1st International Conference on Science, Technology,
Engineering and Mathematics Education
(The 1st ICoSTEM-Ed), Symposium, and Workshop*

ICoSTEM-ED2019: Learning Innovation in Science and Technology to Challenge the Future.

***ICoSTEM-ED2019 Handbook
FKIP University of Jember***

***Jember, Indonesia
September 30 – 1 October 2019***



UNIVERSITY OF JEMBER

Tradition of Excellent

INFORMATION & REMINDERS

Registration, Conference, Symposium and Workshop Rooms

Room	Venue	Open Time & Explanation
Registration Room	Rectorat Building 3 rd floor, Auditorium CDAST 4 th floor	International Conference Registration on rectorat Building 3 rd floor and Symposium Registration on Auditorium CDAST 4 th floor
Conference room	R. Ahmad room at Rectorat building 3 rd floor	September 30, at 8.30 – 11.30 and next Oral Presentation
Symposium room	Auditorium CDAST 4 th floor	October 1, at 8.00 – 11.30 and next Oral Presentation
Workshop room	3 schools at Jember (SDN Jember Lor 1, SMP 3 Jember and SMA 2 Jember)	October 2, at SDN Jember Lor 1, start at 8.00 – 15.30 October 3, at SMP 3 Jember, start at 8.00 – 15.30 October 4, at SMA 2 Jember, start at 8.00 – 15.30
Oral Presentation	CDAST 3 rd and 4 th floor	September 30 and october 1, at 12.30-15.30
Breakrooms and lunch	All venue	There are a breakrooms for lunch and coffe in all session at 11.30-12.30

Registration Booth

Pre-registrants are identified only by the registration and abstract number ([RA0X]). We cannot check your status with your name, region, and affiliation. You can go directly to the appropriate booth led by your registration number. Pre-registrants with credit card problems need to go to the special booth, not to go to the pre-registrant's regular booth. On-site registrants (by cash only) should go to the on-site booth. No credit card is acceptable.

Apparatus for Presentations

Please make sure that you need to bring your own laptop or tablet for the presentation. We are sorry that no computers are facilitated in our lecture rooms. An LCD projector (connected with a VGA or Mini Display Port) is provided in each room. But if your computer or tablet needs a different kind of connection with the projector, you need to bring it with you. In the afternoon of 29th September 2019, most of the session rooms are open for your pre-checking of the connection. Please feel free to check it in advance.

Lunch Box and Lunch Venues

Lunch box tables are open every day from 12:00 in the registration desk. Lunch ticket on designated day is needed. You can enjoy lunch at any conference rooms including breakrooms, if the sessions are closed.

Free Refreshment

Refreshment service is available at 11:00 and 16:00 at the drink bar areas, every day (except 16:00 on the last day).

Photos

We will invite a photo team (UNEJ photo circle members) to take snapshots of 'what are going on' and the drive link of pictures will be uploaded to the Flickr site, which is shown in the instruction sheet, attached to the name tag, every day. You can enjoy the scenes you miss on the site, and even download them. (We believe that all of the participants accept to be photographed and uploaded on the Flickr site (which is not open to the public, but to the participants who know the particular Flickr site shown in the instruction sheet alone). However, if you find a picture you are not willing to show on the site, please send an email to istemhouse.fkip@unej.ac.id, identifying the photo number and asking the photo team to take down, so that they will delete them as soon as possible.

CORRESPONDENCE TABLE OF ABSTRACT & PRESENTATION NUMBERS

RA01_ Salisu Nuhu	RA40_ Ayu Dini Safitri
RA02_ Tomohiro Takebayashi	RA41_ Yullya Erlina Eka Putri
RA03_ Zhuldyz Basheyeva	RA42_ Inge Wiliandani Setya Putri
RA04_ Sabbir Ahmed Chowdury	RA43_ Nuri Ade Iksani Devi
RA05_ Aida Fikriyah	RA44_ Irma Septiani
RA06_ Abi Suwito	RA45_ Septian Anggraini
RA07_ Esther Samwel Kibga	RA46_ Elisa Octaviyanti
RA08_ Nurul F. Sulaeman	RA47_ Mardiyah Sari Dewi
RA09_ Ainur Rofieq	RA48_ Nanda Rizky Fitriani Kanza
RA10_ Nadyatul Ilma Indah Savira	RA49_ Faizah Firdaus
RA11_ Bea Hana Siswati	RA50_ Muh. Erwinto Imran
RA12_ Indira Wahyu Alfa Terra	RA51_ Chaerun Anwar
RA13_ Muhammad Imaduddin	RA52_ Lailatul Masruroh
RA14_ Aulya Nanda Prafitasari	RA53_ Yulike Retno Sari
RA15_ Moh. Zayyadi	RA54_ Sucik Ike Wahyuni
RA16_ Rika Andayani	RA55_ Dian Rani Permatasari
RA17_ Nurcholif Diah Sri Lestari	RA56_ Siti Magfirah
RA18_ Marta Mila Sughest	RA57_ Sumartiningsih Sumartiningsih
RA19_ Marta Mila Sughest	RA58_ Cendy Eka Erlinawati
RA20_ Agus Fernando	RA59_ Listyany Yunia Saroh
RA21_ Aini Meitanti Rosalina	RA60_ Herawati Susilo
RA22_ Mellyatul Aini	RA61_ R.A. Nurul Hidayatus Shalihah
RA23_ Ika Permata Sari	RA62_ Rofika Rofika
RA24_ Nikmatil Hasanah	RA63_ Dyah Intan Priskasari
RA25_ Marinda Resti Sari	RA64_ Lailatul Bulgis
RA26_ Ira Maya Oktaviani	RA65_ Abdul Malik Yunus Wijaya
RA27_ Eka Anjarwati	RA66_ Kunti Kunanti
RA28_ Dian Nuriyah Indah	RA67_ Mita Dwi Agustin
RA29_ Muhammad Reza Firmantara	RA68_ Feni Marcelina
RA30_ Hilya Wildana Sofia	RA69_ Haidhar Reizal
RA31_ Pramudya Putra	RA70_ Ainul Kiromah
RA32_ Siti Magfiroh	RA71_ Alvi Maulidia
RA33_ Jekti Prihatin	RA72_ Soesy Sri Wulandari
RA34_ Vivin Kusumaningrum	RA73_ Iwan Wicaksono
RA35_ Nur Ahmad	RA74_ Dini Febrianti
RA36_ Meliyana Aini	RA75_ Teguh Wijayanto
RA37_ Zidna Qurrota Aini	RA76_ Alvi Maulidia
RA38_ Nisa Dewi Ariska	RA77_ Ika Lia Novenda
RA39_ Amirah Onne Oktavia	RA78_ Tatang Suhery

Second Day of Conference for Presenter

NO	NAME	TITTLE	ROOM
1	Nuri Ade Iksani Devi	Analysis of Mathematics Creativity of High School Students Through Stem Integrated Project-Based Learning in Elasticity Physics Learning in Class Xi Mipa 6 Of Sman 2 Jember	1
2	Irma Septiani	Analysis of Student Learning Interest Using Problem Based Learning Model with Stem Approach on Materials Vector in Class X Mipa 3 Sman 2 Jember	
3	Ayu Dini Safitri	Development of Learning Media Using Vba Excel In Physical Learning on High School	
4	Sumartiningsih	The analysis of the implementation learning material based on discovery-based learning and its effect to student creative thingking skills in solving the multiplication problem	
5	Septian Dwi Anggraini	Science Textbook Based on Socio-Scientific Issues on Environmental Pollution Materials to Improve Science Literacy of Middle School Students	
6	Zidna Qurrota Aini	Identification of Ethnobotany Coconut Plants by Local Communities	
1	Sucik Ike Wahyuni, S.Pd.Sd	The analysis of the implementation of learning materials base on research- based learning to improve the elementary school students creative thinking skills in solving "Polamatika" problems	2
2	Mita Dwi Agustin	Problem Based Learning (Pbl) Model Using Science Technology Engineering Mathematics (Stem) Approaches in Physical Learning of Elasticity Materials in Class Xi Mipa 4 Sma Negeri 2 Jember	
3	Asep Suhendi	Implementation of Fuzzy Dynamic Set-Point Weighting Method on Hydroponics Nutrition Control System	
4	Dr. Dra. Jekti Prihatin, M.Si.	How to Create Alternative Biology Book Using Brain-based Principles	
5	Alvi Maulidia	Innovation in Learning Future Science Through Stem (Science, Technology, Engineering, And Mathematic) Education in Sma Muhammadiyah 3 Jember	
6	Nur Ahmad	Understanding Motorcycle Combustion Engine Work as the Application of Carnot Cycle	
1	Yullya Erlina Eka Putri	Results of High School Student Learning in Physics Learning Using Problem-Based Learning (Pbl) Models with Stem (Science, Technology, Mathematics, And Engineering) Approaches	3
2	Dian Rani Permatasari	Process Skills of Science in Work and Energy Class X through an Integrated STEM Approach with Problem Based Learning (PBL)	
3	Ainul Kiromah	The Influence of Problem-Based Learning (Pbl) Learning Model Using Stem (Science, Technology,	

[RA34] Appliance of Textbook Based of Brain in Material of The Organizational System of Life for The Junior High School Science

Vivin Kusumaningrum (Department of Science Education Magister, University of Jember, Jember, Indonesia)

Ihsan Ullah (Department of Zoology University of Karachi, Karachi, Pakistan)

Abstract: This study in 21st century having much transformation in science and Technology An effective knowledge is a knowledge that include student's ability in understanding study object. There fore, to support an optimum study process there is a need of a text book. Study in science especially in a main study of organitation system of life is study that have the most complexity.

The purpose of this research is investigating the impact of brain based textbooks on knowledge and skill in the organitonal system of life from cellular level to the organism. This book is accompanied by constituante of abstract cell compotition and can't be seen directly because it is inside in organism so that it becomes apparent. This brain – based comes with games, pneumonice, comics and motivation so it trains long term thingking and memory skills. Objective of this research is to know the effectivity of textbook basic on brain against Junior High School Science Student's ability in retention.

This research was conducted in SMP Negeri 1 Rogojampi and MTs Negeri 10 Banyuwangi with research subjects of Class VII in the academic year 2019/2020. The Type of this research was (research and development), using 4-D model Thiagarajan, with stages define, design, develop and deseminates. The technique of collecting data is by collecting product validation data, test methods, interviews with teachers, questionnaire teachers and students and observations. The data analysis technique consisted of product validation analysis, analytic analysis with N-gain and learning retention, and practicality analysis. At the define stage, the data is obtained The results of need needs questionnaire From the results of the questionnaire need assessment of learning in junior high school data obtained by teachers in East Java stated 96% have not made a brain-based textbook that can activate students while students In East Java, 94% also stated that in the material organization, life tends to be difficult to remember in the long run and low retention.

[RA35] Understanding Motorcycle Combustion Engine Work as the Application of Carnot Cycle

Nur Ahmad (University of Jember, Jember, Indonesia)

Abstract: The Carnot cycle is a difficult discussion enough, abstract and often get misunderstood by student. The Carnot cycle is a thermodynamic part in physics. Thermodynamics is spontaneously mechanics of transferring heat energy from high temperatures to low temperatures. The understanding working of a motorcycle combustion engine can connect to thermodynamic concept in Carnot Cycle. The workings of this combustion engine include 4 steps, namely intake, compression, power and exhaust. That four step can explain thermodynamic processes like as adiabatic, isothermic, and isochoric are studied in the Carnot cycle. The purpose of this study is to connect the thermodynamic concepts of motorbike engine combustion to facilitate the learning of physics. The research type is literature review and to develop media learning. The method uses 4 stages are media creation, expert assessment, trial and evaluation. The result of the research were motorcycle combustion engine work learning media with a feasibility level based on the assessment of material expert assessors obtained 76 %, media expert assessors were 83%, and learning experts were 87%. Student trials include simplicity, clarity, ease, educative and attractiveness average 84%. The evaluation phase produces final media. This motorcycle combustion engine learning media is should be apply in Carnot cycle matter.

[RA36] Assessing Teacher's Knowledge, Applications and Attitudes at STEM: for the Development of STEM approaches in the circulatory system material of student's junior high school

Meliyana Aini, Suratno and Iis Nur Asyiah (University of Jember, Jember, Indonesia)

Abstract: The circulatory system is one of the junior high school materials relating to organs which functions to move substances to and from cells. Cells are the smallest structural and functional unit in living things, so to understanding them is very difficult. To overcome this, an integrated model development STEM approach was made to help improve material understanding. The application requires teacher knowledge about the STEM approach and the level of difficulty of the material by students. To determine teacher knowledge about STEM, three assessments were conducted, namely knowledge, applications related to the model used, and attitudes. Based on the assessment obtained teacher perceptions about the difficulties in implementing the STEM approach. This type of research is a mix of methods (qualitative and quantitative). The quantitative analysis method is carried out to overcome the comparative value of the three assessments, while the qualitative analysis method is to strengthen the results of the quantitative analysis through the perception of the teacher and students. The results showed that knowledge about STEM education was still in the low category, applications in the medium category, and attitudes in the good category. This is due to differences in teacher education background, teacher experience in teaching, and teacher understanding in applying learning models that are integrated with STEM.

The 1st

2019

ICOSTEM-Ed

International Conference of
Science, Technology, Engineering
Mathematics Education

Certificate

No7 6 9 5 /UN25.1.5/DL/2019

awarded to

Nur Ahmad

for participation as
Presenter

at 1st annual ICOSTEM-Ed 2019

International Conference of Science, Technology,
Engineering and Mathematics Education

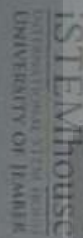
September - October 2019

Jember - Indonesia

Dean,

Faculty of Training and Learning Education
University of Jember

Prof. Drs. Dafik, M.Sc., Ph.D



Understanding Motorcycle Combustion Engine Work as the Application of Carnot Cycle

Nur Ahmad^{1*}

¹ University of Jember, Jalan Kalimantan 37 Jember, Indonesia

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Abstract. The Carnot cycle is a difficult discussion enough, abstract and often get misunderstood by student. The Carnot cycle is a thermodynamic part in physics. Thermodynamics is spontaneously mechanics of transferring heat energy from high temperatures to low temperatures. The understanding working of a motorcycle combustion engine can connect to thermodynamic concept in Carnot Cycle. The workings of this combustion engine include 4 steps, namely intake, compression, power and exhaust. That four step can explain thermodynamic processes like asadiabatic, isothermic, and isochoric are studied in the Carnot cycle. The purpose of this study is to connect the thermodynamic concepts of motorbike engine combustion to facilitate the learning of physics. The research type is literature review and to develop media learning. The method uses 4 stages are media creation, student's assesment, student quality feedback and expert assessment. The media had x-banner and video combination about MCE and Carnot cycle pictures. The result of theresearch were motorcycle combustion engine work learning media with a feasibility suggest based on the assessment of learning media expert assessors. Student trials include readable level font, simplicity, clarity, ease, educative and attractiveness average 74%. Student feedback to find out comment of participant about learning media quality. Participant will requested both strengths weaknesses, critics and suggestion about media construction. Expert suggest need simple and contextual picture about motorcycle engine adapted to real fact in daily activities. This matter fascilitate understanding of engine mechanism more easy. Expert suggest this learningmedia expecially to ICE picture that four cylinder-piston pair should be one cylinder- piston pair or two cylinder-piston only. This motorcycle combustion engine learning media is should be apply in Carnot cycle matter.

1. Introduction

The Carnot cycle is a difficult discussion enough, abstract and often get misunderstood by student. The Carnot cycle is a thermodynamic part in physics. The learning material is the laws of thermodynamics in it there is a heat transfer cycle process. Thermodynamics is spontaneously mechanics of transferring heat energy from high temperatures to low temperatures. To make it easy we need learning media. Learning media as a tool or visual aid is a device created by the teacher as a tool to help students obtain information stimulates the mind, abilities, so that it is able encourage students to be more active and more spirit in learning activities.

This reasearch combined video and X-banner learning media to help student understand their learning activities. The main objective of this research is to understand the Carnot cycle engine through video and X-banner learning media. Video is a technology for capturing, recording, processing, transmitting and rearranging moving images. While X-banner is a promotional media that printed with digital print which is generally in the form of a portrait buffer X shape formed poles made of lightweight aluminum that functions to support it. The purpose of X-banners is to advertise certain products and attract as many people as possible for certain products.

The motorcycle is two-wheeled vehicle driven by an engine. Motorcycle is easily found in everyday life and generally used for transportation. Based on its transmission can be found various motorcycle types such as automatic, clutch and gear. The engine model generally used is moves translational piston burn. The engine models in motorcycle is the internal combustion engine (ICE) that a device can produce power through process that produce heat energy then converted into mechanical energy which is needed to move a vehicle. Temperature and pressure change on the combustion chamber produced compressed gas explosion which is move the piston translatively cause crankshaft rotation through the connecting rod.

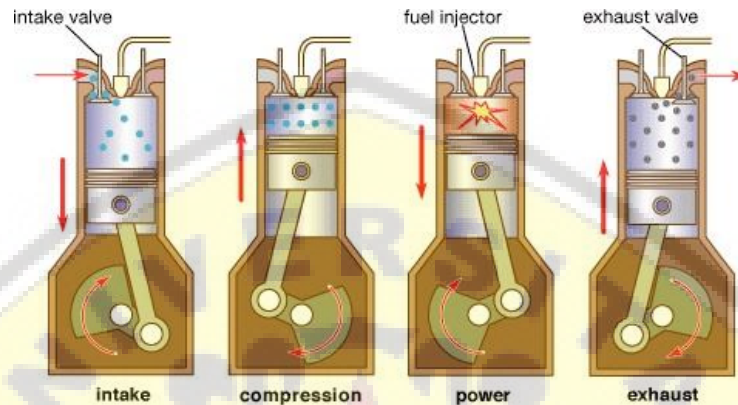


Figure 1. steps in combustion engine process

The workings of internal combustion engine (ICE) include 4 steps are intake, compression, power and exhaust. Terms knew TDC is Top Dead Center and BDC is Bottom Dead Center. The first step is intake since opened valve mix fuel and air from carburetor into the cylinder. Intake cause piston moves downwards from the TDC to BDC. The second step is compression since valves are closed. The piston moves from BDC towards TDC cause the gaseous fuel-air mixture pressure and temperature in the cylinder increased. The next step is power expansion while both valves are closed and the piston moves from TDC to BDC with high pressure hot gaseous mixture burning. The power of this step is transmitted by connecting rod to the rotational crankshaft produce torque. The mechanical energy from power expansion step transmitted to back wheel through chain cause motorcycle moves. The last step is exhaust since opened valve and piston moves from BDC towards TDC push the combustion outcast gases from cylinder.

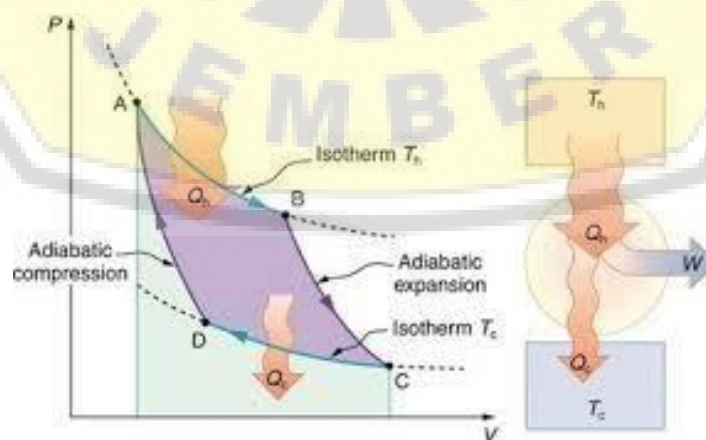


Figure 2. The four processes Carnot cycle (*source: <http://courses.lumenlearning.com>)

A thermodynamic heat machine is a device that can convert heat energy into mechanical work through classical mechanics system where the gas expands and presses the piston inside cylinder. This

heat engine gets its energy from the reservoir high temperature heat, some part of the energy taken is converted to mechanical energy. Hot engine is not perfectly efficient a part of the energy taken from the heat reservoir is not converted to mechanical energy but it is transferred to a low temperature reservoir.

Based on the figure 2, the Carnot cycle can be explained as follows that four processes. The Carnot cycle reduction is done by calculating the heat involved in two isothermal processes and with two adiabatic processes. From A to B is gass process named isothermal expansion. In this process the system absorbs heat energy Q_1 at T_1 high temperature reservoir and conducts work W_{AB} . The B to C process is adiabatic expansion. During this process the system temperature drops from high temperature T_1 to low temperature T_2 while doing work W_{BC} . The process C to D is isothermal compression. In this process the system receives the W_{CD} effort and releases Q_2 heat into the low temperature reservoir T_2 . The D-A process is adiabatic compression. During this process the system temperature rises from T_2 to T_1 due to receiving W_{DA} effort.

The workings of ICE include 4 steps are intake, compression, power and exhaust in motorcycle. The understanding working of a motorcycle combustion engine (MCE) can connect to thermodynamic concept. The four step can explain thermodynamic processes like as two adiabatic processes and two isothermal processes are studied in the Carnot cycle. Bot of them have compression and expansion process each other. The purpose of this study is to connect the thermodynamic concepts of motorbike engine combustion to facilitate the learning of physics.

2. Methods

The purpose of this study is to connect the thermodynamic concepts of MCE to facilitate the learning of physics. The research type is literature review and to develop media learning. The method uses 4 stages are media creation, student's assesment, student quality feedback and expert assesment. The media had two x-banner and video combination about MCE and Carnot cycle pictures.

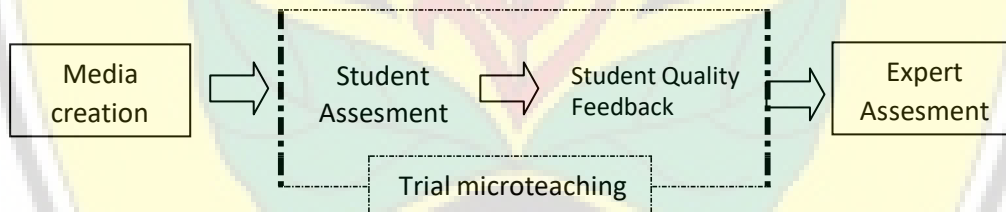


Figure 3. The four steps in this research

Student assesment shows student response formed by questionnaire answer using 1-5 scale according to the question which has been provided from six aspects. There are readable level font, clarity level, simplicity, ease, educatif and attractive. Then these results are interpreted into the Linkert scale. Student feedback to find out comment of participant about learning media quality. Participant will requested strengths, weaknesses, critics and suggestion of context or media construction. Both of student assesment and feedback are included in trial microteaching step. Trial microteaching implemented in September, 14 2019 and attended by 13 participants. The last assesmentto get expert suggestion about learning media in x-banner construction picture.

3. Results and Discussion

3.1. Student Asessment

At this stage to fascilitate understand MCE and Carnot Cycle using learning media will be evaluated about both strengths and weaknesses context or construction. Learning media is used X-banner picture and video combination about MCE and Carnot Cycle. To find out the advantages as well as

the lack of these Carnot engine props conducted by distributing questionnaire responses of participants students.

Trial microteaching implemented in September, 14 2019 to get student response. Assessment of students responses formed by questionnaire about Understanding Motorcycle Combustion Engine and Carnot Cycle with answer using scale between 1-5 according to the question which has been provided from six aspects, then from these results are interpreted into the Linkert scale. There are readable level font, clarity level, simplicity, ease, educatif and attractive.

Table 1. Student Response

	Level (%)	Category
Readable level font	75	Good
Clarity level	77	Good
Simplicity	77	Good
Ease	72	Good
Educative	78	Good
Attractiveness	67	Enough
Average	74	

*Source: Questionnaire

Table 1 shows the results of students' responses from little class. Percentage of students' response values with 13 students of readable level font by 75%, clarity is 77%, simplicity 77%, ease 72%, educative 78% and attractiveness 67%. Average of student response is 74%. Based on criteria Likert scale of this aspect is considered positive. The highest are clarity and simplicity, bot of them had 77% level percentage. The lowest was attractiveness by 67%. According overall of Understand MCE and Carnot Cycle props are positive to be developed in physics learning. But the performance microteaching integrate learning media should be increased especially attractiveness of x-banner and video combination.

3.2 Student Quality Feedback

Student feedback to find out comment of participant about learning media quality. Participant will requested both strengths weaknesses, critics and suggestion context or construction of MCE and Carnot Cycle learning media.

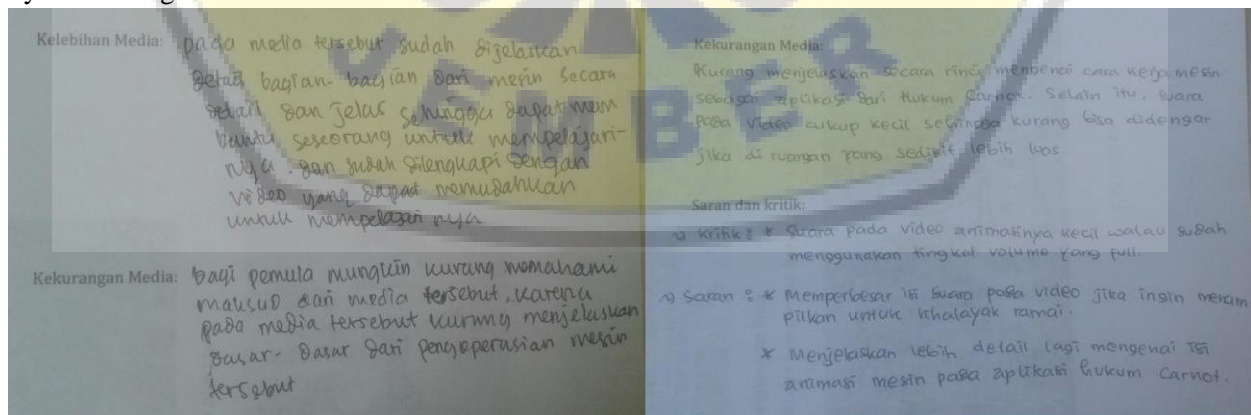


Figure 4. Student feedback

One of participant said about strengths that “on that props was explained in detail a part of Engine to assist understanding it (MCE and Carnot Cycle) and completed by video props so learning it become easy”. There are workings of ICE include 4 steps are intake, compression, power and exhaust.

Each steps explained detail enough. She said weakness the x-banner media that “beginner maybe scant understand it because that props mention operating system of the machine less”. The other participant express the audio of learning media should be more aloud. She also suggest learning media more detail explaine mechanism of MCE connect to Carnot Cycle. Actually MCE steps mechanism and Carnot Cycle process included in video, x-banner picture and presenter explanation in microteaching. But participant need step by step more detail explanation.

3.3 Expert Suggestion

One cylinder engine is a wellknown engine type in the community. It have consist of upright, sleep and 45 degree tilt cylinder. There are main part of motorcycle engine like carburetor, cylinder head, cylinder block, piston, valve crankshaft, flywheel and bearing. The engine models in Motorcycle generally is used moves translational piston burn. The engine is device can produce power through heat energy processes then converted into mechanical energy which is needed to move the piston translatively cause crankshaft rotation through the connecting rod. The crankshaft rotated gears through chain until the vehicle get movement.

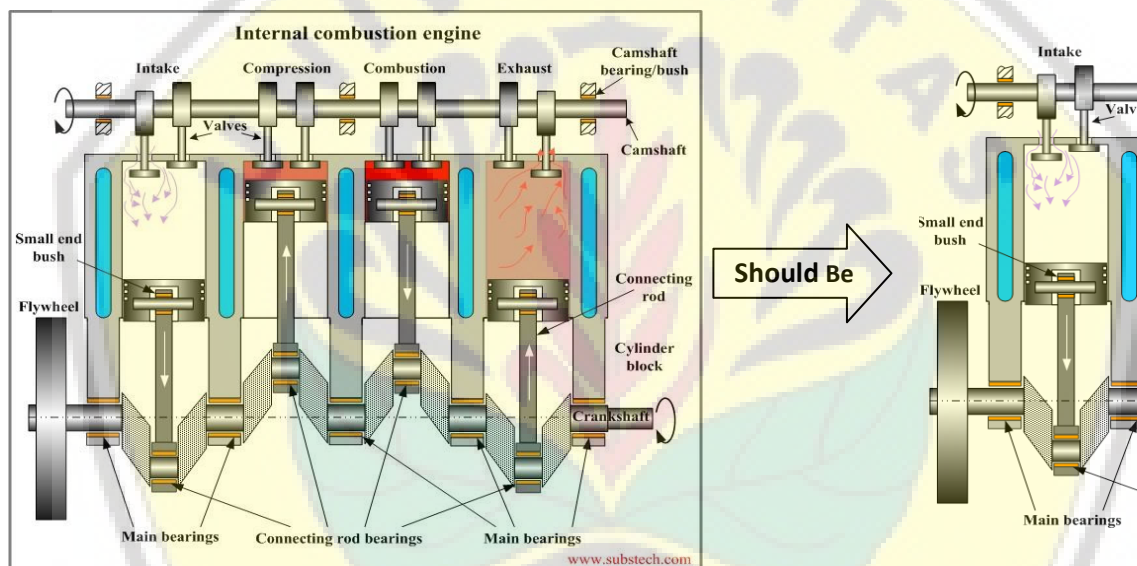


Figure 5. Internal Combustion Engine (ICE) steps(*source: www.georgeherald.com)

The Internal Combustion Engine (ICE) picture in X-banner have four cylinder-piston pair. The expert named prof Gillian Roehrig from Minnessota ICE should be simple and contextual picture about motorcycle engine adapted to real fact in daily activities. This matter fascilitate understanding of engine mechanism more easy. Expert suggest this learning media expecially to ICE picture that four cylinder-piston pair should be one cylinder-piston pair or two cylinder-piston only. This aim to avoid misunderstanding people outlook between motorcycle and car machine from picture. In fact, motorcycle in Indonesia generally have one cylinder-piston pair engine.

4. Conclusions

Student trials include readable level font, simplicity, clarity, ease, educative and attractiveness average 74%. According the research, overall of understanding MCE and Carnot Cycle props are positive to be developed in physics learning. Student feedbact suggest learning media more detail explaine mechanism of MCE connect to Carnot Cycle. Actually MCE steps mechanism and Carnot Cycle process included in video, x-banner picture and presenter explanation in microteaching. But participant need step by step more detail explanation.

Expert suggest need simple and contextual picture about motorcycle engine adapted to real fact in daily activities. This matter fascilitate understanding of engine mechanism more easy. Expert suggest this learning media expecially to ICE picture that four cylinder-piston pair should be one cylinder- piston pair or two cylinder-piston only.

References*

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