

# Analysis Of Procedure And Process Of Expert Assessment Of Modification Of Inquiry Models On Biology Learning

Indah Kencanawati, Asni Johari, Revis Asra, Syaiful

**Abstract:** The aim of this research to analyze procedures and process of expert assessment of modification of inquiry models which is focused on the Theory-driven type F1-O1-S1-A1 conceptual development research on biology learning. This research involved expert reviews in synthesizing the modification of inquiry models procedure. In this research process of expert assessment was measured by using an observation sheet, which consisted of ten statements to get information about the expert's views of the analysis process of the modification of inquiry models on biology learning, while the process of expert assessment of modification of inquiry models was observed throughout Delphi technique. The results showed procedure of modification of inquiry models using the conceptual learning design procedure type F1-O1-A1-S1 consisted of seven stages, namely: analysis of problems, formulating hypotheses, collecting data, comparing communication between groups, making conclusions, communicating results and reviewing result through critical analysis. The expert's assessment begins with determining the objective of the assessment, preparing the assessment instrument, determining the assessment technique and determining the expert. The results of the expert assessment was observed throughout in-depth interviews using the Delphi technique show that the modification of inquiry models was good and very good categories. This showed analysis procedure and process of modification of the inquiry models is feasible to be implemented for the next stage (implementation stage) on biology learning.

**Index Terms:** procedure of modification, process of expert assessment , inquiry models, biology learning

## 1 INTRODUCTION

The learning model is one of the learning tools needed in carrying out various activities in the learning process. The learning model is focused on how educators (lecturers, teachers) transform information, so that the learning process and objectives can be achieved. The learning model has a basis for thinking about what and how students learn, teaching behavior in line with the model applied and a conducive learning environment in line with logical theory in accordance with the creators or developers {1}. Effective learning models must understand diverse educational contexts and be responsive to learning situations and provide new understanding in the learning process {2} Many models were not developed through a significant process or a more systematic study {3}. System validation and implementation tends to be broader than the literature on model building {4}. The philosophical orientation and theoretical perspective frame the construction concept of a model, so that the greater the suitability of the theory and the philosophical context in which the model will be applied, the greater the effectiveness of the applied learning model. Previous research has shown that the main activity of inquiry depends on the subject {5}. One of the models of inquiry based on the learning cycle modified by Gallagher aims to improve critical thinking skills and argumentation in science which has different stages in the inquiry process. Learning models generally only provide conceptual diagrams without operational tools {6}, so that the characteristics of a model and procedural models must be considered. Some of the research that has been done is still general in nature and not specific to certain contexts and

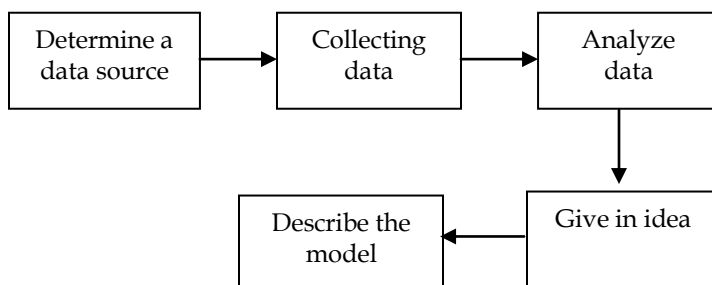
content. This makes it difficult to determine an inquiry model that fits the context and content the researcher wants to apply. A good inquiry model is to include learning theory and the context in which the inquiry learning design model will be applied {7}. The diversity of themes, learning activities and syntax stages according to the expert's view provides opportunities for syntax development / stages of inquiry models based on the inquiry process. Questions in science learning include model development, adjustment of variables in experiments or simulations, inquiry and curiosity. It is generally known as a spectrum of inquiry that can help students develop a broader range of intellectual and scientific processing skills models {8}.

The need for an analysis of the inquiry model modification procedure to connect all the supporting variables in biology learning, the appropriate design model used is an eclectic design learning model, where the design of this model combines several learning theories to build learning experiences. Model modification design (eclectic) with a cognitive approach to the basic theory of science and constructivist knowledge focused on the research process carried out and building scientific knowledge with creative ideas developed and used to study content, processes with a scientific approach with the stages of the scientific method to develop critical thinking {9}. In detail the procedure for modification of the inquiry model describes each stage that must be passed, namely formulating problems, formulating hypotheses, collecting data, comparing communication between groups, making conclusions, communicating results and reviewing results through critical analysis oriented to critical analysis of relevant research results. and continuity of monitoring in biology learning. The expert assessment process begins with the determination of the objective of the assessment, the preparation of the assessment instrument, the determination of the assessment technique and the determination of the expert. The need for analysis at each stage of the procedure and expert views in modifying the inquiry model are the basis for the research process carried out.

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## 2 RESEARCH METHOD

The research used conceptual development method and descriptive, which aims to create a systematic and factual description of the facts of a population. Descriptive research aims to make systematic, factual, and accurate descriptions, descriptions, or paintings of the facts, the properties of the relationships between the phenomena being investigated to find out and investigate a situation or condition whose results are presented clearly and transparently. The procedure for modifying the inquiry model is compiled following the synthesis procedure of Lee and Jang. The development procedure used is the F1-O1-S1-A1 type of conceptual instructional design with a theory-driven approach through a literature review which functions to connect variables or activities in the learning design. The research design is described in (Figure 1). The research subjects in this study consisted of four teams of validation experts who analyzed the inquiry model preparation procedures. The validation sheet contains a rubric in the form of statements that lead to expert views and revisions in the inquiry model analysis procedure for biology learning and is supported by in-depth interviews to obtain correct information on each stage is feasible to be implemented on biology learning. The validation process is carried out in two stages, namely internal validation and external validation {10}. Internal validation is validation that is theoretical in nature that involves developers, experts who master certain fields regarding components and model use. Internal validation of the component aspects of the model is encapsulated in a product that focuses on integrating the model with its usability. Product validation was carried out using the three-round Delphi technique using a list of interview questions (open questionnaire). The stages of the external validation process are focused on the characteristics of the model.



**Figure 1.** Conceptual Development Design

External validation is carried out after obtaining the feasibility of the implementation process from the validator at the internal validation stage. The Delphi technique is used to obtain in-depth information from experts about modification of the inquiry models procedure

## 3 RESULT AND DISCUSSION

### 3.1 The preparation of a modified inquiry model procedure based on the Theory-driven conceptual Instructional Design Models approach through a literature review type F1-O1-S1-A1.

The inquiry model modification procedure was developed in

five stages with a combination of function (F), origin (O), source (S) and schematic analysis (A) type F1-O1-S1-A1, including: (1) determining data sources based on basic theory from the conceptual model developed; (2) collecting data by reviewing relevant literature; (3) analyzing the data by identifying and re-conceptualizing the variables / activities related to inquiry from the literature to produce model components; (4) giving ideas by creating a logical network between the components of a conceptual model based on the relationship between variables / activities; and (5) describe the model by making a conceptual model of the existing components using a flow chart. The modification procedure stage consists of five stages, starting with the first stage, determining the basic theory studied is a theory related to eclectic learning theory with a cognitive approach to the basic theory of scientific knowledge and constructivism focused on the process of building scientific knowledge with creative ideas {11} and the pattern of scientists working in an inquiry process developed using the stages of the scientific method. The second stage, conducting a literature review in exploring, collecting, analyzing and synthesizing theories related to inquiry processes and models so that it helps researchers understand the theoretical aspects of the research topic being carried out {12}. The third stage, the involvement of the expert team with the flow of eclectics' so that it has an open nature in accepting different paradigms in existing learning designs. The choice of an eclectic learning model design must be based on its contribution to the modification of the inquiry model and its application in various activities as well as the clarity of each model component that has the same type of analysis and stages. The resulting process model will be more systematic and dynamic {13}. The fourth stage, explains the new ideas that have emerged based on the previous stages that have been carried out (first, second and third stages). New ideas that emerge can be developed systematically in designing learning based on the experiences that have been obtained. Syntax construction in the modification of the inquiry model describes the learning process that involves dialogical activities and interactions {14}. Syntax in the modification of the inquiry model cannot be separated from the activities in which knowledge is constructed, and where meaning is created, and from cultural communities where knowledge is disseminated and applied. In learning with this inquiry model approach, students will be faced with a problem that must be observed, studied, and observed, which in turn can improve understanding of the concept of courses in learning activities. Logically, if student participation increases in learning activities, it will automatically increase understanding of the concept of learning material, and in the end it will be able to improve critical thinking skills {15}. The fifth stage, the procedure for modification of the inquiry model based on the pattern of working scientists is developed to answer the challenges of the 21st century in understanding, using and interpreting scientific explanations of science, producing and evaluating scientific evidence and explanations, understanding the nature and development of scientific knowledge and participating productively in scientific practice. in the learning process {16}. The modified design of the inquiry model by combining cognitive and constructivist learning theories trains students in constructing, modifying, updating, revising, and changing new information in generating creative ideas.

### 3.2 Expert assessment about the procedure for drafting

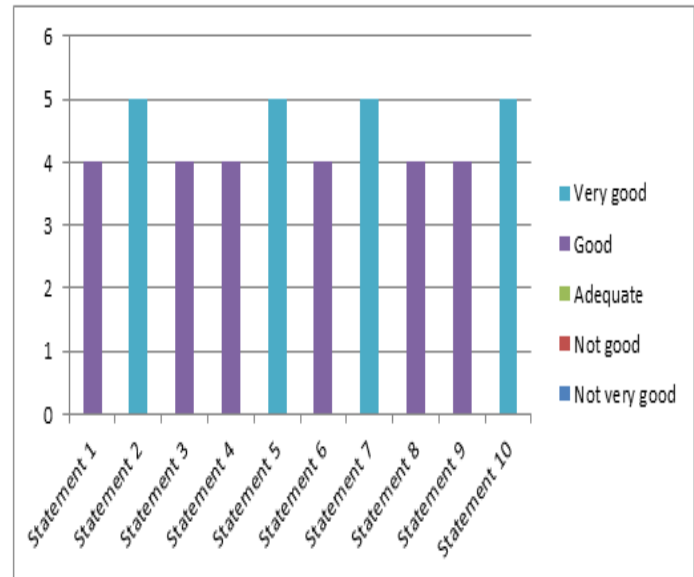
### the concept of modification of the inquiry model

Expert assessment (expert review) in the preparation of the inquiry model modification procedure consists of ten statements aimed at obtaining input and expert opinion on the main substance of the product being developed. The data of expert assessments carried out are described in Table 2 below:

**Table 2.** Expert assessment of the modification of inquiry models

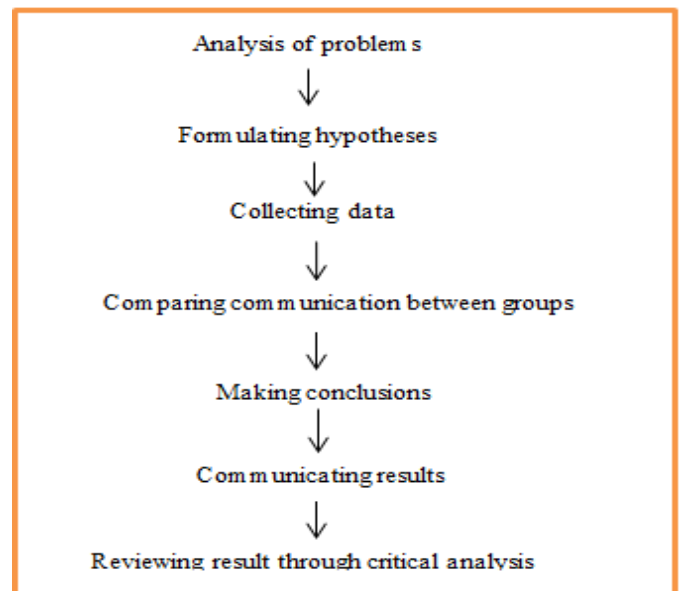
No	Rated aspect	Assessment				
		1	2	3	4	5
1	All stages contained in the preparation of concepts are needed in the modification of the inquiry model				v	
2	The stages contained in the preparation of the modified model inquiry procedure that have been developed are arranged in a systematic sequence					v
3	The stages of modification of the inquiry model that have been developed in accordance with learning theories and patterns of scientists work in stages of the steps of the scientific method				v	
4	Synchronize modified image of the inquiry model that has been developed in accordance with the steps of the inquiry syntax				v	
5	The stages of modification of the inquiry model that have been developed are easy to use for both beginners and senior lecturers in preparing for learning					v
6	Modified inquiry models can actively involve students in learning activities				v	
7	Modification of the inquiry model can produce an efficient learning process to improve critical thinking skills, argumentation, scientific attitudes and self-efficacy in learning					v
8	Modification of the inquiry model that has been developed can be implemented in lectures on the anatomy of the physiology of the human body				v	
9	Modification of the inquiry model that has been developed is easily implemented by lecturers, both beginner and senior lecturers in the anatomy of human body lectures				v	
10	Evaluations and assessments are clearly stated on the modification of the inquiry model					v

Based on the assessment given by the expert team and in-depth interviews using the Delphi technique, it is known that the inquiry model modification procedure is generally in the good and very good categories. This shows that the inquiry model modification procedure is feasible to be implemented for the next stage (implementation stage) on biology learning. The expert team's assessment of the inquiry model modification procedure based on the validation sheet assessment is described in (Figure 2) below:



**Figure 2.** Expert assessment of the inquiry model modification procedure

Based on the assessment process and validation results obtained from in-depth interviews, the modification stage of the inquiry model is obtained, described (Figure 3) as follows:



The stages of modification of the inquiry model through three rounds of validation using the Delphi technique, namely: First, this stage consists of 10 (ten) questions in the form of an open questionnaire. The questions prepared were adopted, adapted and modified from the validation questions developed by {17}. These questions contain matters relating to the product being developed. Ten questions were prepared for the validation process of modification of inquiry model. The second, this stage is a continuation of the first round of validation, after the revision was carried out in the first cycle with 10 (ten) questions on the validation process of modification of inquiry model. The third, this stage is the final stage of the validation process after collecting data on the validation results of

products in the first and second cycle. The third round of validation contains one question about the feasibility of implementing the product developed after going through the revision stage. Based on the answers given by the validator, the part of determining the final form / description of the model to be applied at the implementation stage can be continued. The stages of the external validation process are focused on the characteristics of the model, carried out after obtaining the feasibility of the implementation process from the validator at the internal validation stage

#### 4 CONCLUSION

Based on the results of data analysis and discussion in this study, it can be concluded that the inquiry model modification procedure consists of seven stages, starting from formulating problems, formulating hypotheses, collecting data, comparing communication between groups, making conclusions, communicating results and reviewing results through critical analysis. In general, the expert's assessment process regarding the modification of inquiry model procedure is in the good and very good categories, so it is feasible to be implemented on biology learning.

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