

Development Of Problem Based Learning Model With Case Study Method In Refractive Clinic Course

Rina Novalinda^{1*}, Giatman², Syahril³, Ambiyar⁴, Dedi Irfan⁵, Refdinal⁶

^{*1,2,3,4,5,6} Universitas Negeri Padang, Indonesia.

¹E-mail: rinanovalinda6@gmail.com

²E-mail: giatman@ft.unp.ac.id

³E-mail: ambiyar@ft.unp.ac.id,

⁴E-mail: irfankumango@gmail.com

⁵E-mail: sy_ril@yahoo.com,

⁶E-mail: refmoein@gmail.com

***Corresponding Author:** Rina Novalinda

Abstract

The purpose of this study was to examine the problem based learning model with the case study method in the refractive clinic course. This study uses the R&D method with the ADDIE approach. The research was conducted at YLPT Aro Padang. The results of this study indicate that the development of the learning model is carried out by conducting a needs analysis from the aspects of students, lecturers, concepts and curriculum, the design of the model uses a theoretical study of previous research by adopting a problem based learning model using the Johnson & Johnson model and a case study model using the Yien theory. . The development of the model starts from the conceptual design of the Johnson-Jhonson theory and Yien theory, a hypothetical model is born by examining the concept of learning, adult learning, learning theory and model syntax, novelty of this research takes a slice of the Problem Based Learning learning model and the existing Case Study learning model, which is valid with a learning orientation that prepares learning scheduling through clear learning instructions. Contains a discussion of refractive clinic cases where each case topic is interconnected with the previous project material.

Keywords: Learning Model, Problem Based Learning, Case Study Method

INTRODUCTION

The Refraction Clinic course is a compulsory subject that includes several types of courses that are very difficult to master and many skills that must be mastered by students. Student difficulties are related to eye anatomy, one of the components of visual impairment (reactive error). It is specialized theoretical knowledge, including biomedical and psychosocial aspects. The educational competence of these patients is demonstrated and practiced under the guidance of lecturers and can be carried out by students independently. This course requires a systematic and scheduled learning flow and process.

Preliminary study conducted while serving at the YLPTK Optical Refraction Academy showed that the learning process still relied on conventional learning where learning was done using the lecture method and centered on the lecturer (teacher center learning) causing a lack of creativity and

motivation from students. During lectures, students were less motivated to develop their skills. critical thinking,

Creative and innovative (Freire, 2000), (Syafni et al., 2013), (Cintia et al., 2018), (Herdiawan et al., 2019), (Sekarningsih, 2021) In the learning section in the classroom, it is focused on the ability of students to generate and memorize information and are forced to remember and store various information without even understanding the information they remember about everyday life.

These problems and the achievement of these competencies require efforts that are not easy to solve. This research is expected to help provide solutions that increase students' motivation and competence in qualifying refractive clinics. Where the suggested alternative to improve the quality of learning and communication between students and lecturers is to implement a learning model that is carried out systematically and regularly, one of which is a learning model. (Herawati et al., 2021)

Based on the problems described, there is a gap between the ideal conditions and the facts on the ground. Filling gaps and meeting needs requires learning models that provide broad and deep learning and support students in discovering their knowledge and solving problems. One of them is research (Amelia, 2015), (Herdiawan et al., 2019), (Sutarni et al., 2021), (Sudarmini, 2019), (Elizabeth & Sigahitong, 2018), (Herdiawan et al., 2019), (Erpidawati, 2022). The problem-solving skills survey found that 78% of students chose to work on a problem as usual, and 50% stopped working on a problem when they encountered difficulties. Based on these data, it can be concluded that students' problem solving abilities are less than optimal. Problem solving is also difficult for students because they know the formula used but do not understand the conceptual qualitative meaning of the formula.

This newly developed model, named problem based learning model with case study method which is conceptualized into a new learning model formula, which is based on taking slices of the advantages of the problem based learning and case study models, and adding novelty to the gaps or limitations of the model, and equipped with arguments based on relevant research, so that it becomes a problem model. based learning with a better case study method. The development of this model is a collaborative problem based learning model with the case study method, on the grounds that in problem based learning there is case study learning and case study steps in solving cases, there is an assessment, lecturers control outside the classroom and there is collaborative learning mobility. (Nur'aini, 2020). In accordance with the learning content of the XXI century, there is an element of collaboration, creativity (Taher et al., 2018), (Septian et al., 2020), (Taher et al., 2018), (Sekarningsih, 2021), (Syaputra & Sariyatun, 2020), (Kinard & Parker, 2007), (Pangestu, 2021). The reason for the problem based learning model of (Johnson, 2002) with 5 syntax and case study method from (Yin, 2003) With these 6 stages it was developed, because the existing syntax in its implementation still tends to the lecturer as a learning center (teacher center learning) while in the learning process of clinical refraction courses requires individual abilities to examine, analyze and even create new syntheses to deal with existing problems and also Students do not have a sense of self-confidence, they consider the challenges studied are difficult to solve so that students feel reluctant to solve problems. For this reason, a step in learning is needed that allows the process of analyzing real problems to take appropriate steps as an effort to achieve the ability of students to

construct their thoughts from the problems at hand.

LITERATURE REVIEW

Cooperative Model

Cooperative learning model is a model that learns in groups when doing something. This model is one of the alternative lecturers used in the learning process, because it is considered more efficient and effective in its implementation. This is in line with Roger's view (Miftahul, 2012) that cooperative learning is a group learning activity held with the principle that learning is based on changes in social information between groups of students. Each student is responsible for their own learning and is encouraged to improve the learning of other members

The learning model is built and modified from several component. (Joyce, 2016) shows the five key elements that are the requirements of a learning model. The five components are planning, implementation (syntax, social system, reaction principle, support system, instructional impact (evaluation) and accompaniment.

Problem Based Learning Model

The Problem Based Learning (PBL) model is rooted in the belief of John Dewey. (Abidin, 2018) that lecturers should teach by appealing to students' natural instincts to investigate and create. Dewey wrote that the main approach that should be used for each course is an approach that is able to stimulate students' minds to acquire all non-scholastic learning skills.

Case Study Method

According to (Creswell, 1998) Case study is research that explores a bound system or a case (or it could be several cases) that occurred over a certain period of time through in-depth and detailed data collection from various sources of information that can be trusted to testify. Information gathering in case studies according to Creswell can be done by conducting interviews with informants, direct field observations, as well as various documents and reports that already exist and audiovisual materials.

METHOD

Research development research develops a learning model of problem based learning with the case study method in the clinical course of refraction Data collected from needs analysis

obtained from lecturers and students, theoretical analysis (Low, 2011). The results of the initial research carried out and a needs analysis were carried out that the clinical learning of refraction had problems so that solutions had to be found to overcome them. The research procedure using the ADDIE model (Molenda, 1982).

The ADDIE process begins with the analysis phase with the procedure for analyzing the needs of data collected from students and lecturers as well as theories according to the needs of model development. Design of a conceptual model model, the development starts from hypothesis analysis and produces a final model of problem based learning with the case study method.

The initial data collection used a questionnaire to determine the need for model development by providing instruments to students, interview instruments to determine the needs of special lecturers of optical refraction clinics.

The data were analyzed qualitatively and quantitatively, qualitatively examining the results of the validation from experts related to the given product, then quantitative analysis was carried out by looking at the overall score of the validated instrument. The validated instrument consisted of model book validation, textbooks, lecturer guides and student guide. Analysis of the practical evaluation of the learning model by looking at the learning outcomes before and after the application of the problem based learning model with the case study method

FINDINGS/ RESULTS

Analysis of model development needs *Problem Based Learning* using the Case Study method at the Optic Refraction Academy YLPTK Padang, covering indicators of student perceptions, learning experiences in the refractive clinic course and the need to develop a Problem Based Learning model with the Case Study method in the refractive clinic course.

No	Question	Alternative Answer	
		Yes	Not
1	In your opinion, has refractive clinical learning been going well so far?	50	50
2	Are there any obstacles faced when studying the clinical concept of refraction?	75	25
3	Is the use of libraries and laboratories to help study the clinical concepts of refraction maximally?	25	75
4	Do you have the same textbook as the textbook for the lecturer of optical refraction?	20	80
5	Do you use the handbook as a learning resource to learn the concepts of the refractive clinic course?	20	80
6	Are there other references that you use (besides handbooks) as a complement to other learning resources to learn the concepts of the refractive clinic course?	10	90
7	Do you have a module for the practice of mastering the concepts of refraction clinics?	75	25
8	Do you use the module to practice mastery of the concepts of the refractive clinic course?	10	90
9	Is it necessary to develop a module to practice mastery of the concepts of refractive clinic courses?	100	0

Perceptions of students in learning refractive clinic courses, students are quite enthusiastic about participating in these lectures, but there are also those who do not feel enthusiastic. The methods or media used are still not flexible interactively, and still have learning difficulties, therefore there is still a gap between reality and expectations. Judging from the aspect of lecturers still not using a more structured learning method and not having a complete textbook, (Özyaprak, 2016),

The clinical refraction course is a competency course, which is a subject of expertise that studies knowledge and skills. It is hoped that taking this course can help students in dealing with refractive clinic cases.

Design Stage

The design stage, the design of the Problem Based Learning model development is carried out with the Case Study method, which aims to verify the desired performance and the appropriate testing method to be carried out in the development carried out by designing the Problem Based Learning learning syntax with the Case Study method. (Romadhoni et al., 2017), (Hotimah, 2020)

Learning model development *Problem Based Learning* with the Case Study method, this research was carried out by adopting the Problem Based Learning learning model (Johnson, 2002) and Case Study learning models (Yin, 2003) based on model characteristics, based on a Curriculum analysis which includes subject learning outcomes, analyzing student characteristics, industrial revolution 4.0 competencies, XXI Century learning, also supported by theories. As for the type of Problem Based Learning model with the Case Study method from relevant research (Ambyar, 2022)

Development Problem Based Learning model with the Case Study method by carrying out various stages starting from the conceptual model of one

expert who was adopted including Johnson for the problem based learning model and Yin for the case study method, after that a hypothetical model was designed with several procedures and final models.

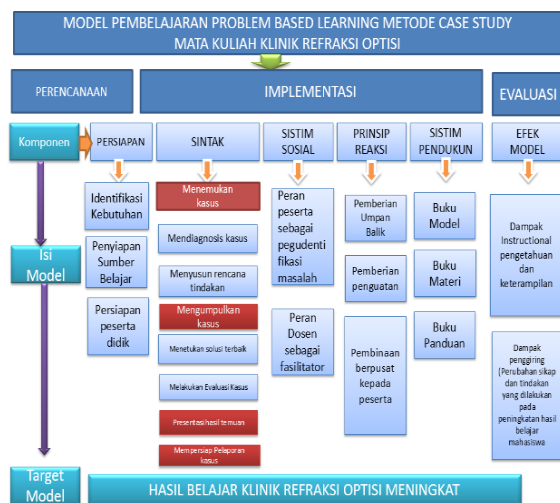


Figure. 1. Final Model Problem based learning with case study method

Problem Based Learning learning model with case study method built with components of planning, syntax, social systems, reaction principles, support systems and model effects. At the Develop stage, it aims to produce and validate the Problem Based Learning learning model with the Case Study method that has been developed. At this development stage, validation constructs are carried out for Problem Based Learning model products using the Case Study method. First, a Focus Group Discussion was held on Wednesday, December 16, 2021 in the Postgraduate meeting room of the Faculty of Engineering, State Universitas Negeri Padang, by presenting products with each validator and revising the product based on input and advice from experts/validators to obtain input and assessment. of practitioners in discussion activities. In this development stage, discussions were held through focus group discussion. This focus group discussion was attended and assessed by 1). Prof. Dr. Ambiyar. M. Pd, 2) Prof.DR. Nizwardi Jalinus.M.Ed 3) DR.Fahmi Rizal.M.Pd, 4) Dr. Ridwan, M.Sc.Ed, 5) Maya Safira, Amd.RO, SE.MM, FIACLE.

The results of the validation from experts, there are several items that need to be revised in the Problem Based Learning model (syntax) with the Case Study method. The analysis of the validation of the model book from the expert obtained a value of 0.88 with a valid category, textbooks with a score of 0.83 with a valid category, a valid lecturer handbook with a score of 0.86 and a valid student handbook with a score of 0.91 problem based

learning model with case study method. practical category.

At the evaluation stage, it aims to assess the quality of the products that have been developed and the teaching process using the problem based learning model with the case study method that has been applied. At the evaluation stage, it is necessary to first determine the evaluation criteria, choose the right evaluation tool, then carry out an evaluation. Conducting effectiveness assessment which includes cognitive, affective and psychomotor. While doing the 4C assessment (critical thinking, collaborative, creativity and communication) through observation sheets.

The results of the independent sample t-test obtained are known *levene test* of 5,714 with a probability of $0.020 < 0.05$, then it has the same variance. Then the value of *tcount* at equal variance assumed is 8.891 with a significance probability of 0.020 (two tailed) and at $t_{table} = 8.891$. Then $tcount > t_{table}$ or $8.891 > 1.703$ therefore H_a is accepted and H_o is rejected.

DISCUSSIONS

The development of the industrial revolution 4.0 allows for learning innovations, one of which is student-oriented learning to facilitate learning activities. Therefore, there is a need for preparation, clear steps in the application of learning. It should also be noted the role of the teacher, the role of students and learning activities. As well as maximizing the use of learning in each phase according to the steps to increase the effectiveness of learning. To combine learning that is relevant for now related to technological developments in the era of the industrial revolution 4.0 and learning in the XXI Century, so that the learning process is needed, namely by using a clear learning model in accordance with the procedures for the stages of implementing the model. (Aabla, 2017), (Menggo et al., 2022), (Naredi et al., 2022).

Vocational education in Indonesia generally aims to prepare and produce graduates who have the skills to be able to enter the world of work and continue higher education, but prioritize being ready to work. Vocational Education aims to prepare graduates for employment (Lucas, B., Spencer, E., & Claxton, 2012), (Amir, 2013), (Sofyawati et al., 2022) Vocational education aims to create education that is characterized and achieves the expected results to describe students and lecturers who have characteristics and have competence with effective vocational learning. Thus, to strengthen graduates who are ready to work, students are equipped with complex and simple skills through effective learning techniques.

PBLmCS is an educational model that presents real problems as a context in which students learn critical thinking and problem solving skills and acquire knowledge (Shoimin, 2017). PBLmCS is an education and curriculum development system that creates interesting critical thinking techniques as well as important information and skills, placing students in the role of regular problem solvers that are not well organized. (Shoimin, 2017) The PBLmCS model tries to solve problems through several stages of the scientific method, so that students can learn knowledge related to the problem. At the same time, students are expected to have problem solving skills (Thursday, 2017), (Sudarman, 2020), (Fakhriyah, 2016).

Needs analysis is an initial investigation of the need for a Problem Based Learning model with the Case Study method in refractive clinic courses to collect information in the form of observations (observations) and distribute questionnaires to identify problems in the field, analyze the objectives and content of refractive clinic courses, analyze characteristics, analyze the needs of the model that includes perceptions, experiences and needs in model development, as well as analyze the needs of the components of the learning model.

At this stage, a literature review was also carried out as the initial stage of developing a Problem Based Learning learning model with the Case Study method. This was used to analyze theories and concepts related to the development of a Problem Based Learning learning model using the Case Study method. with the topic under study. The source is of course based on relevant references such as books, national and international scientific journals, and other sources in writing, both printed and electronic. The results of the literature review to examine in depth and draw conclusions from the development of the Problem Based Learning learning model with the Case Study method

The needs analysis and the results of preliminary research become a reference in developing Problem Based Learning model with the Case Study method and its supporting products such as model books, textbooks, lecturer manuals, and student manuals. Besides that, it also studied aspects of philosophy, psychology, culture and the development of science and technology to make a development of a Problem Based Learning learning model with a rational case study method.

Theoretically, building a model consists of five elements, namely (1) Syntak / operational steps of learning, (2) Social System; atmosphere and norms that apply in learning, (3) Principles of reaction; describe how lecturers should view and treat students, (4) Support system; all facilities, materials, tools, or learning environment that

supports learning, and (5) Instructional and nurturant effects; the learning outcomes obtained are directly based on the goals set and beyond those specified. The model development carried out has resulted in a product in the form of a problem based learning learning model with the case study method at the Optic Refraction Academy YLPTK Padang, while the products produced include: (a) books models, (b) textbooks, (c) lecturer manuals, and (d) student manuals.

As for the results of suggestions and recommendations given from experts to the model book, namely from Dr. Ridwan.M.Sc.Ed, are: 1) create a clear conceptual framework, 2) additional hypothetical models of exiting the Problem Based Learning learning model with the Case Study method, 3) add novelty, 4) describe the model architecture, 5) the syntax that developed by developing a case study model, 6) turning teaching materials into textbooks so that there is a little evaluation in learning, 7) dick and carry interactive analysis so that the learning objectives of the lecturer's guidebook are clear. In the book, lecturers are assisted in cognitive, affective and psychomotor aspects. Advice from prof. Dr. Niswardi Jalinus.M.Pd 1) turn teaching materials into textbooks by meeting textbook standards, 2) add case study methods, 3) in textbooks, there is no need to make RPS, SAP is made in an appendix, 4) validation of the contents of the model book, 5) the case is also validated, and other instruments are also validated. Advice from Dr. Fahmi Rizal. M.Pd include 1) adding one model to enrich the model, 2) adding the syntax must be clear on the source, 3) combining the two models so that updates or novelties appear, 4) add existing (studying the models found). Suggestions from Prof.Dr.Ambiyar.M.Pd, are: 1). Pay attention to the writing according to the EYD, the sentences are very long, 2) Describe the rationale related to the refractive clinic course, 3) Combination of the two models so that it looks novelty. There needs to be reasons and arguments for taking the Problem Based Learning model with the Case Study method. .Furthermore advice from Maya Safira, Practicality of Problem Based Learning Learning Model with Case Study Method with practicality test measured through the use of Problem Based Learning learning model with Case Study method in refractive clinic courses, testing was carried out with lecturers and students. For the practicality of lecturers, including the practicality of learning model books, the practicality of textbooks and the practicality of lecturer guides, the average score is 0.870 in the Practical category. Meanwhile, the student practicality assessment, which includes the practicality of the learning model, the practicality

of textbooks and the practicality of student guides, has an average score of 0.860 in the Practical category. It was concluded that the practicality assessment of lecturers and students stated that the entire product produced had practical value.

The results of testing the effectiveness of the cognitive, affective and psychomotor aspects were then followed by a post-test in the experimental class and the control class. Assessment on the Cognitive aspect to determine the level of success of the extent to which students' mastery of theoretical studies in refractive clinical courses that contain cognitive levels. The experimental class learning outcomes are higher than the experimental class learning outcomes.

The developed model is classified as a model *Problem Based Learning* with a valid Case Study method, which produces a model book product *problem based learning* with the case study method, textbooks, lecturer manuals and student manuals. The model developed is also quite practical, so it can be used in learning. Whereas for The final achievement of students is the application of the Problem Based Learning model with a valid Case Study method, this increases students in the refractive clinic course. After students learn through the Problem Based Learning model with a valid Case Study method, there is an increase in students from learning traditional (Pangestu, 2021)). Therefore, the problem-based model *Learning* with a valid Case Study method plays an important role in providing effective learning in vocational education. In line with the findings (Order, 2022), (Nur'aini, 2020), (Ramadhani et al., 2019), (Kinard & Parker, 2007) through model *Problem Based Learning* with a valid Case Study method in vocational education can be used to develop level abilities.

CONCLUSION

The results of the analysis and development of problem based learning models with the case study method, the following conclusions are obtained:

Model *Problem Based Learning* with the resulting Case Study method in vocational education, is a learning model using *Problem Based Learning* with the Case Study method. There are elements of soft skills with 4C skills in solving refractive clinic cases, containing elements of collaboration, communication, critical thinking to analyze, argue, make conclusions and creativity in solving refractive clinic cases. The development of this model also produces a model book product *Problem Based Learning* with a valid Case Study method, refractive clinic textbooks, lecturer manuals and student manuals. This research has

produced a Problem Based Learning model with a valid Case Study method in the refractive clinic course, with the following model syntax: 1) Student orientation in case 2). Diagnosing cases .3). Prepare an action plan (action plan) 4). Collecting information/data. 5) Determine the best solution 6) Conduct case evaluation. 7) Presentation of findings. 8) Reporting the findings

Product validity and support for Problem Based Learning models with valid Case Study methods in refractive clinic courses include Problem Based Learning model books with valid Case Study methods, textbooks, lecturer guides, and student guides. Products on all aspects of the assessment are categorized as very valid, as evidenced by the analysis using the Aiken's V test, so that it is concluded that the Problem Based Learning model with a valid Case Study method can be applied in learning.

The practicality of the Problem Based Learning model with a valid Case Study method can be seen from the overall good implementation of the use of the model. The results obtained from the lecturers have a practical category and the results from the practicality of students are also stated to be practical.

The effectiveness of the Problem Based Learning model with a valid Case Study method has been measured covering aspects of the cognitive domain in the experimental class students and the control class using conventional learning models. Result proven model *Problem Based Learning* with a valid Case Study method more effective.

IMPLICATION FOR THE PRACTICE

1. The learning model produced by the Problem Based Learning learning model with the Case Study method is relevant for carrying out XXI Century learning which includes critical thinking, creative, communication and collaboration skills and the era of the industrial revolution 4.0 such as data literacy, technological literacy and human literacy.
2. The results of the research on the development of a Problem Based Learning model with a valid Case Study method and a support system in the form of a Problem Based Learning model book with a valid Case Study method, textbooks, lecturer guide books, student guide books that are valid, practical and effective. In general, the Problem Based Learning model with a valid Case Study method allows students to learn flexibly, and can improve students' creative spirit. The developed model is also packaged effectively. Problem Based Learning model

with a valid Case Study method can strengthen cognitive aspects.

3. It is necessary to collaborate between lecturers who support clinical refraction courses with other courses, so that all courses in Vocational Education can use the Problem Based Learning model with a valid Case Study method in learning activities.
4. It is necessary to disseminate the findings from the development of the Problem Based Learning model with a valid Case Study method in study programs, departments, faculties and in Vocational Education in a comprehensive and sustainable manner, in order to be able to overcome learning, improve the quality of learning so that the graduates produced have competence in the XXI Century which includes 4C, competence in the industrial revolution 4.0 and being able to think at a higher level.

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