Development of Student Worksheet through Deep Questions with Physics Comics to Train High Order Thinking Skill in High School Students in Optical Instrument Lup for Maximum Accommodation Eyes

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Development of Student Worksheet through Deep Questions with Physics Comics to Train High Order Thinking Skill in High School Students in Optical Instrument Lup for Maximum Accommodation Eyes

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Abstract. Student Worksheet (LKPD) was developed with comic strips and through integrating deep questions in them. Comic strips were taken from the WHY Science Comics series? LIGHT AND SOUND. Comics Strip are written in LKPD to stimulate and provide information and basic concepts of optical devices to students. LKPD through deep questions approach consists of 4 sub-activities, where each activity contains the main sub-questions. In addition, 4 activities in LKPD are arranged systematically through the most basic sub-questions to the high-level sub-questions. In-depth questions integrated in LKPD provide a stimulus for thinking of students so that they practice high-level thinking skills and gain depth in learning. The systematic learning process using LKPD is proven to promote deep learning and can train students' high-level thinking skills. Physical comics provide basic information about physics concepts and give a good impression to motivate student learning. LKPD is applied to two classes through different discussion models. The result show that student-centered discussion model will be more effective to be applied in learning with LKPD.

Keywords: LKPD; Comic physics; Deep questions; Lup; Maximum accommodation eyes.

1. Introduction

The failure of students in solving problems is caused more by failure in activating relevant knowledge that is already owned, not because they do not have the right knowledge related to the problem [1,2]. Therefore there is a need for direction for students to activate knowledge quickly and accurately when solving physical problems. Learning physics has a good meaning if the physical concept is studied in depth. Physics learning more often applies a mathematical mindset rather than a deep concept, this brings the atmosphere of learning physics which leads to the rote nature of the formula, so that the high level conceptual and thinking abilities of students are less trained [3,4]. School institutions are important to equip students with their thinking skills, such as critical thinking, decision making, and problem solving, as well as the development of higher-order thinking skills (HOTS) [5,6].

The level of scientific reasoning in physics for the population of high school students is at a fairly low level of reasoning [7]. The study of teacher skills from aspects of the level of knowledge and practice of assessment aspects of HOTS teachers shows the weakest aspects [8]. In promoting HOTS learning, teachers can forge their teaching skills to get used to HOTS learning that is best suited to the character of students. Students often avoid difficult questions posed by the teacher. Though deep

questions can facilitate HOTS [3,9]. Deep questions are developed on basic questions (factual and procedural), which includes the nature of teaching and raises "astonishment" (understanding, predicting, detecting anomalies, applications, and planning) that trains their HOTS [3,10,11,12,13].

Physics is a branch of the study of physical phenomena. Physics is a branch of science regarding understanding concepts and their application in problem solving. To achieve this goal conceptual change is needed by modifying the learner's initial knowledge to match the actual scientific knowledge [14,15]. In general, when entering the class, students have the wrong knowledge that is built by themselves as a result of interaction with nature [37]. Some of them know the physical phenomena around them with wrong assumptions. For example, some students when see the Archimedes phenomena, they assume that objects with high mass will sink, while low mass objects will float. Conceptual change requires learning that allows students to develop new concepts and improve previous ways of thinking [16,17,18]. Therefore, a means is needed to facilitate students to store knowledge in depth for a long period of time so that knowledge can be activated when needed.

Physics learning is often associated with many mathematical formulas. Learning physics that can create fun learning will have a good impact on increasing the interest of students. Comic or manga is a popular reading among teenagers, besides that among students in Asia, some students are addicted to comics [19]. The Author glance at comics to be poured into the learning process. It would be very interesting if a physics comic was integrated in learning. Some studies reveal that, comics have advantages when applied in learning. The appearance of comics in the classroom gives students room to enjoy science because it brings students to scientific concepts and values [20]. The research conducted [21] gained an impression that, most students were helped to learn Newton's Law through the comic stip by simplifying the concepts of science and pictures. In addition, cartons or comics can be used to simplify difficult concepts and make them entertaining [22]. Evidence has shown that comic participation can help students learn. Therefore, the writer adapts a comic strip that will be poured in the creation of student worksheets (LKPD).

This study aims to develop products in the form of LKPD integrated physics comics through a deep questions approach to train high-level thinking skills (HOTS) of high school students (Senior High School). This study also explains how LKPD is applied in learning to train HOTS. The Student Worksheet (LKPD) was developed by pouring comic strips and integrating deep questions in them. Comic strips are taken from the series "WHY Science Comics? LIGHT AND SOUND "The work of Yoo, Geon-Ho (Supervised), Cho, Yeong-Seon (Written), and Lee, Young-Ho (Cartooned) which was first published in 2008 in the Republic of Korea. Comic strips are taken in the series "Reflection and Refraction", and "Concave Lenses and Convex Lenses". Strip comics are written in LKPD to stimulate and provide basic information on the concept of optical lup tools to students regarding physical phenomena

The rest of this paper is organized as follow: Section 2 describes the proposed research method. Section 3 presents the obtained results and following by discussion. Finally Section 4 concludes this work.

2. Research Method

This research is a development research. The learning device developed in this research is HOTS oriented LKPD for X11 class high school students with a Plomp development model consisting of three stages: olive preliminary research, prototyping stage (development stage), assassment phase (assessment phase). The product developed in the form of LKPD is arranged with a deep questions approach and integrates physics comics in it.

The application of LKPD was carried out on two classes of Natural Sciences majoring in high school which was held for 1 meeting (2 × 45 minutes). The two classes are used as a comparison to see the effectiveness of teaching models that are more suitable to be applied. In general, the learning process in the two classes is the same. The comparison focuses on the discussion model applied. Class A will get learning with LKPD through a semi-discussion process where teachers often open questions widely to students, while students only respond to teacher questions. Furthermore, class B will get

learning with LKPD through the full discussion process of students where students are more involved to be more active in presenting and interacting with questions and answers in class.

The validation process and product quality is done by looking at the score on the assessment sheet. Validity test is carried out on material experts. Each item on the assessment sheet uses a score in the range 1-4. Score analysis is carried out through the process of calculating the validity of material experts.

The learning process is carried out by group discussion and class discussion. Learning consists of opening (containing apperception and motivation), core activities (containing 5M learning; observing, asking, starting, associating, and communicating), and closing (concluding). LKPD plays a role in the core activities process. In the 5M process, LKPD facilitates students in observing, trying, associating comic readings and in-depth questions. While the process of asking and communicating appears in the process of group discussion and class discussion .. The role of the teacher is as a facilitator, facilitates the discussion process, and oversees learning so that there is no misconception.

2.1 Student Worksheet (LKPD)

LKPD are one of the learning resources and learning media that can be developed in learning activities according to the conditions of students and schools. LKPD can be applied with learning media or other learning resources. The author designs a LKPD that is collaborated with the media and teaching approaches. Media integrated in LKPD in the form of physics strip comics. Comic media is poured as teaching material that provides basic information about the topic being taught. Furthermore, a deep questions approach is applied to the questions in the LKPD. Although deep questions are generally applied to interview techniques when a person wants to find in-depth information on a particular source. However, the author tries to pour the deep questions approach in the form of writing that is applied in LKPD questions. This deep questions approach is applied to lead students to obtain learning depth, and train students to think systematically through structured questions that have been made.

Piaget stated that the theory of knowledge is a theory of mind adaptation into a reality. The process of someone to get knowledge is called assimilation, accommodation, and equilibrium [38,23]. Assimilation is a cognitive process by which a person interprets new perceptions, concepts, or experiences into a scheme or pattern that is in his mind. Accommodation is a condition where new experiences do not fit into existing schemes so that someone forms a new scheme that can match new stimuli. Piaget's system of thought requires a child to be active in his environment so that he can assimilate and accommodate, so that the learning process results in a continuous process of concept change [38,24].

2.2 HOTS

HOTS is a pattern at a higher level of cognitive level. The more accepted cognitive realm is Taksnomi Bloom. HOTS covers the realm of cognitive skills processing including the ability to analyze (C4), evaluate (C5) and create (C5) from the revised Bloom Taxonomy [25,26,27,35,39]. Deep learning can be done with the introduction of general concepts and bring to a more specific concept, and qualitative learning [3]. As an effort to stimulate students' thinking to train HOTS in deep learning, it can be done by free and structured interviews. Free forms of interview can be adapted into written form in the form of structured questions. So that structured interviews can be contained in an in-depth question in the LKPD problem. The use of conceptual questions can help learners learn to verify the concepts they understand [28,10]. Questions have been prepared and the order has been arranged so as to facilitate practice, the advantage is that researchers can systematically ask and extract students' thoughts [29,10,40].

2.3 Deep Questions

The author sees a question as a basis for building LKPD. Deep Questions which are integrated in LKPD will provide a stimulus for students' thinking so that they gain depth in learning. Giving deep questions can play a role in influencing profound answers [30]. Learning in an effort to try to dig up

information from memory through in-depth questions which means that it will enhance deeper learning [31]. A profound question can be prepared by introducing the concept of "key" which is accompanied by an analogy to the explanation that will make learning facilities good [3,12,32].

2.4 Physics Comic

Comics is one of the most popular reading books for teenagers. Comics are composed using immovable images that form the fabric of the story and have a strong appeal to provoke interest in reading [33,34]. This impression can be used by teachers to use comics as teaching media. Comic books visually and verbally can generate many perspectives from the reader's mind, suspecting the beginning and end of the story line, encountering climax moments, and feeling the complexity of complicated stories. So that comic is suitable as an additional learning media, even the main learning media that can be used to introduce physical concepts.

3. Result and Discussion

The Student Worksheet through the deep questions approach consists of 4 sub-activities. Each activity contains the main sub questions. In addition, 4 activities in LKPD are arranged systematically through sub-questions. questions asked from the bottom up to the high-level sub-questions. It is intended that the learning process through 5M (observe, ask, try, associate, and communicate) and be carried out well, and direct coherent learning so that the material can be digested easily by students. Table 1 explains how deep questions are applied in the LKPD as a means to promote and provide training for students to develop HOTS.

Table 1. LKPD Deep Questions Development Grid

Activity	Question Number	Treatment Questions- Indicator	Cognitive Level
I	1	Mention	C1
	2	Realize	C1
	3	Identifying	C1
	4	Identifying	C1
	5	Browsing	C1
	6	Browsing	C1
	7	Mention	C1
II	1	Explaining	C2
	2	Assume	C2
	3	Predicting	C2
	4	Classifying	C2
	5	Describing	C2
	6	Sort	C3
	7	Adapting	C3
III	1	Evaluating	C3
	2	Adapting	C3
	3	Verifying	C4
	4	Solving	C4
	5	Solving	C4
	6	Solving	C4
IV	1	Detect	C4
	2	Affirmating	C4
	3	Conclude	C5
	4	Selecting	C5
	5	Connecting	C6

Activity I focuses on finding loops characteristics that contain characteristics, properties, lens type and loop function. Activity II students are directed to recognize physical symptoms in the loop (for example: enlargement of shadows, focal points, distance of objects /shadow, virtual / real and upright / upside down). Activity II students begin to focus on analyzing the nature of the shadow produced by the loop. In this process, a problem is given about the process of forming a lup shadow in a different position in terms of the object placed at the focal point and the radius of the lesnsa curvature, and between the two. Activity IV is the final process in the LKPD, in this process students focus on the mathematical equation of the magnification of the angular lup for the eyes with maximum domination and will get the conclusion of learning. In the final process, a mathematical problem is given about the magnification of angular eyes for maximum accommodation so that students can fully represent previously acquired information to solve mathematical problems.

The Author integrate deep questions (deep questions) in LKPD to help students train their HOTS. Following is the insertion of activities in the LKPD:

a. Activity I: Characteristics of Lup
b. Activity II: Physics Concept in Lup
c. Activity III: Shadows produced in Lup
d. Activity IV: Mathematical Equation of Angular Lup Magnification for Maximum Accommodation Eyes

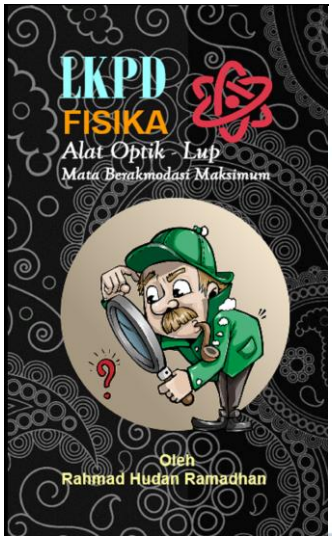
LKPD is tested for validity by experts before learning process to find out which products are feasible. Score analysis is done through the calculation process of equation 1 expert validity test material (Va) product valuation by dividing the number of empirical scores (TSe) divided by the total score (TSh) [41]:

Table 2. Validity Criteria [41]

Validity Criteria (%)	Validity Level
81,26 - 100,00	Very valid
62,51 - 81,25	Valid
43,76 - 62,50	Invalid
25,00 - 43,73	Very invalid

$$\overline{Va} = \frac{TSe}{TSh} \times 100\% = \frac{73}{80} \times 100\% = 91,25\,\%$$

Furthermore, the value of the validity test calculation is then compared with the validity criteria in Table 2. The value of the validity test is 91, 25%. In accordance with the validity criteria in Table 2, it can be concluded that the LKPD products developed (see Figure 1) are very valid and can be used in the learning process.



(a)

ALAT OPTIK - LUP

A. Kompetensi Dasar

3.11 Menganalisis cara kerja alat optik menggunakan sifat pemantulan dan pembiasan cahaya oleh cermin dan lensa

B. Indikator

3.11.1Menelaah fungsi lup

3.11.2Menganalisis sifat bayangan yang dihasilkan lup

3.11.3Mengidentifikasi persamaan perbesaran anguler lup pada mata berakomodasi maksimum

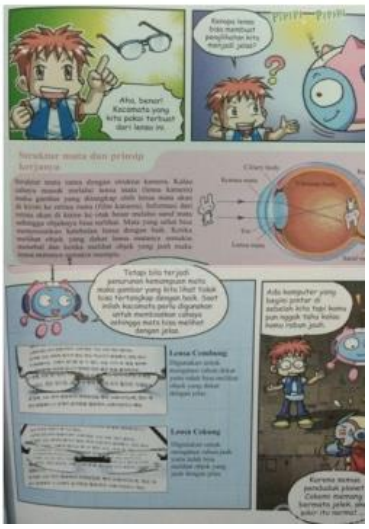
3.11.4Merumuskan perbesaran anguler lup pada mata berakomodasi maksimum

C. Petunuk Pengerjaan

1. Buatlah kelompok beranggotakan 4 orang
2. LKPD terdiri dari **komik 1**, **komik 2**, dan **Ringkasan Materi**
3. Diskusikan permasalahan **Aktivitas I, Aktivitas II, Aktivitas III dan Aktivitas IV** melalui peristiwa yang terdapat pada **komik 1, komik 2, dan ringkasan materi** secara berkelompok. (waktu: 45 menit)
4. Jawablah pertanyaan pada aktivitas dengan **singkat dan tepat** sesuai perintah soal.
5. Kerjakan aktivitas I, II, III, dan IV secara **berurutan**

(b)

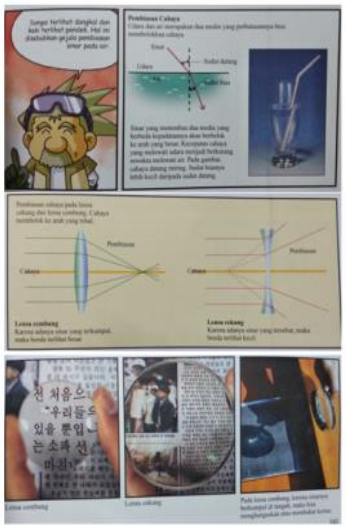
(c)



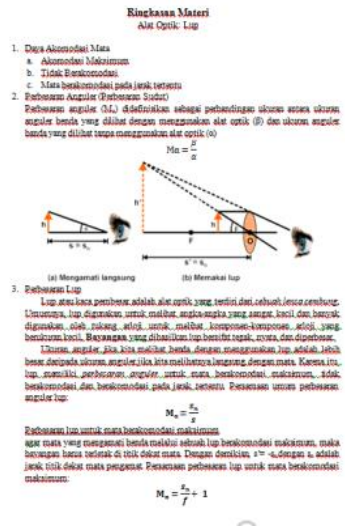
(d)

(e)

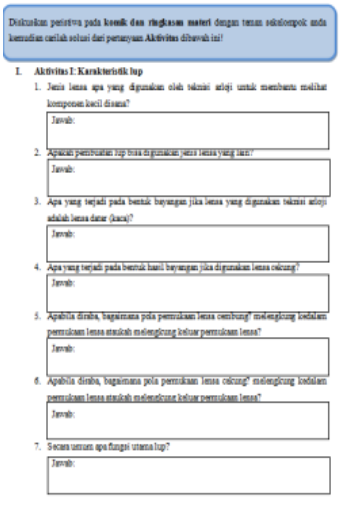
(f)



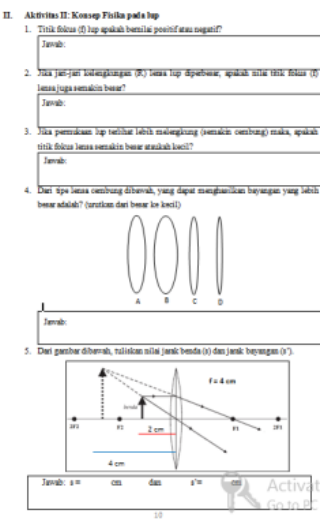
(g)


Ringkasan Materi
Alat Optik: Lup
1. Daya Akomodasi Mata
a. Akomodasi Maksimum
b. Tidak Berakomodasi
c. Mata berakomodasi pada jarak tertentu
2. Perbesaran Anguler (Perbesaran Sudut)
3. Perbesaran Lup

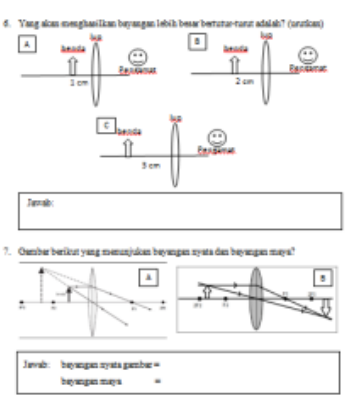
(h)


Diskusikan peristiwa pada konsik dan ringkasan materi dengan teman sekelompok anda kemudian carilah solusi dari pertanyaan Aktivitas dibawah ini!
I. Aktivitas I: Karakteristik lup
1. Jenis lensa apa yang digunakan oleh teknisi arloji untuk membantu melihat komponen kecil disana?
Jawab:
2. Apakah pembuatan lup bisa digunakan jenis lensa yang lain?
Jawab:
3. Apa yang terjadi pada bentuk bayangan jika lensa yang digunakan teknisi arloji adalah lensa datar (kaca)?
Jawab:
4. Apa yang terjadi pada bentuk hasil bayangan jika digunakan lensa cekung?
Jawab:
5. Apabila diraba, bagaimana pola permukaan lensa cembung? melengkung kedalam permukaan lensa sentuh melengkung keluar permukaan lensa?
Jawab:
6. Apabila diraba, bagaimana pola permukaan lensa cekung? melengkung kedalam permukaan lensa sentuh melengkung keluar permukaan lensa?
Jawab:
7. Secara umum apa fungsi utama lup?
Jawab:

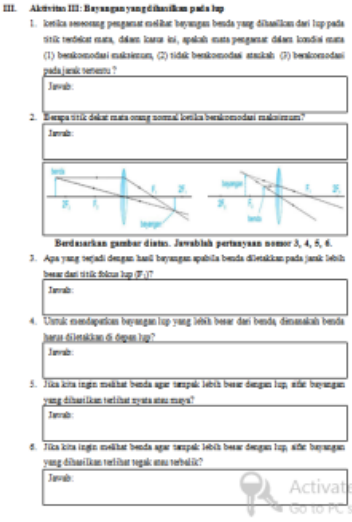
(i)


II. Aktivitas II: Konsep Fisika pada lup
1. Titik fokus (f) lup apakah bernilai positif atau negatif?
Jawab:
2. Jika jari-jari kelengkungan (R) lensa lup diperbesar, apakah jarak titik fokus (f) lensa juga semakin besar?
Jawab:
3. Jika permukaan lup terlihat lebih melengkung (semakin cembung) maka, apakah titik fokus lensa semakin besar atau kah kecil?
Jawab:
4. Dari tipe lensa cembung dibawah, yang dapat menghasilkan bayangan yang lebih besar adalah? (urutkan dari besar ke kecil)
A B C D
Jawab:
5. Dari gambar dibawah, tuliskan nilai jarak benda (s) dan jarak bayangan (s').
f = 4 cm
2 cm
4 cm
Jawab: s = cm dan s' = cm

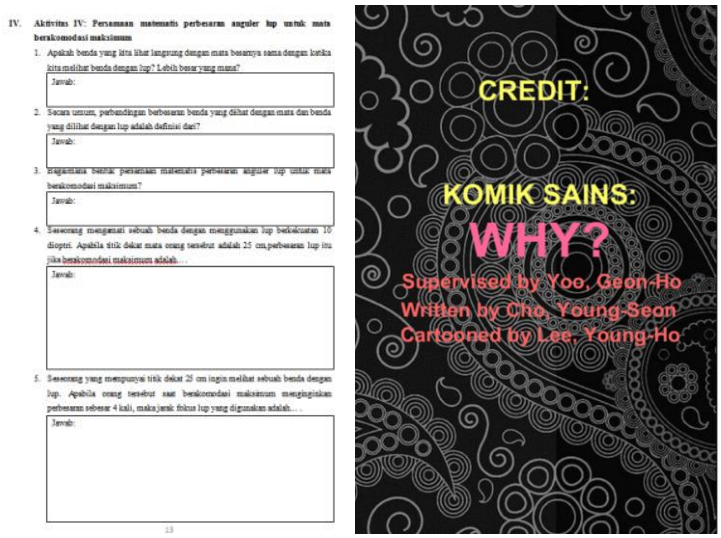
(j)


6. Yang akan menghasilkan bayangan lebih besar berturut-turut adalah? (urutkan)
A
benda
lup
Pengamat
1 cm
B
benda
lup
Pengamat
2 cm
C
benda
lup
Pengamat
3 cm
Jawab:
7. Gambar berikut yang menunjukan bayangan nyata dan bayangan maya?
A
B
Jawab: bayangan nyata gambar =
bayangan maya =

(k)


III. Aktivitas III: Bayangan yang dihasilkan pada lup
1. Ketika seseorang pengamat melihat bayangan benda yang dihasilkan dari lup pada titik terdekat mata, dalam kasus ini, apakah mata pengamat dalam kondisi mata (1) berakomodasi maksimum, (2) tidak berakomodasi sama kah (3) berakomodasi pada jarak tertentu ?
Jawab:
2. Berapa titik dekat mata orang normal ketika berakomodasi maksimum?
Jawab:
Berdasarkan gambar diatas. Jawablah pertanyaan nomor 3, 4, 5, 6.
3. Apa yang terjadi dengan hasil bayangan apabila benda diletakkan pada jarak lebih besar dari titik fokus lup (F ;)?
Jawab:
4. Untuk mendapatkan bayangan lup yang lebih besar dari benda, dimanakah benda harus diletakkan di depan lup?
Jawab:
5. Jika kita ingin melihat benda agar tampak lebih besar dengan lup, sifat bayangan yang dihasilkan terlihat nyata atau maya?
Jawab:
6. Jika kita ingin melihat benda agar tampak lebih besar dengan lup, sifat bayangan yang dihasilkan terlihat tegak atau terbalik?
Jawab:

(l)



(m) (n)

Figure 1. LKPD Development Products

3.1. LKPD Learning to Train HOTS

The learning process is carried out by group discussion and class discussion. Learning consists of opening (containing apperception and motivation), core activities (containing 5M learning; observing, asking, starting, associating, and communicating), and closing (concluding). LKPD plays a role in the core activities process. In the 5M process, LKPD facilitates students in observing, trying, associating comic readings and in-depth questions. While the questioning and communicating process appears in the process of group discussion and class discussion. In more detail, the learning process is carried out with LKPD work during 1JP, and continued with the discussion process in the next 1JP. The role of the teacher is as a facilitator, facilitates the process of discussion, and oversees learning so there is no misconception.

Problem solving activities raise more broad questions. The developer sees a question as a basis for building LKPD. In-depth questions integrated in LKPD will provide a stimulus for students' thinking so as to gain depth in learning. LKPD consists of 4 activities which are systematically structured and structured based on the level of simple thinking to high level thinking. So, learning with LKPD must be done in a coherent manner, meaning that every activity must be done sequentially, starting from activities 1, II, III, and IV. as shown in Figure 2 below:

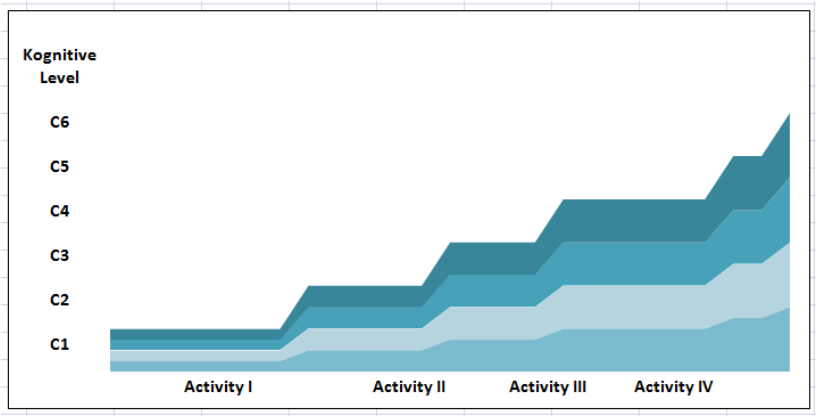


Figure 2. Stimulus Deep-Questions Pattern to Train HOTS

Deep Questions provides facilities to train HOTS through coherent questions. LKPD activities are developed through stages of cognitive level 1 to the cognitive level of HOTS. Figure 2 shows deep questions gradations that facilitate students to train HOTS.

Activity I is a simple thinking activity. In this activity the question focuses on finding the characteristics of the loop that contains the characteristics, properties, type of lens and use of loop. Activity I consists of 7 questions given to test students' thinking skills about physical loops. Basically, any object will be easy to learn if we know the characteristics, properties, and basic ingredients of its manufacture. Thus, students will be helped by an understanding of the characteristics of loops to learn the full loop in subsequent activities.

Activity II consists of 7 questions, students are directed to recognize physical symptoms in the loop (for example: enlargement of shadows, focal points, distance of objects / shadow, virtual / real and upright / upside down). In activity II, students have recognized the characteristics of lup, so learning is improved to analyze the physical concepts that are in it. This process will bring students to think a little higher than before. They will construct the previous information and analyze the physical phenomena in it. In addition, the questions in activity 2 have a higher problem of thinking by linking concept 1 with and others (for example: the relationship between the focus point and the radius of the lens curvature); analyze and sort the lens thickness relationship with the lens focal point (for example: a lens that means more is to have a smaller focal point, and so on); analyze-predict-sort the large shapes of shadows produced by lups at different distances; and write the distance of the shadow-distance object from the resulting image. So in activity II, students already have a handle on physical concepts related to learning optical devices.

Activity III consists of 6 questions, students begin to focus on analyzing the shadow properties generated by the loop. In this process, a problem is given about the process of forming a lup shadow in a different position in terms of the object placed at the focal point and the radius of the lens curvature, and between the two. Through previous activities, students have been equipped with physical conceptions of optical devices. In activity III, students are deployed in a higher analysis of problems to be able to recognize the process of forming a shadow for maximum eyes. Problems are provided that require students to try, link facts to concepts, and process information from previous material to find the results of shadows produced by maximum accommodating eye shots.

Activity IV is the final process in the LKPD which consists of 5 questions, in this process students focus on the mathematical equation of the magnification of the angular lup for the eyes with maximum domination and will get the conclusion of learning. In the final process, a mathematical problem is given about the magnification of angular eyes for maximum accommodation so that students can fully represent previously acquired information to solve mathematical problems.

3.2. Student Learning Outcomes Use LKPD

The effectiveness of integrated LPPD physics comics through deep questions approach in terms of the achievement of learning outcomes of students according to the Minimum Completeness Criteria (KKM). The analysis of LKPD scores is done by calculating the correct points divided by the maximum number of LKPD points. Where the maximum number of LKPD points is 29. Here are the LKPD learning outcomes of students in class A and class B.

Tables 3 and 4 explain that in class B learning the value of the group of students is better than learning in class A. In class B learning, the teacher applies the discussion process after the LKPD work process is completed by the group. Where the LKPD process is carried out and the discussion process is carried out for 1 lesson time (45 minutes). Class B discussion process where the discussion process is more left to students shows a better process. With the class discussion model all around, developers find advantages that are more in terms of depth and effectiveness of learning. Teachers must maximize the role of each group to contribute to class discussions. So that all students can participate in the learning process well.

Table 3. Learning Outcomes of LKPD Students in Class A (max points = 29)

Group	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Correct Score	26	24	26	26	25	27	26	26	14
Score	**89.7**	**82.8**	**89.7**	**89.7**	**86.2**	**93.1**	**89.7**	**89.7**	**48.3**
The Highest Score	**93.1**								
Lowest Score	**48.3**								
Average	**84.3**								

Table 4. Learning Outcomes of LKPD Students in Class B (max points = 29)

Group	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Correct Score	26	24	26	26	25	27	26	26
Score	**89.7**	**93.1**	**89.7**	**89.7**	**86.2**	**93.1**	**93.1**	**89.7**
The Highest Score	**93.1**							
Lowest Score	**89.7**							
Average	**90.5**							

It is seen that the group's value in working on LKPD looks very good. This is evident from the average score of the LKPD score of 84,3 and 90.5. Overall, groups can solve problems from questions in LKPD. The deep question approach applied in LKPD is structured to hone students' high-level thinking skills.

3.3. Discussion

The systematic learning process using LKPD is proven to promote deep learning and can train students' high-level thinking skills. Physical comics provide basic information on physics concepts and give a good impression to motivate student learning. Deep questions positively impact students in training HOTS. Deep questions provide treatment for conceptual thinking. This treatment has an impact on the growth of students' mindset to become more active so as to bring students to gain learning depth. This learning depth is achieved through a series of deep deep treatment questions that provide a coherent and systematic learning pattern. In the end a combination of comics with deep questions has a good effect on training their HOTS. This is in line with [3] [30] that giving deep questions can play a role in influencing deep answers. In addition, learning in business tries to explore information from memory through deep questions which means that it will increase deeper learning to train their HOTS [10] [11] [35] [36]. Subsequent research, the development of deep questions can be stated in learning through student worksheets or media and learning resources.

The next step can be done by adding comic strips that are more relevant and complete with teaching materials. In-depth questions can be applied in the learning process that is integrated in teaching models, teaching media, or teaching materials. It would be better to use deep questions and apply them to technology, for example in learning smartphones or online learning. The model of making use of LKPD must continue to be developed and more participants strive to conduct group discussions and class discussions. In addition, the teacher must be bolder for everyone and more in the learning process, such as communicating results, debating/arguing/opinion, and the process of drawing conclusions.

4. Conclusion

The LKPD development has been carried out by integrating physics comics and applying deep questions. The LKPD consists of 4 activities which are systematically and structured based on the level of simple thinking to high level thinking. In-depth questions integrated in LKPD provide a stimulus for thinking of students so that they practice high-level thinking skills and gain depth in learning. The LKPD is proven to be valid and feasible to be used in the learning process. This is evidenced by an expert validity test that gives a good value presentation. The LPKD learning process is carried out by group discussion and class discussion. The learning process is carried out with LKPD work for 1 hour, and continued with the discussion process for the next 1 hour. The role of the teacher is as a facilitator, facilitates the process of discussion, and oversees learning so that there is no misconception, and more courageously involves all students to actively participate in discussion activities. LKPD is proven to be able to be used and understood well by students. The discussion model that involves more students in it will be more effective to be applied in learning with LKPD.

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