PILLAR OF PHYSICS EDUCATION
Vol. 15 (3), 2022, page.164-171
ISSN (Print) : 2337-9618
ISSN (Online) : 2684-8880

NEED ANALYSIS OF CURRICULUM FOR DEVELOPMENT OF PHYSICS LEARNING GAMES CONTAINED WITH SCIENTIFIC LITERATURE

Farhannisa Tsalatsiyah[1], Hidayati[1]*, Ramli[1] ,Renol Afrizon[1]

[1] Departement of Physics, Universitas Negeri Padang, Jl. Prof. Dr. Hamka Air Tawar Padang 25131, Indonesia
Corresponding author. Email:hidayati@fmipa.unp.ac.id

ABSTRACT

21st century education is an important part because it is expected to improve the quality of human resources. The purpose of this study was to analyze the high school curriculum for the needs of developing physics learning games containing scientific literacy. This research is a descriptive research with a qualitative approach. The population were all senior high schools in the city of Padang. Sampling technique used was Stratifies Random Sampling Technique. The sample selection was based on school accreditation and the Physics National Assessment Score for 2018/2019 academic year. The sample in this study consisted of five schools consisting of 3 public high schools and 2 private high schools. The research was carried out by analyzing the lesson plan Physics Class X documents from semesters 1 and 2. Data was taken using the lesson plan presentation analysis instrument and data collection techniques through documentation in the form of lesson plan. The data analysis techniques carried out were 1) Summing the RPP components, 2) Calculating Percentages, 3) Determining criteria, and 4) Drawing conclusions. Based on the research conducted, data were obtained from curriculum analysis for the needs of developing physics learning games with scientific literacy. The average percentage of lesson plans from 3 high schools with material on Measurement, Vector, Straight Motion, Parabolic Motion, Circular Motion, Newton's Laws, Law of Gravity, Work and Energy, Momentum and Impulse, and Simple Harmonic Vibration. It has been obtained that the average high lesson plan percentage is Simple Harmonic Vibration Material and the low lesson plan percentage average is Straight Motion Material. It can be concluded that the Straight Motion Material is a learning game media because the results of the analysis of lesson plan documents have a low percentage.

Keywords :*Analysis; Curriculum; Game; Literature; Scientific*

I. INTRODUCTION

The 21st century is the century of knowledge which is the main foundation in aspects of life. In this 21st century, education is very important to ensure students have skills in terms of learning and innovation. Learners can use technology and information media, and are able to work and survive with the skills they have for life. This makes it a challenge for educators to make the next generation of the nation who have various skills to adapt and have a strong mentality in competing in order to survive with an increasingly advanced world in the future. Education is an important part of people's lives.

Education can improve the quality of human resources and the level of civilization of human life becomes more advanced. Education can experience change, development, and improvement by adjusting developments in all areas of life. Changes and improvements in education have several components to implement education in the field, such as teacher competence and quality of teaching staff, quality of education, curriculum devices, educational facilities and infrastructure and quality of education management including changes in innovative learning methods and strategies. Efforts to change and improve are able to make the quality of education in Indonesia better[1].

The low interest in literacy in Indonesia is influenced by several factors. The first factor is the absence of habituation in reading that is instilled from an early age. Second, access to educational facilities is not evenly distributed and the quality of educational facilities is minimal. And lastly, the lack of book production in Indonesia is due to publishers in undeveloped regions [2]. The low learning outcomes of physics students are caused by many things, namely: a dense curriculum, textbook material that is felt to be too difficult to understand, less precise use of the learning media chosen by the teacher, inadequate laboratories, less than optimal and lack of awareness of the students themselves, or the nature of the students themselves. conventional method in which students are not much involved in the learning process and class activities are mostly dominated by teachers [3]. The low understanding of physics in students is caused by the lack of student participation in the learning process. Students do not understand the material presented because these students just sit, be quiet and listen to what the teacher has explained and students lack the courage to express their opinions to others [4].

The existence of a scientific approach to the 2013 Curriculum can make students learn more effectively and meaningfully. The implementation of the 2013 curriculum is the implementation of a scientific approach that can make efforts to improve the school literacy movement. The school literacy movement is an effort that is carried out in a comprehensive and sustainable manner to make schools a place of learning. Classical learning with the lecture method is still very popular with teachers because it has advantages over other methods. The advantages of this lecture method are that it is efficient in using time and media as well as economical and practical in conveying learning content, but it must be admitted that not always learning with the lecture method can take place well. The effect of this lecture method is that students become bored quickly and do not pay attention to the material being lectured [5]. Therefore, through learning that is presented through more efficient media because it can be used by students anytime and anywhere, as well as making an innovative and interactive learning system that can motivate students.

Game is a form of entertainment that is interesting and in demand by the community, including students. Game is a form of art in which the player, makes decisions to manage their resources through objects in the game in order to achieve goals [6] An educational game is a game that has been created in order to teach players about certain topics, expand concepts, strengthen development, understand a historical or cultural event or assist them in learning a skill [7]. The existence of educational games can affect the development of technology around the students. The game has become an attraction that is able to combine with various aspects of interest and function and there are many positive impacts. Games have a positive impact, namely: First, games make people smart. According to research at Manchester University and *Central Lancashire University* , players who play games for 18 hours per week have the same good hand-eye coordination as athletes. Second, it can improve concentration. At a university in England, the head of research said that a true gamer has a high concentration that is able to make them complete tasks. Third, Improving brain performance and sharpening the brain in accepting stories while playing games that are not excessive can improve brain performance so that it has a little saturated capacity compared to studying and reading books. Fourth, Improving reading ability [8]. Learning game media can help teachers in the learning process to deliver subject matter. The development of learning media goes hand in hand with technological developments. The use of media in learning games is expected to make students interested in learning and student learning outcomes to be better. Student learning outcomes depend on the learning process that has been designed in the lesson plan, therefore according to the researcher, the analysis of the lesson plan document is needed for the process of developing physics learning games. This research has a clear target and its achievement can be measured, it is necessary to determine the research objective, namely to analyze the high school physics curriculum for the development of physics learning games with scientific literacy.

II. METHOD

Based on the background that the researcher put forward, the purpose of this study was to find out Curriculum Analysis for the Development Needs of Physics Learning Games with Scientific Literacy with this type of descriptive research with a qualitative approach. Descriptive research is a study that can collect information about the status of an existing symptom, namely the state of the symptoms according to what they were at the time the research was conducted without making general conclusions or generalizations. Qualitative research is research that intends to understand phenomena about what is experienced by research subjects such as attitudes, assumptions, motivations, actions and others holistically and with descriptive methods in the form of words and language, in a special natural context [9].

The population is a generalization area consisting of objects or subjects that have certain qualities and characteristics that are applied by a researcher to be studied and then drawn conclusions [10]. The population in this study were all senior high schools in the city of Padang, consisting of 16 public high schools and 17 private high schools. Population data was taken from the National Accreditation Board for Schools/Madrasah and also took the Physics National Exam scores for the Padang City High School for the 2018/2019 academic year which were obtained from the Puspendik Kemendikbud. The sample is part of the number and characteristics of the

population. In taking the sample used *Stratified Random Sampling*. *Stratified Random Sampling* is a sampling technique by taking into account a level (strata) in the population element. Based on the Stratified Random Sampling technique, the selected sample can be obtained randomly which is grouped into high, medium, and low criteria based on school accreditation. So, researchers will take samples from 5 high schools in the city of Padang.

Instruments are tools used to approach the research objectives. The research instrument is a tool used to measure the observed natural and social phenomena [11]. The research instrument used is compiled and will be tested for validity. Based on the objectives of the research conducted, a research instrument is needed to analyze the curriculum in the form of an analysis sheet in the form of a statement regarding curriculum analysis for the development of physics learning games containing scientific literacy.

The research instrument used was compiled and tested for validity. To develop a good instrument, it is necessary to take several steps [12], namely:

1. Planning, the stages of goal formulation, determining the variables, and their categories.
2. Instrument grid writing. The instrument grid is designed first before writing down the instrument items.
3. Writing instrument items.
4. Trial, in the form of a validity test.

The results of the overall validity of data analysis based on validator responses using percentages:

$$P = \frac{\Sigma x}{\Sigma xi} \times 100\% \quad (1)$$

With:
P = Percentage
X = Score obtained
Xi = Maximum score

Table 1. Category Validation

Percentage (%)	Category
0 - 20	Very Low
21 - 40	Low
41 - 60	Fairy High
61 - 80	High
81 - 100	Very High

(Source : Ref [12])

The validation results obtained from three expert validators are in the very valid category. These results can be seen in table 2.

Table 2. Instrument Validation Results By The Three Validators

No	Validator	Value	Category
1.	Validator 1	96,42%	Very High
2.	Validator 2	96,42%	Very High
3.	Validator 3	89,28%	Very High

After being validated by three validator lecturers, then revisions are made according to the input given by the validator. Next is the stage of data collection. Data collection techniques are the methods used to obtain research data or information. The data collection technique in this research is the documentation study. This technique requires an instrument as a guide for data collection [13]. The documents in question can be in the form of writing, pictures, or monumental works from someone. The documents used in this study are written documents, namely the lesson plan class X semester I and II Physics of senior high school in Padang City. The data obtained by the documentation data collection technique is the lesson plan.

The procedure in the research is divided into three stages, namely the preparation, implementation and completion stages.

1. Preparation Stage

There are several things that must be done at this stage, including; prepare research-related data, prepare research designs, determine research subjects and objects in the form of lesson plans from schools to be analyzed and prepare research instruments.

2. Implementation Stage

At the implementation stage of data collection is used by analyzing the lesson plan Physics Class X semester I and II based on instruments that have been validated by the validator. Researchers analyzed the lesson plans per material.

3. Completion Stage

After analyzing the RPP, the next stage is the completion stage. There are several things that must be done at this stage, including; processing research data, interpreting research data, drawing conclusions from research, and reporting research results.

After the three stages of the research procedure were carried out, the next step was data processing. The analytical technique used is descriptive qualitative analysis technique from curriculum analysis. To determine the curriculum analysis can be obtained by calculating the scores obtained. The score of each indicator can be obtained by the following equation:

$P = \frac{\Sigma_x}{\Sigma_{xi}} \times 100\%$ [2]

With:

P = Percentage

X = Score obtained from each indicator

Xi = Maximum score of indicators

Table 3. Criteria for Percentage of Achievement for Each Indicator

Percentage (%)	Category
0 - 25	Less
26 - 50	Enough
51 - 75	Good
76 - 100	Very Good

(Source : Ref [2])

III. RESULTS AND DISCUSSION

A. Research result

Based on research that has been carried out in senior high schools throughout the city of Padang, from 33 high schools that have been used as a population and a sample of 5 schools using lesson plan Class X Semester I and II. There are several lesson plan models used, namely emergency lesson plan and K13 lesson plan. The K13 lesson plan will show the learning steps compared to the emergency lesson plan. Emergency lesson plan is lesson plan that is used for learning during the Covid-19 pandemic or for later when conditions are normal. The lesson plan is made by the subject teacher concerned with the experience possessed by the teacher. The lesson plans were taken from SMAN 5 Padang, SMAN 12 Padang and SMAS Adabiah Padang. This lesson plan was taken because the 3 schools used the K13 lesson plan. The results of the K13 lesson plan Document Analysis are as follows:

Table 4. Data Presentation Percentage Average Results of Analysis of lesson plan K13 Documents

No	Material	SMAN 5 Padang	SMAN 12 Padang	SMAS Adabiah Padang	Average
1.	Measurement	65%	46%	49%	53%
2.	Vector	50%	54%	55%	53%
3.	Straight Motion	49%	47%	59%	51%
4.	Parabolic Motion	50%	48%	58%	52%
5.	Circular Motion	54%	53%	64%	57%
6.	Newton's Law	48%	59%	64%	57%
7.	Law of Gravity	61%	56%	63%	60%
8.	Business and Energy	71%	55%	57%	61%
9.	Momentum and Impulse	50%	47%	60%	52%
10.	Simple Harmonic Vibration	48%	56%	59%	54%

Analysis of the lesson plan documents used is the lesson plan from SMAN 5 Padang, SMAN 12 Padang, and SMAS Adabiah Padang. This lesson plan uses K13 model in the first and second semesters. Based on the results of the analysis that has been carried out from 3 schools where the lesson plan is using the K13 lesson plan model. It was found that a high percentage was found in the Simple Harmonic Vibration material. Meanwhile, at a low percentage, the material is Straight Motion.

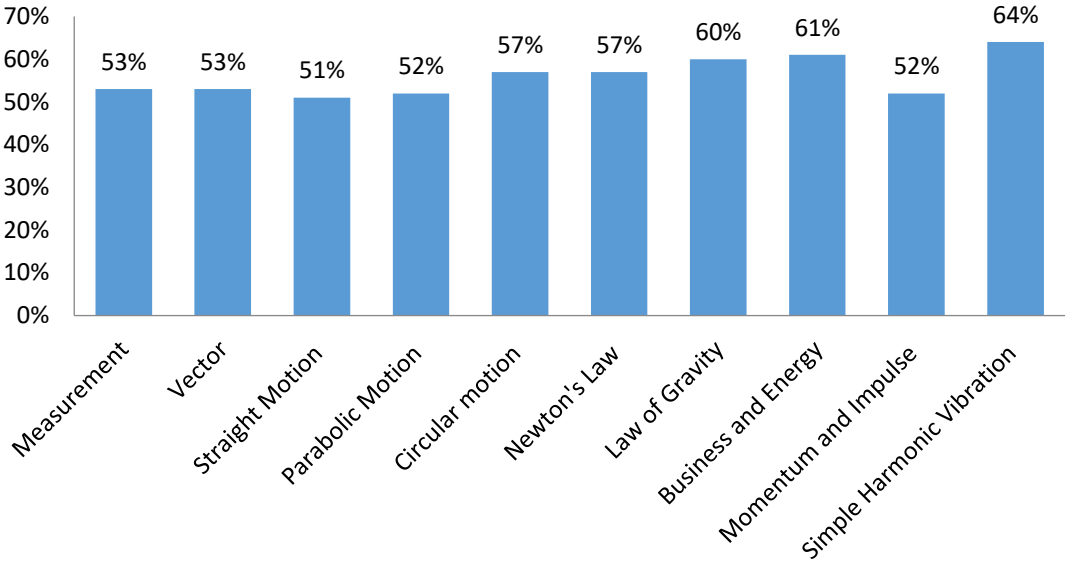

Figure 1. Percentage of Average Results of K13 Lesson Plan Document Analysis.

The graph above illustrates the results of the analysis of the K13 lesson plan document. It can be seen that the average of the Measurement Materials obtained a percentage of 53%. Then the vector material obtained a percentage of 53%. In the Straight Motion material, the percentage is 51%. In the Parabolic Motion material, the percentage is 52%. In Circular Motion, the percentage is 57%. In Newton's Law material obtained a percentage of 57%. In the matter of the Law of Gravity, the percentage is 60%. In the matter of Business and Energy, the percentage is 61%. In the Momentum and Impulse material, the percentage is 52% and in the Simple Harmonic Vibration material, the percentage is 64%.

Seen from the percentage that has been described, a high percentage is obtained, namely from the material of Simple Harmonic Vibration. While the low percentage is from Straight Motion material. Therefore, it was found that the material that will be used as a learning game media is Straight Motion Material. It was concluded with Straight Motion material as a learning game media because the results of the lesson plan analysis that had been carried out got a low percentage.

Schools that use emergency lesson plan are SMAN 3 Padang and SMAS Pertiwi 1 Padang in semester 1. So the material to be analyzed is the material for Measurement, Vector, Straight Motion, Parabolic Motion, and Circular Motion. The results of the analysis of this Emergency Lesson Plan document are as follows:

Table 5. Data Presentation Percentage Average Results Analysis of Emergency Lesson Plan documents.

No	Material	SMAN 3 Padang	SMAS Pertiwi 1 Padang	Average
1.	Measurement	30%	48%	39%
2.	Vector	54%	56%	55%
3.	Straight Motion	30%	47%	38%
4.	Parabolic Motion	32%	55%	43%
5.	Circular Motion	39%	57%	48%

Analysis of the lesson plan documents used is the from SMAN 3 Padang and SMAS Pertiwi 1 Padang. This lesson plan uses an emergency lesson plan model. At SMAN 3 Padang, they used emergency lesson plan in semesters I and II, while at SMAS Pertiwi 1 Padang, they only used emergency lesson plan in semester I. Therefore, the analysis of the emergency lesson plan document was carried out in the first semester. Based on the results of the analysis that was carried out from 2 schools whose lesson plan was in the first semester, it was found that a high percentage was found in vector material. While the low percentage is in the material of Straight Motion. It was concluded that the learning game media to be developed was Straight Motion Material due to the low percentage in the lesson plan.

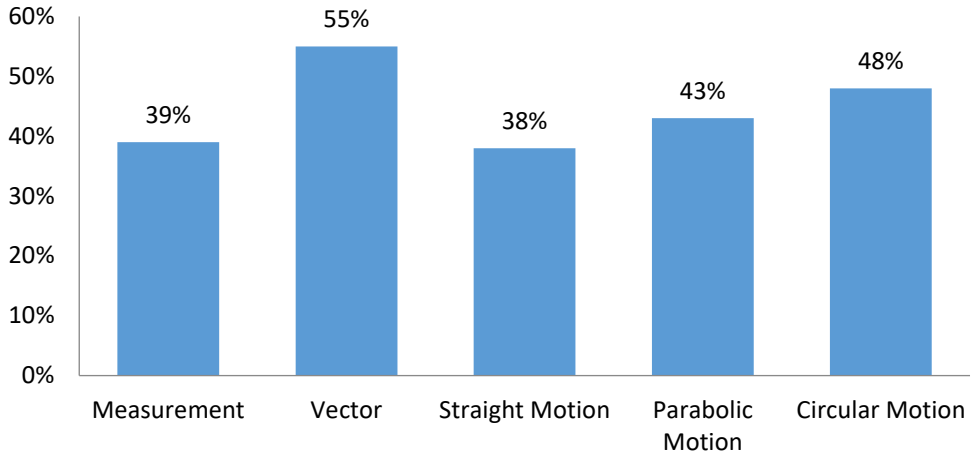

Figure 2. Percentage of Average Results of Emergency Lesson Plan Document Analysis.

Analysis of the lesson plan documents used is the lesson plan from SMAN 3 Padang and SMAS Pertiwi 1 Padang. This RPP uses an emergency lesson plan model. At SMAN 3 Padang, they used emergency lesson plan in semesters I and II, while at SMAS Pertiwi 1 Padang, they only used emergency RPP in semester I. Therefore, the analysis of the emergency lesson plan document was carried out in the first semester. Based on the results of the analysis that was carried out from 2 schools whose lesson plan was in the first semester, it was found that a high percentage was found in vector material. While the low percentage is in the material of Straight Motion. It was concluded that the learning game media to be developed was Straight Motion Material due to the low percentage in the lesson plan.

B. Discussion

In this study, the instrument used was validated by three validators and the average percentage was 87.49% with a very valid instrument category. The category used in measuring the valid level of this instrument is where if the results of the validation are at 61-80% then it is said to be valid and 81-100% is said to be very valid [15]

Curriculum analysis for the need for the development of physics learning games containing scientific literacy aims to find out which subject matter is suitable to be used as physics learning games with scientific literacy. Through analysis with the lesson plan adjusted for the lesson plan component with Permendikbud No.22 of 2016 whose components contain: Name of School, Name of Subject, Class/Semester, Main Material, Time Allocation, Core Competence, Basic Competence, Competency Achievement Indicators, Learning Objectives, Material Learning, Learning Media, Steps of Learning Activities and Assessment.

Based on the data that has been collected, there are several lesson plans that use K13 and emergency. At SMAN 3 Padang, physics teachers use emergency lesson plans. At SMAN 5 Padang, the physics teacher uses K13. At SMAN 12 Padang, the physics teacher uses K13. At SMAS Adabiah Padang, physics teachers use K13. And at SMAS Pertiwi 1 Padang, in semester 1 using emergency and in semester 2 using K13.

This Competency Achievement Indicator uses operational words and in the lesson plan it is appropriate in its use.domain *cognitive* , namely defining, explaining, identifying, distinguishing, operating and forming. The *psychomotor* includes using and describing [16]. In the lesson plans, the learning objectives have been explained by paying attention to the rules of setting goals, as stated by Priyanti [17], one of which is the ABCD concept which explains that in the learning objectives there are A (*audience*), B (*behavior*), C (*condition*), and D (*degree*). Learning materials are written in the form of points in accordance with the formulation of competency achievement indicators. Media are all physical tools that can present a role and stimulate students to learn. Learning resources are references/literature, objects or materials used in the preparation of the syllabus and learning activities in the form of print and electronic media, resource persons, as well as the physical, natural, social, and cultural environment [18]. In the lesson plan Physics Class X, most of the use of learning media and learning resources uses videos from the Internet and teaching materials in the form of books and LKPD. Based on the Standards of the Learning Process in the 2013 Curriculum, namely Learning Activities: a) Introduction is the initial activity in a learning meeting aimed at generating motivation and focusing the attention of students for active participation in the learning process. b) Core activity is the learning process to achieve KD. This activity is carried out systematically through the process of exploration, elaboration, and confirmation. c) Closing activities are activities carried out to end learning activities that can be carried out in the form of summaries or conclusions, assessments, and reflections, feedback, and follow-up. Assessment is carried out using tests and notes in written and oral form,

performance observations, attitude measurement, assessment of work in the form of assignments, projects and products, use of portfolios, self-assessment and educator journal notes [19].

IV. CONCLUSION

Based on the results of the research and discussion, it was concluded that the results of the analysis of the Learning Implementation Plan document for the Class X Physics teacher there were still some that were not suitable both in terms of learning objectives, Basic Competencies and Competency Achievement Indicators. The analysis of the lesson plan document for the Class X Physics teacher with the principle of linkage and integration was in accordance with the indicators on the aspects of the linkage and integration between KI and KD, learning materials, learning activities, assessments and learning resources in the unit of whole learning experience. Then the learning game media that will be developed is from Straight Motion material.

REFERENCES

[1] P. Griffin, E.Care and B. MC Graw. The Changing Role of Education and Scholls. Assessment and teaching of 21st Century Skills, pp 1-15. 2012.

[2] E. Hariadi. Faktor-faktor yang Mempengaruhi Literasi Sains iswa Indonesia Berusia 15 Tahun. Jurnal Pendidikan Dasar. VOL. 10, No. 1, 28-41, 2009.

[3] Supriadi, Leonard, Suhendri H. and Rismurdiyati. The Influence of Learning Media And Interest in Learning. Jurnal Pendidikan Dasar. Vol. 2, No. 1, 71-81. 2015.

[4] Ringan J, Arsyad M, And Nurlina. Improving Stdents' Understanding of Physics Through The Type of Jigsaw Cooperative Learning Model in Clas X SMAN 09 Makassar. Jurnal Pendidikan Fisika Unismuh. Vol. 2, No. 1, 138- 145. 2014.

[5] Fitri, N.R, and Afrizon, R. Meta Analysis Of The Influence Of ICT Based Physics Learning Media On The Learning Outcomes Of Senior High School Students. Pillar of Physics Education. Vol 14, No. 4, pp 274-282. 2022

[6] Walelang A, V. Liliana, dan Budhi, G. S. Game Pembelajaran Fisika Dengan Game Bertipe Adventure Game. *Jurnal Infra*, *3*(2), 346–352. 2015

[7] L.J. Moleong. Metode Penelitian Kualitatif. Bandung: Remaja Rosdakarya. 2009.

[8] Hermawan, D.P Herumurti, And Kuswardayan. The Effectiveness of Using Educational Games of Puzzle, RPG, and Puzzle RPG Types as a means of Learning Physic. Jurnal Ilmiah Teknologi Informasi, Vol 15, No. 2, 195-205, 2017.

[9] Syafrinaldi, S.Y.Sari, Darvina and W.S Dewi. Hots Availability Analysis on Clas XI Semester 1 Physics Student Worksheet in West Sumatera. Pillar of Physics Education, Vol. 13 No.3, 387-394. 2020

[10] M. Alvino, Y. Darvina, W. Satria, And D. Amali. Validity of Problem Solving-Based LKS To Achieve Critical Thinking Skills On Material Rotation Dynamics And Elasticity of SMA/MA Physics. Pillar Phys. Educ., Vol. 13, No. 1, Pp 193-200, 2020.

[11] H.R.Anjani, S.Y. Sari, Y. Darvina, and L.Dwiridal, The Effect of Hots-Oriented Worksheets on Heat and Kinetic Theory of Gases on Students' Critical and Creative Thinking Ability with Guided Iquiry Model in Grade XI SMA AL-Istiqamah Pasaman Barat, Pillar of Physics Education, Vol. 14, No.1, P. 74, 2021.

[12] T.F. Delvia, F. Mufit and M.Bustari. Design and Validity and of Physics Teaching Materials Based on Cognitive Conflict Integrated Virtual Laboratory in Atomic Nucleus. Pillar of Phiyscs Education, Vol14. No 1. P. 4-15, 2020.

[13] H. Yanto And A. Putra, Analysis of Stdent Physics Learning Outcomes Reviewed From His Perception Of Learning On Newton's Legal Material About Motion in Class X high school in Padang City, Pillar of Physics Education , Vol. 13, No,. 1, Pp. 105-112, 2020.

[14] Riduwan. Easy Learnig Research For Teachers, Employees, and Beginner Researcher. Bandung: Alfabeta : 2012.

[15] Tsania, L.S. Penerapan Model Praktikum Higher Order Thinking Laboratory Untuk Meningkatkan Keterampilan Berpikir Kritis Peserta Didik pada Materi Gelombang Bunyi. Journal Metrologia. Vol 5, No. 3, 1-110. 2018

[16] Amri, Sofa. Pengembangan dan Model Pembelajaran Dalam Kurikulum 2013. Jakarta : PT. Prestasi Pustaka Raya. 2013

[17] Vincenius, J., and Putra, A. Design Of Learning Set Based Combination Of Knowledge Dimensions And Thinking Process Level For Physics Learning. Pillar of Physics Education, Vol. 15, No. 2, Pp 114-122, 2022

[18] Wika Nengsih. Analisis Rencana Pelaksanaan Pembelajaran Mata Pelajaran Bahasa Indonesia di Kota Cimahi. Jurnal Ilmiah UPT P2M STKIP Siliwangi. Vol. 2, No. 1, 90-108. 2015.
[19] Amri, Sofa. Pengembangan & Model Pembelajaran Dalam Kurikulum 2013. Jakarta:PT. Prestasi Pustaka Raya. 2014