Flipped Classroom Mode for Geometry Optics Teaching and Learning Teachers' Perceptions and Expectations

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Flipped classroom mode for geometry optics teaching and learning: teachers' perceptions and expectations

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Abstract. Integrating active learning with traditional learning in the classroom can actually be done simply. However, teachers are still trying to find learning innovations so the learning process can be focused on each student. One of the learning models that can be used by teachers is flipped classroom. This study aims to analyze the perceptions and expectations of teachers towards the use of flipped classroom models for the learning process of physics. The research model used is a mixed-method with Sequential Explanatory Strategy. The study was conducted in high schools in the Lampung province with the subjects of the research were 60 physics teachers. Data collection used a four-point questionnaire instrument with Likert Scale and interviews. The results of the study showed that teachers had considerable expectations for the use of flipped classroom model. The flipped classroom learning model can help teachers to convey all the physics material easily so as students can understand the material, active, interest with physics, then communication and the relationship between teachers and students will increase. The flipped classroom model will work well if it is supported by appropriate media and teaching materials. The results of this study will be a reference for the next research.

1. Introduction

Integrating active learning with traditional learning in the classroom can actually be done simply. However, teachers are still trying to find learning innovations [1], so that the learning process can be focused on each student [2]. One of the learning models that can be used by teachers is flipped classroom which is a relatively new learning model.

Flipped Classroom is defined as a combination of traditional learning with online learning. The focus of flipped classroom learning is directed at discussing things that are not yet understood/difficult to solve, deepening concepts and discussion through collaborative learning using learning time that is not only inside but also outside the classroom [3]. The main character in this learning process is that students have more roles and responsibilities in the learning process [4], where direct teaching will be more effective if given to each individual.

The flipped classroom model is very interesting to use in physics learning as in geometrical optics, because video related to material for all subjects including geometrical optics is available on the internet. But in reality, geometrical optics is one of the physics material that is difficult to teach if it only uses conventional learning model. This is supported by [6] which states that students often experience misconceptions in: (1) image formation by a plan mirror; (2) image formation by a convex lens; (3) indirect and direct observations of a real image formed by a convex lenses; and (4) ray diagrams.

The difficulties of students in understanding geometrical optics' concepts can be solved by flipped classroom learning. Flipped classroom learning has several advantages, they are: (1) students can determine the steps of learning in their own way; (2) doing "homework" in the classroom giving the teacher a better teaching experience about the difficulties and learning styles of each student; (3) The teacher is easier to adjust and update the curriculum and give it to students; (4) learning time in class can be used more effectively and creatively; (5) Teachers can use the report model to see improvements in students' achievements, interests and involvement; (6) new learning theories support this model; and (7) the use of technology in accordance with learning in 21st century [7]. This model also has its own charm, because in the electronic era, students can easily access various kinds of videos directed by the teacher easily through mobile phones.

Flipped classroom learning model can provide an opportunity for teachers to be able to focus on each student, so that communication between teachers and students become more increasing. Teachers can guide students in the learning process, such as in managing team work and collaboration between colleagues [9]. Other studies report the reasons for using a flipped classroom model include: (1) there is more time that can be spent with students for authentic assessment; (2) students get more time to do practicum in class; (3) students are more active in the learning process; (4) students really enjoy to learn with this model; and (5) this model can advance students' thought, both inside and outside the classroom [10]. Based on literature review and real conditions, it is necessary to determine teacher expectations regarding this learning model and teacher's perceptions when using classroom flipped learning model.

Related to this, the purpose of the research was to analyze the perceptions and expectations of teachers towards the use of flipped classroom learning model for teaching and learning. This study was conducted to physics teachers who taught geometrical optic.

2. Research Method

This research is a mixed-method research with Sequential Explanatory Strategy. The study was conducted in the high school of the Lampung province area with the subject of the research were physics teachers. Data was collected using questionnaires and interviews. The questionnaire given to 60 physics teachers used four Likert Scale points and was adapted from [11], for each question the respondents were asked to give statements: strongly disagree (SD), disagree (D), agree (A), strongly agree (SA). The questionnaire contained 15 closed questions consisting of 7 questions related to teacher perceptions and 8 questions about teacher expectations for classroom flipped learning. This questionnaire was analyzed quantitatively and interviews were analyzed using qualitative descriptive.

Interviews were conducted on four physics teachers to determine the knowledge of physics teachers about flipped classroom learning and their perceptions and expectations about this learning model. The teacher interviewed by the researchers were three people, with specifications: two teachers have master degree in physics education with an average teaching experience of nine years, and one teacher is bachelor degree in physics education with seven years teaching experience.

3. Result and Discussion

3.1 Teacher's Perception of Flipped Classroom Learning Model

The teacher's perception of the use of flipped classroom learning model was analyzed through a questionnaire with seven statements where teachers were asked to choose statements from strongly agree to strongly disagree. The statement regarding teacher perceptions is presented in table 2.

Table 2. Statement of Teacher's Perception about Flipped Classroom Learning

S1	I have understood the flipped classroom learning model
S2	Flipped classroom can be used to teach all physics material
S3	Learning videos can improve students' understanding
S4	Watching virtual simulations can help when doing physics practicum
S5	Video must be designed with a good structure and clearly defined
S6	Video must increase students' curiosity
S7	Assignment can help to guide students during learning

The first statement (S1) is intended to determine teachers knowledge about clasrroom flipped learning model. This statement is intended to find out whether the teacher has used and understood this learning model or not. The data obtained showed that only 8.4% of teachers did not understand the classroom flipped learning model. Besides, there is a positive general perception about flipped classroom (S2-S7). The teachers agree that giving a video about physics phenomena can help to improve students' understanding and curiosity about physics material (S3 and S6). This finding is supported by previous research which stated that pre-class videos are made for conceptual understanding and provide comfort for students in learning [12, 13, 14]. Moreover, the learning video must be designed with a good structure (S5). Most teachers are satisfied with this model and are willing to use it on various material in physics subjects, one of them is geometrical optic (S2). Giving a virtual laboratory simulation before learning helps teachers to direct students when practicing in class (S4). The teacher becomes easy in guiding students during the teaching and learning process through the given assignments (S7), only 1.7% of teachers who do not agree with this (Figure 1). Experts and practitioners have also reported positive results from flipped classroom learning model [15, 16, 17, 18].

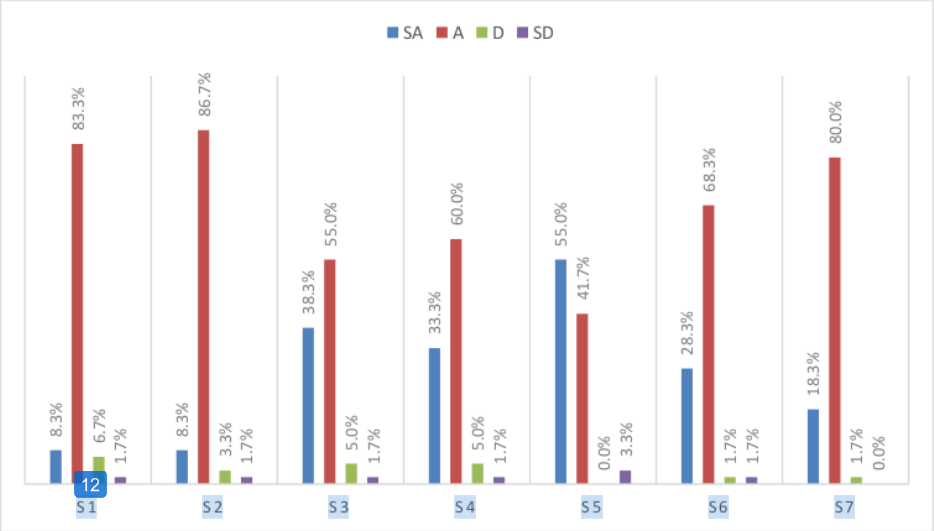

Figure 1 Response to Likert-type tests as a percentage of teacher's perceptions

The results of the research indicated by the graph above which shows the percentage of teacher perceptions of flipped classroom are supported by previous research which states that flipped classroom model can be suggested to be used by teachers in teaching [19, 20].

3.2 Teacher's Expectations towards Flipped Classroom Learning Models

Teacher's expectations towards flipped classroom learning model revealed through eight statements that are presented in table 3.

Table 3. Statement of Teacher's Expectations about Flipped Classroom Learning

S8	Very interesting to teach physics
S9	Can help teachers make students like physics lesson more
S10	Make it easy to explain abstract lessons
S11	Helps in providing learning experiences to students
S12	Make students more active
S13	Improve communication and the relationship between teachers and students
S14	Giving video about physics phenomena can help explain the material

Table 3 represents a fairly large teacher expectation of the classroom flipped learning model. Most teachers agree that collaboration and communication between teachers and students and cooperation between studentss are very good during the learning process. The teacher becomes easier to direct students to be more active during learning (S12, S13 and S15). These findings indicate that flipped classroom is better at helping teachers make students play a greater role in learning than other learning models [21].

The phenomenon video used must be designed with a good and interesting structure so that it helps teacher to make students more interested, enjoy to learn physics, and provide a different learning experience (S8, S9, and S10). All participants agree or strongly agree that the video about physics phenomena that is given could help in explaining the material (S14) where no one chose disagree or strongly disagree (Figure 2).

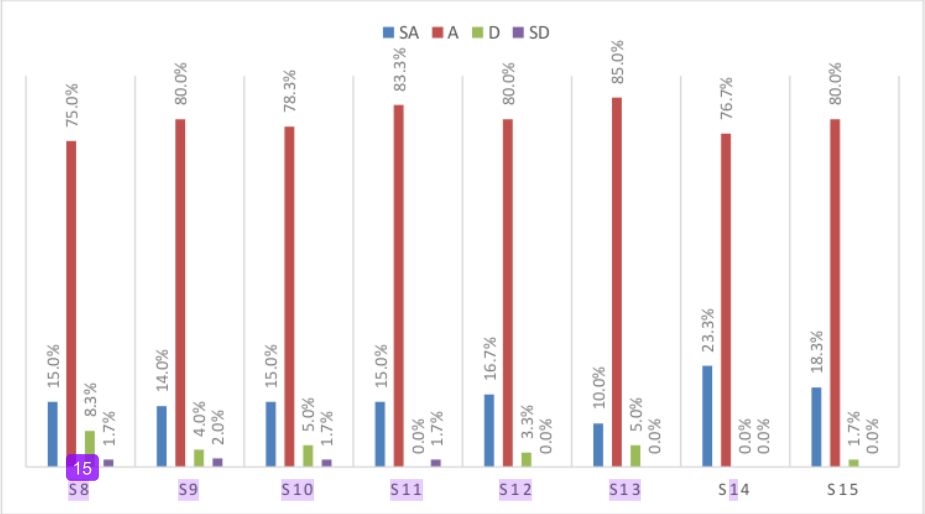

Figure 2 Response analysis for Likert-type test as a percentage of teacher's expectations

Students may take the material from books, e-books, or access all kinds of material or videos of physics phenomena on the internet relating to the material to be studied at the next meeting. These videos can be presented through various computer applications. Students who have watched the video before learning have a picture of the material that has been studied. The teacher will find it easier to explain the material that is difficult to explain such as geometrical optics, so there is no misconception.

The results described above regarding the perceptions and expectations of teachers towards the flipped classroom are in line with previous research which emphasizes that many teachers are happy to use this learning model [22, 23]. The inhibiting factor in using flipped classroom is the availability of

the internet for students. Weak internet connections make it difficult for students to access material and videos online at home [24].

3.3 Hyphotetical Model of Flipped Classroom Mode

Most of the research about flipped classroom learning model uses group-based interactive learning activities in each class based on the results of their work and how they build their own mind's constructivity [25]. The teacher directs students to discover the phenomenon of geometrical optic phenomena that they often find in everyday life, then students must prepare various questions about things that they still do not understand related to these phenomena to be discussed later in class. In this regard, teachers need scaffolding in the use of technology for physics learning, especially in optical material to help students solve problems they found.

The scaffolding technique referred to in this paper is that the teacher can provide a website address to access a video about optical phenomena to students. Through this video it is expected that students can understand better about the phenomena they find. Previous research stated that giving scaffolding to teachers was very important in optimizing the use of ICT as a medium for practicing flipped classroom [26, 27]. Furthermore, in the classroom learning, the teacher must provide the widest opportunity for each student to ask question and discuss it, both with the teacher and with his friends. Every student must have challenges different questions related to the same phenomenon where the teachers facilitated their engagement with open-ended problems [28].

Flipped classroom according to teacher perceptions can theoretically be described as in figure 3.

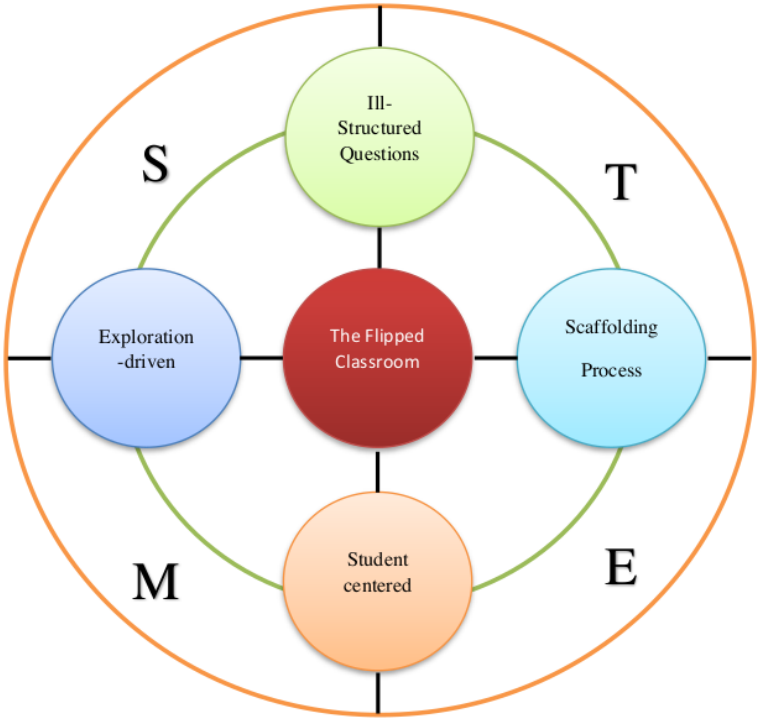

Figure 3 Hyphotetical Model of *Flipped Classroom Mode*

The reason why teachers provide this learning model is because students can understand easier and students will be able to find problems and then asking question about the problem if they have studied the lesson before. So the teacher no longer needs to explain in detail when the teaching and learning process is going. Students become more active in class because the teacher gives more opportunities to each student to ask questions that have not understood by them.

Questionnaire results are reinforced by interviews with teachers. The teachers give statements regarding the flipped classroom model that they use in teaching physics. They give the following statement:

> *I use this learning model because the response of students is very enthusiastic when they are directed to watch videos of physics phenomena. Students often have various questions in their minds when observing the natural phenomena they encounter where they are often unaware of their relation to physics. Students who are asked to make their own questions will have larger and deeper thoughts about the material they will learn. Communication between teachers and students also increases during the learning process, because the great curiosity of the students makes them not hesitate to ask questions.*

According to the results of interviews with several teachers, through this learning model, the teacher does not need to explain a lot of material in the classroom, but students who must actively seek out and study the material. Although there are some opinions who state that the teacher must keep giving a little explanation to students, such as providing explanations that make students more interested in the lesson to be studied. One of them also stated that teachers must pay attention to students optimally so that not just smart students can understand. In addition, the teacher must provide appropriate teaching media or multimedia that truly support learning activities with this model [29].

So in future research, it is necessary to provide and update teaching materials to teach flipped classroom to overcome obstacles such as weak internet connection that can inhibits the learning process. The teaching materials can be an electronic students' worksheet, online test, and other written documents that teachers will use in the classroom.

4. Conclusion

The results of the study show that teachers generally have a positive perception and great expectations of the flipped classroom learning model. In general, teachers find that this learning is interactive and fun for physics learning. Most teachers assume that this learning model can provide valuable experience for students and can improve communication between teachers and students. This learning model also makes the teacher easier to explain physics material, one of them is geometrical optic.

Although the results obtained in this study provide a promising picture of teachers' perceptions and expectations of the flipped classroom learning model, further research is needed to explore the potential of this learning. There needs to be provision and updating of teaching materials to teach flipped classroom such as electronic students' worksheet, online test, and other written documents that teachers will use in class. The teaching and learning process in the class is more focused on practicum sessions or making work projects.

5. References

[1] Strayer J F 2012 *Learn. Environ. Res.* **15** 171.

[2] Bergmann J and Sams A 2014 *Flip Your Classroom Reach Every Student in Every Class Every Day* (USA: ISTE. ASCD).

[3] Tucker B 2012 *Education Next* **12** 82.

[4] O'Flaherty J and Phillips C 2015 *Internet High. Educ.* **25** 85.

[5] Hill J R, Song L, and West R E 2009 *Int. J. Phytoremediation* **21** 88.

[6] Ceuppens S, Deprez J, Dehaene W, and De Cock M 2018 *Phys. Educ.* **53** 1.

[7] Fulton K 2012 *Learn. Lead. with Technol.* **39** 12.

[8] Mattis K V 2015 *Technol. Knowl. Learn.* **20** 231.

[9] Moore C 2010 *International Journal for Educational Integrity* **6** 74.

[10] Herreid C F and Schiller N A 2013 *J. Coll. Sci. Teach.* **42** 62.

[11] Roach T 2014 *Int. Rev. Econ. Educ.* **17** 74.

[12] Arshad K and Imran M A 2013 *Compass J. Learn. Teach.* **4** 1.

[13] González-Gómez D, Jeong J S, Airado Rodríguez D, and Cañada-Cañada F 2016 *J. Sci. Educ. Technol.* **25** 450.

[14] Long T, Logan J, and Waugh M 2016 *TechTrends* **60** 245.

[15] Baker J W 2000 *Annu. Technol. Conf.* pp. 1.

[16] Bergmann J, Overmyer J, and Wilie B 2013 *Thedailyriff.Com*.

[17] Butt A 2014 *Bus. Educ. Accredit.* **6** 33.

[18] Bates S and Galloway R 2012 *HEA STEM Conf. – 13 April 2012, Imp. Coll. London {&} R. Geogr. Soc.* , no. April pp 12.

[19] Enfield J 2013 *Tech Trends Link. Res. Pract. to Improv. Learn.* **57** 14.

[20] Johnson L W and Renner J D 2012 *Effect of the flipped classroom model on a secondary computer applications course: Student and teacher perceptions, questions and student achievement (Dissertation)* (Louisville, Kentucky: Univ. Louisville).

[21] Roehl A, Reddy S L, and Shannon G J 2013 *J. Fam. Consum. Sci.* **105** 44.

[22] Strayer J 2007 *The Effect of The Classroom Flip on the Learning Environment: a Comparison of Learning Activity in a Traditional Classroom and a Flip Classroom that Used an Intelligent Tutoring System (Dissertation)* (Athens, Georgia: The Ohio State University).

[23] Vaughan M 2014 *Educ. Res. Perspect.* **41** 25.

[24] Chen Y, Wang Y, Kinshuk, and Chen N S 2014 *Comput. Educ.* **79** 16

[25] Grabinger R S and Dunlap J C 2012 *Res. Learn. Technol.* **3** 5.

[26] Nurulsari N, Abdurrahman A, and Suyatna A 2017 *Journal of Physics: Conference Series* **909** 012053

[27] Rahman B, Abdurrahman A, Kadaryanto B, and Rusminto N E 2015 *Aust. J. Teach. Educ.* **40** 11

[28] Romli S, Abdurrahman, and Riyadi B 2018 *Journal of Physics: Conference Series* **948** 012050

[29] Khoiriah K, Jalmo T, and Abdurrahman A 2016 *Jurnal Pendidikan IPA Indonesia* **5** 75

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