e-ISSN: 2986-8076
DOI: 10.57254/tess.v1i2.16

International Journal of Geometry and Applied Mathematics
TESSERACT
Vol. 1, No. 2, July 2023 hal. 78-89
Journal Page is available at http://ekalaya.nindikayla.com/index.php/home

DESIGN OF GEOMETRY OPTICAL TRAINERS FOR HIGH SCHOOL PHYSICS LEARNING (CONCEPTS OF HABITUATION, REFRACTIVE INDEX, CRITICAL ANGLE AND PERFECT REFLECTION)

Aisyah Fatoni[1]
[1]Universitas Negeri Jakarta, Indonesia
Email: aisyahfatoni@gmail.com

Abstract

This study aims to design and produce learning media in the form of geometric optical props that can show refraction events, critical angles and perfect reflection. This geometry optical instrument trainer can be used to calculate the magnitude of the refractive index between two mediums, while the mediums that can be used are liquid-air and liquid-liquid mediums. The method used in this study is the development research method, where the first step in this research is to conduct a needs analysis regarding the design of teaching aids to be made. This needs analysis involved 7 physics teachers and 111 grade XI science students from SMAN 3 Pandeglang, SMAN 3 Pandeglang and SMAN 10 Pandeglang. The results of this needs analysis obtained data that all students and teachers supported the design of this geometric optical trainer. Based on the needs analysis, then the design and manufacture of physics learning media in the form of geometry optical props were carried out followed by testing geometry optical props. This trial phase involved 7 expert lecturers, 11 physics teachers and 80 students of class XI high school science. The indicators measured in this study are design, concept suitability, content suitability and interactive. The design and testing stage of this teaching aid obtained a percentage achievement above 75%, meaning that the media is well designed. The results of this study generally show that geometric optical props can be accepted and used as a physics learning medium that can explain the concepts of refraction, refractive index, critical angle and perfect reflection.
Keywords: planning, props, geometry, physics learning

INTRODUCTION

Learning is the development of new knowledge, skills or attitudes as individuals interact with information and the environment. Learning is also a complex process and involves various interrelated aspects. Therefore, to create creative and fun learning requires several skills (Moh. Uzer, 2002:69). The learning process is essentially to develop student creativity through various interactions and introductions to learning and provide ease of learning. Through the learning process, it is hoped that messages or information can be absorbed by students. A professional teacher is expected to be able to choose or design his own learning media that can be used as teaching aids, especially in the Physics learning process.

Learning media is an integral part of the learning process in schools. Learning media provide opportunities for students to obtain more concrete learning experiences. One of the learning media that can be used in physics learning is teaching aids. Briggs quoted by Hamalik (1989: 23) emphasizes the importance of media as a tool to stimulate the teaching-learning process.

Teaching aids are one of the learning media. In the teaching process, teaching aids or educational aids or *audio-visual aids are needed*. Teaching aids are also called educational media or *teaching material,* namely tools, methods, and techniques used

e-ISSN: 2986-8076
DOI: 10.57254/tess.v1i2.16

in order to streamline communication and interaction between teachers and students in the process of education and teaching in schools (Hamalik, 1997: 23).

Optics geometry studies that light propagates straight and studies the laws of reflection and refraction of light. Refraction (refraction) of the change in direction experienced by the wavefront when passing obliquely from one medium to another. At the time of refraction, a change in the propagation rate occurs. This phenomenon occurs in all types of waves but the most common is in light waves.

For geometric optical props in schools, parallel plan glass is generally used. It is used to show refraction and calculate the refractive index of air and parallel plan glass, but critical angles and perfect reflection are difficult to demonstrate. Not all schools studied have adequate props to measure refraction, refractive index, critical angle and perfect reflection. So that physics teaching aids, especially for the concepts of refraction, refractive index, critical angle, and reflection are not involved in the Physics learning process.

The focus of this research is on the design of geometric optical trainers to explain the concepts of refraction, refractive index, critical angle and perfect reflection in Senior High School (SMA). Based on the results of initial observations, the procurement of geometry props is needed, this is evidenced by initial observations made in three schools, including SMA at SMAN 3 Pandeglang, SMAN 4 Pandeglang and SMAN 10 Pandeglang. The results of the initial study showed that 80.1% of students did not understand refraction, 87.3% did not understand the refractive index, 95.4% did not understand the critical angle and more than 70% did not understand perfect reflection for reasons that were too abstract, the way the teacher delivered was unclear and did not use the right media in this case teaching aids. More than 90% of students are interested and understand the concepts discussed using teaching aids, be it demonstrations or experiments. The limited media of geometric optical props used is thought to be one of the causes of students' weakness in mastering geometric optical material.

METHOD

The research method used is development research. Development research is a process or steps to develop a new product or develop an existing one, which can be accounted for (Nan Syaodiah Sukmadinata, 2005: 169).

The assessment scale used in each questionnaire to test light reflection props consists of four categories that have been arranged by researchers based on score interpretation criteria for the Likert scale (Sukardi, 2003: 146-147), namely:

Score 4 :Excellent
Score 3 :Good
Score 2 :Less
Score 1 :Bad

Table 2 Validation test instrument grid for expert lecturers.

Indicators	Assessed aspects	Item number
Content suitability	• The prop is able to show the direction of light refraction	1
	• Using these props can calculate the magnitude of the refractive index.	2
	• Able to show critical angles	3
	• Able to show perfect reflection	4

e-ISSN: 2986-8076
DOI: 10.57254/tess.v1i2.16

	• This prop can be used on liquid-air and liquid-liquid mediums.	5
Concept compatibility	• Understanding the concept is easier.	6
	• Conveying concepts is easier.	7
	• No misconceptions occurred.	8
Design	• Media is more interesting for students.	9
	• The prop shows the events of perfect refraction and reflection between two mediums in real time	10
	• Using media is easier.	11
Interactive	• Students can show the magnitude of the refractive index.	12

Table 3 Test instrument grid for teachers

Indicators	Assessed aspects	Item number
Content suitability	• The props are able to show the direction of refraction.	1
	• Using these props can calculate the magnitude of the refractive index.	2
	• Able to show critical angles	3
	• This trainer can be used on liquid-air and liquid-liquid mediums	4
Concept compatibility	• Understanding the concept is easier.	5
	• Conveying concepts is easier.	6
	• No misconceptions occurred.	7
Design	• Media is more interesting for students.	8
	• The props show the perfect reflection event in real time.	9
	• Using media is easier.	10
Interactive	• Media motivates students to be more active.	11
	• Students can exhibit a medium refractive index.	12

Table 4 Test instrument grid for students

Indicators	Assessed aspects	Item number
Content suitability	• The prop is able to show the direction of refraction	1
	• Using these props can calculate the magnitude of the refractive index.	2
	• Able to show critical angles	3
	• This trainer can be used on liquid-air and liquid-liquid mediums	4
Concept compatibility	• Understanding the concept is easier.	5
Design	• The props are more interesting.	6

e-ISSN: 2986-8076
DOI: 10.57254/tess.v1i2.16

	• The props show the events of light refraction and perfect reflection in real time.	7
	• Using props is easier.	8
Interactive	• Students can calculate the magnitude of the refractive index.	9

Score interpretation is calculated based on the acquisition score of each item,

$$\% \text{ interpretation score} = \frac{\sum skor\ perolehan}{\sum skor\ maksimum} x\,100\%$$

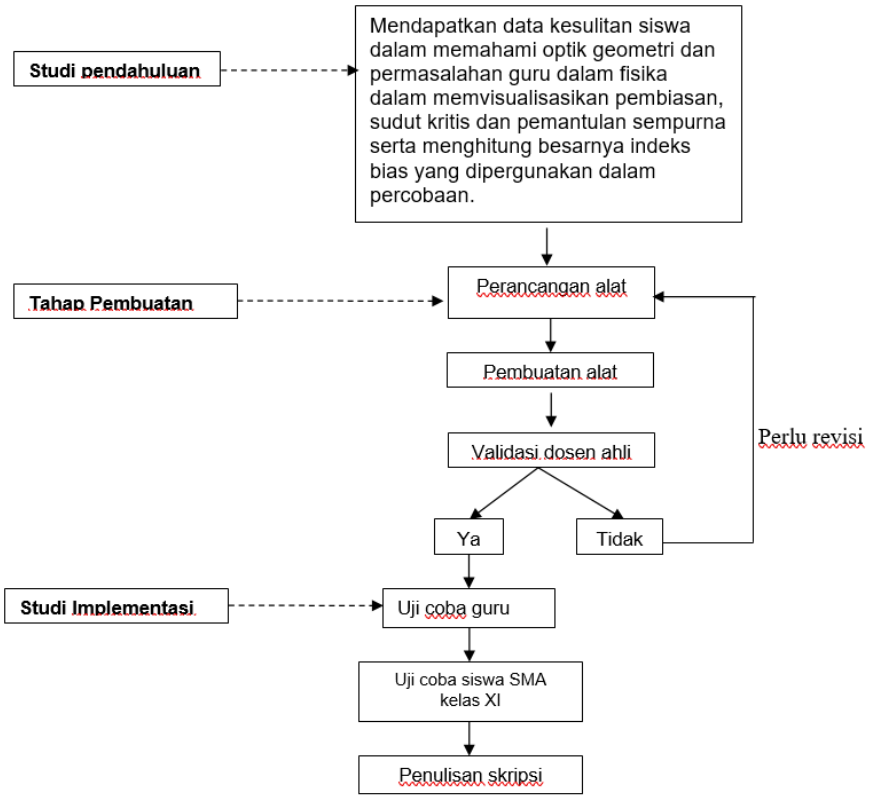

Figure (3) Research Design Design of Geometric Optical Trainers

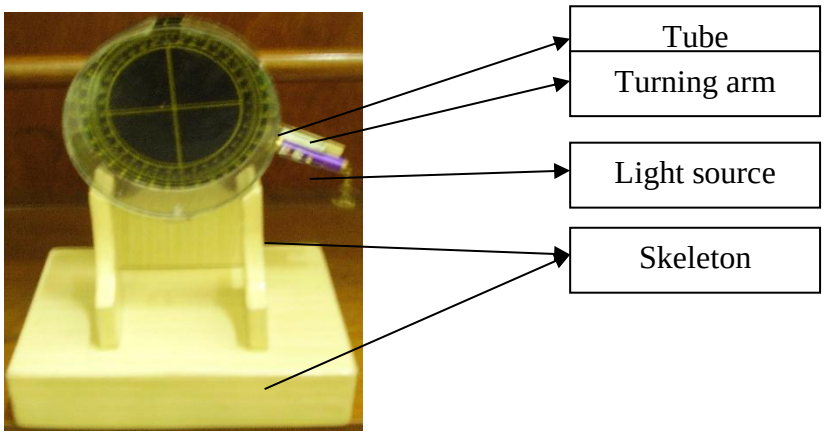

Figure 4. Design of geometric optical trainers

From the design above, it can:

1. Shows light refraction events
2. Shows light events that form critical angles

3. Shows the event of perfect reflection of light
4. Can be done to replace the desired medium.
5. The rotating arm can be rotated 360o so as to explain the concepts of refraction, refractive index, critical angle and perfect reflection from a tighter medium to a less dense medium and vice versa
6. Can calculate the refractive index of the medium used (n1 sin i = n2 sin r)
7. The light source used is a laser so that it emits focused radiation (not random) so that the occurrence of refraction and reflection can be easily observed

The tube is designed round with an acrilyc thickness of 0.5 cm and the back of the tube is fitted with a protractor. This is so that the rays coming from any angle will point to the center point (the intersection of horizontal lines and vertikat contained in the arc) so as to obtain an accurate magnitude and direction in measuring refraction, refractive index, critical angle and perfect reflection.

The rotating arm as the beam source holder is designed in such a way as figure 4 shows so that the beam (laser) is precisely aimed at the center of the tube/center of the arc. While the frame functions as a support / holder for tubes and light sources with a disassembly design.

The phenomenon observed by this prop is that if the rays come from a denser medium (water) to a more tenuous medium (air), there will be a deflection of rays in the boundary plane of the medium (refraction process). In this event, the angle of the incident beam with respect to the normal line (i) will be smaller than the angle of the refracted ray (r). This shows that if the light comes from a tighter medium to a more tenuous medium, it will move away from the normal line and vice versa.

Supporting data for the calculation of the refractive index of a medium can be measured using this geometric optical trainer. if knowing the refractive index of air = 1. When a beam is fired by changing the angle of incidence (greater than the first shot) so that an angle is obtained that results in the refractive beam parallel to the surface of the water, then this is called the limit / critical angle. If the angle of the beam fired is greater than the critical angle, then no rays are refracted, but all rays are reflected back into the water. This is called perfect reflection where the surface of the water acts as a flat mirror.

RESULTS AND DISCUSSION

Activities carried out to obtain the purpose of needs analysis as listed above are by means of respondents, physics teachers and students of grade XI science are asked to fill out questionnaires given by researchers. This activity was carried out in 3 schools, namely SMA Negeri 3 Pandeglang, SMA Negeri 4 Pandeglang and SMA Negeri 10 Pandeglang with the distribution of questionnaires were 7 respondents of physics teachers and 111 respondents of class XI science students. From the results of the needs analysis, physics learning information was obtained regarding the concept of refraction, refractive index, critical angle and perfect reflection shown in the following table:

INITIAL CONSERVATION DATA
(STUDENT)

Origin of School : SMA Negeri 3 Pandeglang, SMA Negeri 4 Pandeglang and SMA Negeri 10 Pandeglang

Number of students : 111 Students

Table 5. Student observation data

NO.	QUESTION	ANSWER

e-ISSN: 2986-8076
DOI: 10.57254/tess.v1i2.16

1.	How does your teacher deliver geometry optics material, especially light refraction in class?	(44) lectures (29) demonstrations (63) discussion
2.	Is the concept of light refraction difficult to understand?	(89) Yes (18) no
3.	If the answer to no.2 is yes, what makes the meter difficult to understand?	(21) too abstract (38) Unclear Teacher Delivery Methods (47) has not used the right learning media (10) absent
4.	How do teachers teach you to understand geometric optics, especially light refraction?	(107) demonstrations (props) (9) lectures (25) practice questions
5.	Does studying the phenomenon of light refraction using props make it easier for you to understand the concept of refraction and refractive index?	(110) Yes (1) no
6.	How does your teacher deliver geometry optics material, especially perfect reflection in class?	(55) lectures (49) demonstrations (47) discussion
8.	Is the concept of light reflection difficult to understand?	(79) Yes (32) no
9.	If so, what makes the seal difficult to understand?	(21) too abstract (33) unclear ways of delivering teachers (43) have not used the right learning media (25) absent
10.	How do teachers teach you to understand geometric optics, especially perfect reflection?	(100) demonstrations (props) (13) lectures (31) practice questions
11.	Is studying the phenomenon of perfect reflection easier for you to understand the concepts of refraction, perfect reflection, refractive index and critical angle?	(97) Yes (14) no
12.	How does your teacher deliver geometry optics material, especially refractive index in class?	(68) lectures (22) demonstrations (41) discussion
13.	Is the concept of refractive index difficult to understand?	(97) Yes (14) no

e-ISSN: 2986-8076
DOI: 10.57254/tess.v1i2.16

14.	If so, what makes the seal difficult to understand?	(31) Too abstract (31) unclear ways of delivering teachers (53) have not used the right learning media (12) absent
15.	How do teachers teach you to understand geometric optics, especially refractive index?	(96) demonstration (props) (22) lectures (41) practice questions
16.	How does your teacher deliver geometry optics material, especially critical angles in class?	(76) lectures (23) demonstrations (35) discussion
17.	Is the concept of critical angle difficult to understand?	(106) Yes (5) no
18.	If so, what makes the seal difficult to understand?	(25) too abstract (45) unclear teacher delivery methods (50) has not used the right learning media (2) absenteeism
19.	How do teachers teach so that you understand geometry optics, especially the discussion of critical angles?	(103) demonstrations (props) (17) lectures (27) practice questions
20.	Is it easier for you to study critical angles using props to understand the concepts of refraction, refractive index, critical angle and perfect reflection?	(111) Yes (-) no

The description of the results of the needs analysis:

a. Discussion of the Results of the Needs Analysis from Student Questionnaires
   1. The results showed that 80.1% of students did not understand refraction, 87.3% did not understand the refractive index, 95.4% did not understand the critical angle and more than 70% did not understand perfect reflection for reasons that were too abstract, the teacher's delivery method was unclear and did not use the right media in this case teaching aids.
   2. From the data obtained, all students are interested in learning the concepts of refraction, refractive index, critical angle and perfect reflection using teaching aids.

From the data described above, it can be concluded that students have difficulty in understanding the concepts of refraction, refractive index, critical angle and perfect reflection because the delivery of the concept is still abstract. This is due to the limited measurement of teaching aids and the limitations of geometric optical facilities (props) in schools. From the results of the needs analysis, all students feel interested in learning using teaching aids.

e-ISSN: 2986-8076
DOI: 10.57254/tess.v1i2.16

From the results of the needs analysis, it is necessary to conduct a study on the design of geometric optical props that facilitate the understanding of the concepts of refraction, refractive index, critical angle and perfect reflection for physics learning. This is corroborated by the majority of respondents supporting the plan to design geometric optical props, which is 86.4%.

The trial of geometric optical props is divided into three stages, namely the trial stage on expert lecturers, trials on physics teachers and trials on grade XI high school students by means of each respondent (expert lecturers, physics teachers and students) asked to fill out the questionnaire that has been provided. This stage was carried out from November to December 2009. The purpose of this questionnaire is to:

a) Expert lecturers

The purpose of giving questionnaires to expert lecturers is to validate geometry optical props that have been made, so that an assessment of the accuracy and feasibility of teaching aids for physics learning in high school is obtained.

b) Physics teacher

The purpose of giving questionnaires to teachers is to obtain teacher assessment data on light reflection props that will be used as learning aids to make it easier for teachers to convey the concepts of refraction, refractive index, critical angle and perfect reflection.

c) High school students grade XI

The purpose of giving questionnaires to students is to find out students' assessment of geometry optical props that have been made.

The rating scale used in each questionnaire to test light reflecting props consists of four scores according to the Likert scale, namely:

Score 1: Not Good
Score 2 :Less
Score 3 :Good
Score 4 :Excellent

The criteria for interpretation of the score percentage are:

0 - 25% = not good
26 - 50% = Less
51 - 75% = Good
76 - 100% = Excellent

1. Trials on expert lecturers

The purpose of the trial on expert lecturers is to test the feasibility and find out the lecturers' opinions about the geometry optical props developed. The results of the analysis are used as input for further improvement of teaching aids. The results of the expert lecturer trials are as follows:

Table 6. Data from the trial results of expert lecturers

EXPERT LECTURER QUESTIONNAIRE RECAPITULATION						%			
Question No.	1	2	3	4	Number of lecturers	1	2	3	4
1	0	0	3	4	7	0%	0%	42,8%	57,1%
2	0	0	2	5	7	0%	0%	28,5%	71,4%
3	0	1	1	5	7	0%	14,2%	14,2%	71,4%
4	0	0	3	6	7	0%	0%	42,8%	85,7%
5	0	0	1	6	7	0%	0%	14,2%	85,7%

e-ISSN: 2986-8076
DOI: 10.57254/tess.v1i2.16

6	0	0	2	5	7	0%	0%	28,5%	71,4%
7	0	0	2	5	7	0%	0%	28,5%	71,4%
8	0	0	2	5	7	0%	0%	28,5%	71,4%
Question No.	1	2	3	4	Number of lecturers	1	2	3	4
9	0	0	2	5	7	0%	0%	28,5%	71,4%
10	0	0	3	4	7	0%	0%	42,8%	57,1%
11	0	0	3	4	7	0%	0%	42,8%	57,1%
12	0	0	3	4	7	0%	0%	42,8%	57,1%
13	0	0	3	4	7	0%	0%	42,8%	57,1%
14	0	0	3	4	7	0%	0%	42,8%	57,1%
15	0	1	2	4	7	0%	14,2%	28,5%	57,1%
16	0	0	3	4	7	0%	0%	42,8%	57,1%
17	0	0	2	5	7	0%	0%	28,5%	71,4%
18	0	0	2	5	7	0%	0%	28,5%	71,4%

Based on the results of the interpretation of the scores obtained, the four aspects of assessment, namely the suitability of content, suitability of concepts, design and interactive obtained a high assessment. The interpretation of scores for each aspect is almost entirely at a very good scoring level and a small part good as seen in the table above. This shows that geometry optical props for physics learning in high school are declared accepted and can be used as physics learning media in the form of props to explain the concepts of refraction, refractive index, critical angle and perfect reflection.

2. Trials on physics teachers

Physics teacher trials were conducted in six schools, namely SMA Negeri 1 pandeglang, SMA Negeri 2 pandeglang, SMA Negeri 3 pandeglang, SMA Negeri 4 pandeglang, SMA Negeri 6 pandeglang and SMA Negeri 10 pandeglang with the total number of teacher respondents namely 11 physics teachers. The stage in this trial is that the teacher observes the teaching aids and after the teacher observes the teaching aids, the teacher is asked to fill out a questionnaire. The questionnaire sheet consists of four aspects of assessment. The four aspects are aspects of content suitability, conceptual compatibility, design and interactive whose statements are interrelated. The results of the physics teacher trials are as follows:

Table 7. Data on the results of physics teacher trials

TEACHER QUESTIONNAIRE RECAPITULATION							%				
Question No.	0	1	2	3	4	Number of teachers	0	1	2	3	4
1	0	0	0	1	10	11	0%	0%	0%	9,09%	90,9%
2	0	0	0	3	8	11	0%	0%	0%	27,3%	72,7%
3	0	0	0	2	9	11	0%	0%	0%	18,2%	81,8%
4	1	0	0	1	9	11	9%	0%	0%	9,09%	81,8%
5	0	0	0	1	10	11	0%	0%	0%	9,09%	90,9%
6	0	0	0	2	9	11	0%	0%	0%	18,2%	81,8%
7	0	0	0	2	9	11	0%	0%	0%	18,2%	81,8%

e-ISSN: 2986-8076
DOI: 10.57254/tess.v1i2.16

8	0	0	0	2	9	11	0%	0%	0%	18,2%	81,8%
9	0	0	0	5	6	11	0%	0%	0%	45,4%	54,6%
10	0	0	0	2	9	11	0%	0%	0%	18,2%	81,8%
11	0	0	0	4	7	11	0%	0%	0%	36,4%	63,6%
12	0	0	0	1	10	11	0%	0%	0%	9,09%	90,9%
13	2	0	0	5	4	11	18%	0%	0%	45,4%	36,4%
14	1	0	0	4	6	11	9%	0%	0%	36,4%	54,6%
15	1	0	0	3	7	11	9%	0%	0%	27,3%	63,6%
16	1	0	0	2	8	11	9%	0%	0%	18,2%	72,7%

From the results of trials by teachers Interpretation scores for four aspects consisting of a total of 16 questions, showed very good and good results as seen in the table above. This shows that the tested props are valid and help in the process of conveying the concepts of refraction, refractive index, critical angle and perfect reflection. Because the teacher can easily show the refraction event, critical angle, perfect reflection and calculate the refractive index of the medium used in the experiment.

3. Trials on students

Props were tested on students as well. After students made observations on teaching aids, students were asked to fill out questionnaires. The questionnaire sheet consists of questions related to aspects of *content* suitability, concept suitability, design and interactivity. Students who participated in the teaching aids trial were 80 students of grade XI science, this trial was carried out at SMA Negeri 4 Pandeglang.

Table 8. Data on the results of trials on grade XI high school students

STUDENT DATA RECAPITULATION							%			
Question No.	0	1	2	3	4	Number of students	1	2	3	4
1	0	0	4	14	62	80	0%	5.0%	17.5%	77.5%
2	0	0	2	28	50	80	0%	2.5%	35.0%	62.5%
3	0	0	3	18	59	80	0%	3.7%	22.5%	73.7%
4	0	0	6	27	47	80	0%	7.5%	33.7%	58.7%
5	0	0	3	30	47	80	0%	3.7%	37.5%	58.7%
6	0	0	2	23	55	80	0%	2.5%	28.7%	68.7%
7	0	0	2	30	48	80	0%	2.5%	37.5%	60%
8	0	0	2	30	48	80	0%	2.5%	37.5%	60%
9	0	0	2	34	44	80	0%	2.5%	42.5%	55%
10	0	0	3	23	54	80	0%	3.7%	28.7%	67.5%
11	0	0	3	38	39	80	0%	3.7%	47.5%	48.7%
12	0	0	1	33	46	80	0%	1.25%	41.1%	57.7%
13	0	0	1	30	49	80	0%	1.25%	37.5%	61.2%
14	0	0	3	31	46	80	0%	3.7%	38.7%	57.5%
15	0	0	3	30	47	80	0%	3.7%	37.5%	58.7%
16	0	0	2	43	35	80	0%	2.5%	53.8%	43.7%
17	0	0	1	31	48	80	0%	1.25%	38.7%	60%
18	0	0	3	38	39	80	0%	3.7%	47.5%	48.7%

This trial stage is that this tool is tested by practicum. Due to the limited set of geometric optical displays, in each class students are divided into 6 groups. The first

e-ISSN: 2986-8076
DOI: 10.57254/tess.v1i2.16

three groups conducted practicum (data collection) and the next three groups prepared practicum.

CONCLUSION

Based on the results of the formulation of the research problem of designing geometric optical props to explain the concepts of refraction, refractive index, critical angle and perfect reflector, it can be concluded:

1. The design of geometric optical props are:
   a. designing the shape, size, materials used, symmetry, accuracy and color of geometric optical props that will be made to produce attractive props and can be used in physics learning in high school. This design was made based on the results of a needs analysis conducted in 3 high schools with a total of 111 students and 7 physics teachers, input / suggestions from supervisors and fellow physics students. This design stage consists of two sub-stages, namely the design stage and the manufacturing stage.
   b. After designing the props, the geometric optical props are made in accordance with the design results that have been made. The teaching aids that have been made were tested on 7 expert lecturers, 11 physics teachers and 80 students of class XI high school science.
2. From the results of the trial, data were obtained in the form of: props from the design of geometry optical props for physics learning in high school can show refraction events, critical angles, and perfect reflections, and can measure supporting data for calculating the refractive index of a medium and can be used as geometric optical props for physics learning in high school. This is supported by the data from the results of geometric optical props trials, namely almost all test respondents stated that the props from designing geometric optical instruments for physical learning in high school are very good and good as shown in the test results data in the appendix.

e-ISSN: 2986-8076
DOI: 10.57254/tess.v1i2.16

3. Geometry optical props design aids can be accepted and used as teaching aids for physics learning in high school, especially on refraction materials, refractive indexes, critical angles and perfect reflection. This is supported by data from the trial results of expert lecturers, physics teachers and students in the appendix.

REFERENCES

Abidin, Zainal. 25-28 Oktober 2003. Media Internet untuk Pembelajaran Fisika yang Menyenangkan. Jakarta: Simposium Nasional I Inovasi Pembelajaran dan Pengelolaan Sekolah

Darhim. 1986. Media dan Sumber Belajar Matematika Modul 1-3. Jakarta: Karunika Universitas Terbuka.

Hamalik,Umar. 1997. Media Pendidikan. Bandung: PT. Citra Aditya Bakti.

Ibrahim,R. dan Nana Syaodih S. 2003. Perencanaan Pengajaran. Jakarta: Rineka Cipta.

Oxford. 1995. Kamus Lengkap Fisika. Jakarta: Erlangga

Riduwan. 2005. Belajar Mudah Penelitian untuk Guru-Karyawan dan Peneliti Muda. Bandung: ALFABETA.Tipler. 2001. Fisika Untuk Sains dan Teknik Jilid Dua, Alih Bahasa Dr. Bambang Soegijono. Jakarta: Erlangga.

Sadiman, Arif. 1996. Media Pendidikan cetakan ke-4. Jakarta: PT Raja Grafindo Persada

Hecht Eugene. 2002. Optik . personal education

Waldopo.2002. Penelitian Pengembangan; Pendekatan dalam Mengembangkan Produk-Produk di Bidang Pendidikan Pembelajaran.

hlm. http//www.pustekom.go.id/teknodik/t11/11-1.htm, 17 agustus 2009. 19.30