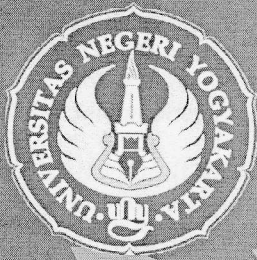


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IMPROVING THE QUALITY OF CARE AND QUALITY ASSURANCE ASSESSMENT IN LEARNING SCIENCE THROUGH LABORATORY-BASED INTEGRATED DEVELOPMENT OF CMI (COMPUTER MANAGED INSTRUCTIONAL)

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Abstract

The purposes of this study were (1) to develop CMI (Computer Managed Instructional) for the management of an integrated science-based practicum laboratory with a focus on service and value systems, (2) to overcome the problems that occurred in practice management through collaboration between faculty and students, so that all parties could mutually benefit (reciprocity of benefits), and (3). To develop the design and implementation of strategies in an integrated lab-based science laboratory database as input to the development of CMI. The results of the study are (1) The carrying capacity of a computer-based information systems was still very low to be used in conducting laboratory management in the Science Education Program, Faculty of Mathematics and Science, (2) Utilization of CMI could improve service quality and quality assurance in the laboratory science, (3) in the laboratory organizational structure was also empowered as a function of laboratory manager laboratory management system so it needed no intensive special training, and (3) There are ten aspects assessed in the lab activities in Science Education Program, namely (a) observing skills, (b) the skills to analyze the data, (c) skills to communicate the results of the experiment, (d) practical reports, (e) skills using tool, (f) measurement accuracy, (g) discipline, (h) honesty, (i) persistence, and (j) teamwork.

Keywords: *Computer Managed Instructional, lab-based learning, quality assurance*

Introduction

An integrated lab-based science laboratory at Faculty of Mathematics and Science, Yogyakarta State University (YSU) followed by almost all students of science education from a variety of forces, which is attended by about 250 students. This of course resulted in quite the complexity of managing lab activities, ranging from scheduling, monitoring, provisioning, implementation of pretest, practical implementation, guidance or assistance activities until at last assessment. This condition is sometimes caused primarily length assessment management for nearly 2000 file reports each semester (250 x 8 topics practicum students). For this reason it is considered very necessary to improve the management system in the management of this lab. To given the advances in the computer field has enabled it to be tested in this study was developed CMI (Computer Managed Instructional). CMI is used as a teaching aide increasing administrative function, such as the recapitulation of student achievement data, database worksheets, laboratory administrative

activities such as student data records, lab reports and assessments.

Studies in Science Education, Faculty of Mathematics and Science, YSU, has provided quite a lot of computers connected to the Internet network that is easily accessible to students. This kind of facility is very supportive to develop CMI can be accessed by faculty and students through the existing internet network. Students are provided information about the practicum. In addition, it can also be arranged structured tasks and some questions related to lab materials as deepening understanding of the concept. It is important that the process of practical implementation can run well.

Another problem that arises based on the results of preliminary observations and guiding experience in an integrated lab -based science laboratory during the past few years it is still a lack of independence of students who may be an obstacle in the development of CMI 's other

problem is still not revealed dioptimalkannya existing computers in developing management lab activities. If this problem is left it is feared lab management is not optimal, or the same as previous years[3]. Based on the revealed problems it is necessary a realistic activity in the form of learning for CMI development of integrated lab-based science laboratory. The general objective of this study was to increasing the quality of processes and products in an integrated lab -based science laboratories through the development and implementation of CMI that is used primarily for administration and scoring. While the specific objectives are [4]: (1) CMI to develop an integrated management practicum laboratory-based science with a focus on service and value systems, (2) address the problems that occurred in the management practice through collaboration between faculty and students, so that everyone can reap the reciprocity of benefits, (3) develop the design and implementation of strategies in an integrated lab-based science laboratory on the basis of the data as input for the development of CMI, (4) an inventory of the constraints that exist as a material consideration for reflection and implementation of subsequent research.

Research for the development of CMI for improvement quality and administrative processes in an integrated lab-based science lab provides a positive contribution both from the aspect of matter (content) that can be seen from the material and tutorial system through the Internet, methods and approaches using communication technology that is easily accessible, the evaluation system more quickly and efficiently, and come out in the form of student independence, which is directly related to quality improvement in an integrated lab -based science laboratories in both the practical and theoretical level [5].

Method

Research for the development of CMI for quality improvement and administrative processes in an integrated lab-based science lab provides a positive contribution both from the aspect of matter (content) that can be seen from the material and tutorial system through the Internet, methods and

approaches using communication technology that is easily accessible, the evaluation system more quickly and efficiently, and come out in the form of student independence, which is directly related to quality improvement in an integrated lab-based science laboratories in both the practical and theoretical level.

In accordance with the objectives of this research, to improve the quality of integrated lab-based science laboratory to develop CMI, the developed approach to research and development (R&D). In the process of developing learning materials development model oriented contextual approach used Four-D model developed by [1] which consists of four stages: definition, design, development and deployment.

Borg and Gall [2] propose a series of steps that must be taken in its approach to R&D, namely "Research and information collecting, develop a preliminary form of the product, preliminary field testing, the main product revision, playing field testing, operational product revision, operational field testing, the final product revision, and dissemination and implementation ". If these steps are followed correctly, it is assumed that education will produce a product ready to be used at the class level of learning. According to [2], the stages of research and development put forward Borg and Gall can be simplified into four main steps are simpler to be a model 4-D cycle (Define, Design, Develop, Desemination). Based on the opinion of the steps being taken in this study are:

1. Defining Stage (Define)

The purpose of the definition phase is to establish and define the needs of teaching based on preliminary studies. In establishing the teaching needs to be considered include the circumstances sins learning in the classroom learning, developmental levels of students, and the syllabus used. At this stage of defining the characteristics examined in an integrated lab-based science laboratories, ketapatan learning outcomes and evaluation tools need to be integrated lab-based science laboratory. Through this phase is obtained, among others, the problems that arise in learning.

2. Stage Design (Design)

The purpose of this stage is to design or plan a form of learning devices. Included in this phase is to describe the indicators of achievement of learning outcomes based on the basic competencies to be achieved. Of these indicators will be grating evaluation capabilities using measuring devices. In this stage also carried out planning, including; defining skills, set goals, determine the order of presentation of the material, and small-scale evaluation that can be applied.

3. Phase Development (Develop)

At this stage of the learning examples that will be used was developed. The steps being taken are:

- Develop the initial product forms, including by preparing teaching materials, reference books, and evaluation tools.
- Initial field tests (on a limited basis). Carrying out interviews, observations, questionnaires, to collect data and analyze it.
- Major product revision, revised in accordance with the recommended products in step b.
- Revised semi-finished products, performed by a step d.
- Revision of the finished product, implemented based on suggestions from the field test of semi-finished products (step f)

4. Phase Pendesiminasian (Deseminate)

The purpose of this stage is mendeseminasikan results and distribution of finished product in the form of a script so learning devices are used in classes pemebelajaran. Deseminasi and distribution of finished products in the form of a script so the set of professional meetings and in journals. Finally, for the implementation of quality assurance of the finished product quality control needs to be done on the basis of predetermined quality standards.

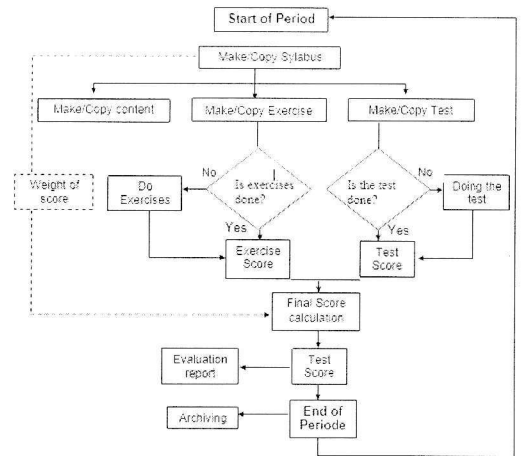


Figure 1. Flow chart computer-based assessment program within the framework of the CMI

Results And Discussion

Planning stage in product development according to the needs expressed in the results of observations in the form of computer-based assessment program within the framework of CMI laboratory [6]. The development is carried out in this study is fully started and is based on the planning process at this stage. Delineation process or made a rough sketch used as an ingredient in the manufacturing process flow maps or flow charts are a core part of the initial process of product development.

This plan includes the preparation of the program framework in the form of a flowchart (flowchart) that describes the basic components and functions of the program are developed in Figure 1.

The assessment program is basically operated via a computer network comprising a server computer and some computer users (clients) [7]. The computer serves as a central computing server also functions as a data storage medium (database). while the user computers used to access the program in the learning process. In this case there are two types of users are administrators (teachers/lecturers) and user/user (student/student). Therefore, this program is basically organized into two types of pages (pages)

that the page administrator that serves to supply the data required various purposes in learning as well as manage all of the components on the program, and user page/user page is intended as learners to access a variety of learning needs through this program [8].

The developed program content is divided into several menus that are tailored to their respective functions on each type of page, both the page and the page administrator user. Some menu on page administrators are [9]:

- 1) Directive, provides general information about how to use and some things that need to be prepared before starting the learning through this program.
- 2) The teaching period, a menu to adjust the teaching period data as well as initial point of commencement of learning through the assessment program.
- 3) Syllabus, is a data set menu syllabus. Weight rating calculation is used as a reference in the assessment of this program is set in this menu.
- 4) Learning Materials, a menu to adjust the presentation of learning materials. The material can not be made if the teaching period or syllabus is not yet available.
- 5) Exercise, a menu to adjust the making exercises. There are three types of questions in the multiple choice questions, true - false, and multiple answers.
- 6) Test, a set menu item construction and testing are also available in a matter of three types namely the type of multiple choice, true - false, and multiple answers.
- 7) Student Account, a menu that displays account data of students enrolled in the program this assessment.
- 8) Academic Information, a menu that presents the values of the student when the student has been doing exercises or tests are presented. The values are presented consists of numeric values and letter grades, either for training or value of test scores. Additionally it also served as a general statistical information relating to the values presented.
- 9) Records, a menu that functioned as storage files in the previous period so that learning can be accessed again if necessary.
- 10) The setting of CMI, is a set menu some administrative purposes in the program which consists :
 - a) Setting class, which is used to add and change grade class. Classes that have been added can not be removed, because it relates to some of the data in the database and associated with the data - the data in the archive.
 - b) Registration Service, which is used to open or close the registration services to mahasiswa. Layanan this registration should be closed when all students have registered so as to minimize the existence of the accounts are not valid.
 - c) Setting the Student Account, which consists of setting to reset (reset) the password if required and students to change the settings on the student class.
 - d) Change Admin Password, functioned to change the administrator's password.
- 11) Account, a menu that presents information administrator account data such as user ID, Name, NIP, Status, Date and Date Last Access list.
- 12) Logout, in the form of a link to exit the program. About CMI, which contains general information about CMI (Computer Managed Instruction).
- 13) Profile, containing information about the program developers.

While some of the menus on the page regular users (students) are:

- 1) Directive, a menu that provides general information about how to use and some things that need to be prepared before starting the learning through this program.
- 2) The period of the Doctrine & Syllabus, a period that presents a menu that goes along with the teaching syllabus that is used as a reference in the study.

- 3) List of exercises, a menu that lists latihan yang provided. In this menu the students can access and work on the exercises.
- 4) List of tests, a menu that lists yang disediakan test if the test is more than one. In this menu the students can access and work on such tests in realtime.
- 5) Academic Information, a menu that contains the information value of the exercise and the student test scores. Values presented consists of numeric values and letter grades.
- 6) Change Password, namely the menu to change the account password the students concerned.
- 7) Account, a menu that presents information on the student account data such as user ID, Name, NIM, Class, Status, Active Period, Date and Date Last Access list.
- 8) Logout, in the form of a link to exit the program.
- 9) About CMI, which contains general information about CMI (Computer Managed Instruction).
- 10) Profile, containing information about the program developers.

Operationally, the two types are separated based on the status page the user (administrator or user) so that when the user accesses the program in question need to enter the User ID and Password on the main page (login). The registration process is done once pada saat administrator of this program was first installed at the time of login which is accessible for the first time the registration link provided administrators. While the registration process the user (student) is set during the period of the teaching and syllabus are available [10].

This assessment program was developed through writing courses in web programming language that is based on the results of the above planning. As for some of the main software used to create and develop this program are:

- 1) Apache, is software that is used as a server to accommodate the file - file program.

- 2) MySQL database, which is software that serves as a database for storing data - program data such as account data, the period of the teaching, syllabus, materials, exercises, tests, the data value and some other related data.
- 3) PHP, a programming language that is at the same software that is used to translate the program steps of human language into computer/machines.

While some support software used are :

- 1) Notepad + +, a text editor software for writing programs.
- 2) Adobe Dreamweaver, the software for the design of the page as well as writing the program in the text editor.
- 3) Corel Draw and Adobe Photoshop, a software used to design the required images in page creation program.

The whole process of making and development planning program based on the results compiled and adapted to the requirements formulated in the basic objectives of this study. The results of the development of the program in the form of a web - based application program whose main function is to accommodate, modify and save content that is required in the learning process and calculate the corresponding value of existing procedures and workflows that have been prepared.

Computer-based assessment program within the CMI framework aimed at laboratory -based learning is essentially created and developed by the foundation as elearning with combined based on the basic principle of CMI (Computer Managed Instruction) the ability to collect a variety of information related to the learning process (gather information), store (store), update (update), take (retrieve), analyze (analyze) and report the information (reports the information).

The development of the overall program is based on the reference algorithm depicted in the flow chart has been prepared as presented in the flowchart assessment program within the framework of a computer-based CMI). Basic principle operational assessment programs are to be per each teaching period means that there is learning content on the program is fully bound in one period so that the assessment process is done entirely in the data period ongoing teachings. Besides the teaching period can be regarded as the gateway over other learning components such as syllabi, learning materials, exercises and tests.

The assessment process is done based on the availability of the data needed is when the practice or testing done by the users (students). Automatically each exercise or test is completed, the program calculates the value directly obtained and presented in a numeric value or the value of the letter. The reference to the conversion of a numeric value into a letter grade that is used in the assessment process based on the Standard Assessment in Academic Regulations Yogyakarta State University in 2006, CHAPTER VIII Article 29, paragraph 4 of that final value is converted into an A, A -, B +, B, B -, C +, C and D are the standard and number/weight set.

As for some of the main points are used as references in the development of the assessment program are as follows :

- a. The learning system is programmed in one period teachings.
- b. Syllabus as a reference signs in the learning process can only be issued if the teaching period has been opened. The syllabus is also a reference in the assessment process in which the final score ratings are based on the amount of weight training and test weights.
- c. Learning materials as a source of learning material or can be made or arranged with content updated information where it relates to the ease to change/update Opera necessary. In the process of making/publishing of learning materials can not be done if the syllabus has not been formed/no.

- d. Exercises and tests as the basis for examining understanding of the concept presented in a matter of three types namely the type of multiple choice, true - false and multiple answers. In the assessment process serving/weight training and assessment for the test based on the weight of assessment in the syllabus.
- e. Academic information as the presentation of the values achieved are presented in the form of an informative and provided in the format of numbers and letters.
- f. Archiving is done when the teaching period has closed. The data in the archive can be accessed at any time if necessary.

As described in the earlier stages of planning at the top where the program has two types of users are administrators (teachers) and user (student). Program is basically organized into two types of pages (pages) that the page administrator that serves a variety of purposes to supply the required data in the study and manage all of the components on the program, and user page/user page is intended as a student to access a variety of learning needs through this program.

2. Distribution Aspects of the Validation Program

Product/program developed a kind of electronic products/digital operation which requires a computer device. Therefore in this product validation process required several aspects related to the basic functionality of programs/products developed. As for the aspects required in the validation process of the program are as follows :

- a. Aspects of the interface and navigation, an aspect that needed to reveal product quality in terms of general use and functions of the navigation program page.
- b. Aspects of access rights, intended to assess the degree of consistency in the diversion program and the presentation of the appropriate type of user pages. This is because there are two types of customized user is an administrator (educators) and user/users (students).

- c. Aspects of the input-output process, intended to assess the suitability of the input data to output data in the program.
- d. Aspects of assessment calculation functions, an aspect that is needed to assess the suitability and correctness assessment process in the learning process through a program/product.

3. Distribution Aspects of the Program Assessment

As in the validation process of the product program, also required the formulation of aspects in the assessment process by the user program with the aim to find out some information related to the use of aspects.

As for the necessary aspects of the assessment process by the user program is as follows :

- a. Convenience aspects, namely whether or not related to the operation of the program is easy to activate functions.
- b. Benefit aspect, an aspect that is needed to assess the usability and usefulness of the basic functions of the program, namely in terms of assessment of learning.

4. Results Validation Program.

Based on the data analysis program validation can be seen that the achievement assessment scores in the aspects of access rights, aspects of the input - output functions and aspects of assessment calculations have rerataskor uniform amount that is equal to 5.00. As for the aspects of the interface and navigation got a mean score of 4.66. It can be explained that the presence of less value in the aspects of the interface and navigation caused by the level of clarity of navigation points on the session type operation, where it relates to not include a button to return to the previous page. It is also at the same time as the points are used as the point of repair/revision program developed. As for other aspects ie aspects of access rights, aspects of the input - output functions and aspects of assessment calculations have been insufficient for general use.

It has been mentioned that the feasibility of the product/program being developed will be

categorized worth taking if the value of the final validation ber kriteria ' good ' by substituting the value obtained to the reference criteria of an ideal assessment scale of five categories (1-5), which was adopted from the [11]. Through calculating the value akhir validasi products/programs for every aspect of the obtained values of 4.28 akhir validasi. It can be concluded that the product/assessment program that has been developed is a product unfit for use by the criteria gets ' very good ' in the assessment of the five ideal scale (1-5).

5. Results Assessment Program

As in the analysis of the data regarding the assessment of the program by the user it appears that both aspects for user convenience administrator/faculty and student users scored higher than the expediency aspect. It can be based on several related materials referenced Things repair/revision of the product such that the absence of further clarification on the feedback on the exercises or tests and not supporting the optimal placement of images on the page program. Through obtained values on the results of this assessment it is Thus Obtained an overall score of good in the aspect of convenience and expediency are aspects of the criteria very well with the value assessment score of 3.98. Thus the product/assessment program that has been developed is a product category 'good' for use with a decent level of convenience and expediency adequate.

CONCLUSION

With the backup and restore method via the network using a computer program laboratory managed in science Education Program Faculty of Mathematics and Science, YSU we can: (1) make standardization of operating systems and application software for laboratory science education, especially in terms of laboratory management activities, (2) create a backup system and application which has been installed in the form of images that can be easily accessed and facilitate services for the improvement of quality assurance, and (3) repairing the damaged system quickly by restoring over the network.

Related to the purpose of this study is to greater quality of processes and products in an integrated lab-based science laboratories through the development and implementation of the CMI in used mainly for administration and assessment of achievement can be seen through the following indicators: (1) CMI has been developed for the management of science in Practice integrated laboratory-based with a focus on service and value systems, (2) there has been a collaboration between faculty and students, so that all parties can mutually benefit (reciprocity of benefits) associated with the use of CMI in laboratory activities, (3) has been developed design and strategy implementation in an integrated lab-based science laboratory database as input to the development of CMI, and (4) have been inventoried to the constraints that exist as a material consideration for reflection and implementation of subsequent research. Methods This study is a Research and Development (R&D) carried out in an integrated laboratory-based science labs Faculty of Mathematics and Science, YSU start of observation, the manufacture of CMI, until the testing activities.

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