A proposed class model for integrate of block and conventional structure curriculum for supporting quality assurance system

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Abstract. Currently, the higher education curriculum has developed two systems, namely the block-based curriculum in the field of medicine and the semester credit-based curriculum. The block-based curriculum is currently applied in medical schools while the semester credit-based curriculum is applied in non-medical faculties. The presence of these two curriculum systems raises problems in the management of academic information systems. One of the problems that occur is that the existing information system has not been able to manage the block curriculum and semester credit simultaneously in one system. So that this causes the academic information system unable to manage the implementation of assessments on the block-based curriculum. This paper proposes a new model in the design of academic information systems that are able to integrate the needs of block-based curriculum and credit. The method used to solve this problem is an object-oriented approach using class diagrams as a model to describe the structure of academic information systems. The results of the development of the new model show that the structure of the block-based curriculum is a general form (generalization) of semester-based credit. Therefore the implementation of the two curriculums can use a similar model class structure to be more efficient and easier to maintain information system software in the future.

1. Introduction
It is very important to manage the curriculum of a field of science within a faculty. In addition, it is not an open secret that the management of the university curriculum in Indonesia has been divided into 2, namely the block-based and semester-based credit curriculum (SKS base curriculum) so that if we want to manage the curriculum well from A to Z, it is very important to build a powerful academic information system.

At the writing of this paper, we brought an example of an academic information system for managing at Jenderal Soedirman University. Until now, it has been implemented to manage the study program curriculum in all faculties. However, in general, it has not been able to manage the curriculum for the block system that is run in the medical faculty. At a minimum, it is just able to serve the administration of lecture
contracts at the beginning of the academic semester. It is quite difficult to function it for the needs of a fairly detailed management of the block system. For example, the management of block system face-to-face learning is not only the 1st to 14th meetings, nevertheless more detailed for each sub-block implementation.

In contrast to the semester credit-based curriculum, evaluation of the block-based curriculum management not only evaluates the overall course (block) in one semester, but the block system provides an evaluation of sub-competencies as part of the blocks held in the unit time range of weeks. Learning assessment is carried out in a span of weeks for each instructor per field of science in a block. The impact of these needs, the academic information system used must be able to detect the presence of students, detect the presence of lecturers, detect the implementation of assessment, detect learning achievements for each competency in each sub-block.

As a result of the weak academic information system services to block system management, learning monitoring and evaluation for block systems cannot be implemented in detail, even the calculation of lecturer performance in block system learning cannot be automatically calculated by academic information systems. Of course, all these impacts will affect the implementation of the university's academic quality assurance system as a whole. Academic quality assurance cannot work for block systems because like touching a blank spot area in a communication issue, no data is obtained from the blank spot area. Based on these problems, the authors are interested in writing a paper that can be a solution to address the problem of information system-based curriculum management services. In addition, the author submitted a title about "A Proposed Class Model For Integrate Of Block And Conventional Structure Curriculum For Supporting Quality Assurance System".

This paper aims to integrate the management needs of the block-based curriculum and semester credit into a class diagram model that can accommodate the needs of the system. It is necessary to look for a general model that can solve curriculum management problems in two perspectives. The effort to achieve this, namely the change in perspective towards the two curriculum structures, there is no longer a dichotomy for both of the curriculum structures. From now on it is based on a provisional assumption that the case of semester credit curriculum is a special case of the block system curriculum.

The method used to design information system software is an object-oriented approach, using class diagrams in UML notation. Stages so that the goal of the paper is achieved carried out various activities, namely first modeling the existing academic information system into the class diagram; second, investigating the weaknesses of the structure of the existing class diagram system; third, inventorying the needs of the implementation of the block system curriculum and semester credit; fourth, composing a new class model. Another aspect of the discussion of this paper is the plan to migrate the old system to a new system.

The research structure and organization are grouped into several sections. The section I presents background, objectives, method; Section II discusses research reference; Section III presents the object-oriented approach that performs to solve the curriculum problem; Section IV provides a conclusion.

2. Previous Research

In a previous study, the results showed that the block plan scheduling did not seem to benefit students in terms of preparing for college in science [1]. Bateson conducted a study to compare the success rates of science students on the Traditional or Block scheduling system. The results showed that the traditional system scheduling system was better than the block system scheduling system [2]. In the traditional scheduling system, it allows students to not fall too far behind for missed days, thereby missing less
instructional time. The curriculum tends to be less watered down; students believe the day goes by faster; and the drop-out rate decreases [3].

Based on the traditional scheduling system, a Model for Classification of Time Study Classifications has been created using Data Mining Techniques [4]. Based on four measures of academic performance, namely: distribution of grades, writing ability, Stanford Level 9 Achievement Test, and Middle School Competency Test. No significant differences were found between the Traditional and Block scheduling systems [5]

In general, the block scheduling system will have more teaching time, with fewer classes and students compared to the traditional scheduling system. [6]. In America, block scheduling has emerged as a trend for high schools; this trend is fueled by the potential for block scheduling to increase student achievement [7].

The academic quality assurance system is currently quite difficult to implement using information systems because the block system curriculum has not been accommodated in the existing information system, it has not been integrated. This condition is quite complicated to manage big data as a basis for verifying quality assurance indicators. One factor is that Technology is a requirement that a quality assurance system can be done well, in addition to other factors namely Process and Culture [8]

In another study compared block scheduling with traditional schedules in small high schools (schools with fewer than 500 students in grades 9 to 12), see their impact on student achievement, school climate, and teaching methodology. The results show that teachers and administrators generally believe block scheduling has improved student achievement [9]

The disadvantage of the block scheduling system is that when students are not present once in a class, it is equivalent to losing the equivalent of two classes on a traditional schedule [10]. Zepeda and Mayers conclude that block scheduling systems are easier than traditional scheduling systems due to the smaller amount of content in a block class. [11]. In addition, the block system scheduling encourages the use of active teaching strategies and greater student involvement [12].

3. Proposed System
At present, the Academic Information System, namely SIA, uses a conventional method where a set of courses based on one curriculum will be given to students in one semester based on the number of credits owned by the student.

![Figure 1. Conventional class diagram](image-url)
The credit score of a course will be represented by the duration of teaching in one week's vulnerability. The SIA system is currently adopting a method conventional can be drawn with the class diagram as figure 1.

Figure 2. Block class diagram

A student represented by the class prognosis has a curriculum representation of the class template curriculum which has several subjects representing classes of subjects (Figure 1).

Figure 3. Proposed class diagram
But with conventional systems, the block method cannot be accommodated. Because the block method has different teaching patterns with conventional methods. Actually, the block unit has the same position as the course, the difference is the mapped blocks based on competencies and fields of science. When the block method data is entered into the SIA, it cannot be read by the system.

To be able to accommodate the two methods, a relation must be made that connects the subject to the block. Before proposing a model that accommodates the two previous methods describes the class model that adopts the block method. The following is a picture of the block method model class

Based on both the SKS class diagram model and the class diagram block model (figure 2), a model that can adopt both can be produced. Figure 3 is the proposed class diagram model

3.1. The curriculum in Higher Education

This section shows how a credit-based curriculum is managed, monitored and measured in quality. The curriculum management and monitoring activities are recorded in table 1 that describes the performance summary of the lecturers to carry out learning. Based on data from table 1, management can calculate the performance figures of each subject taught by the lecturers.

| Subject         | Lecturer | Total Credit | Total Credit-Classical | Number of class lecture meetings |
|-----------------|----------|--------------|-------------------------|----------------------------------|
| Mathematics     | Adriana  | 3            | 2                       | 14                               |
| Physics         | Lelono   | 3            | 3                       | 7                                |
| Software Development | Tumbler  | 2            | 2                       | 7                                |
| Software Development | Hary     | 2            | 2                       | 7                                |

In more detail, the implementation of learning must be monitored until the implementation of each sub-learning outcome per meeting. This monitoring is needed to determine compliance with targets written in the learning design.

| Subject           | Sub-learning outcome | Material                        | Meeting to | Checklist | Conclusion |
|-------------------|----------------------|---------------------------------|------------|-----------|------------|
| Software Development | Analysis            | Methodology                     | 1          | ¶         | OK         |
|                    |                      | Example of analysis activity     | 2          | ¶         | OK         |
|                    |                      | Case study                      | 3          | ¶         | OK         |
| Modeling          | Construct a model using UML Notation | 4   | x | Not OK |
| Verify a model    |                      | 5                               | x          | Not OK    |
| Generate some classes from a model | | 6   | x | Not OK |
| Construction      | Develop a program    | 7                               | ¶          |           | OK         |
Table 2 shows the monitoring of compliance with the semester learning design, containing data on subjects equipped with learning outcomes per meeting. The monitoring activities contained in Table 2 are a series of quality assurance activities. Because according to some researchers that the effort to meet the targets that have been written, has been promised is an activity in a series of quality assurance (Crosby, 1979; Ryall and Kruithof, 2001; ISO 9000, 2005).

Table 1, and table 2 above illustrate the management of the semester credit system curriculum. Then how to illustrate the management of a block system curriculum. Based on observations of block system management at Jenderal Soedirman University, that Table 1 and Table 2 are also used to manage, monitor course performance with a block system curriculum, but specifically for block systems, there is a specific need to monitor the implementation of learning per competency on a weekly basis.

Table 3. Data Example for Assessment activity of credit semester Curriculum

| Subject   | Competency | Laboratory/study program/fields | Lecturer | Total Credit | Total Credit-Classical |
|-----------|------------|---------------------------------|----------|--------------|-----------------------|
| Nerve     | K1         | Anatomy                         | Adriana  | 3            | 2                     |
| System    | K2         | Physiology                      | Mambo    | 7            |                       |
| Physics   | K1         | Anatomy                         | Andrew   | 3            | 3                     |
|           | K2         | Physiology                      | Budi     | 7            |                       |

4. Result and Discussion

Based on the proposed model, the both of curriculum can be implemented into one model, so that it can be used as a basis in the development of academic information systems that are able to accommodate the curriculum based on credit and block-based, at one time. The skeleton code of the model writes as follow.

```java
package sia;

import java.util.ArrayList;
import java.util.List;

public interface Block {
    List<KnowledgeField> knowledgeFields = new ArrayList<KnowledgeField>();
    List<CompetencyStandart> competencyStandarts = new ArrayList<CompetencyStandart>();
    List<BasicCompetencies> basicCompetencies = new ArrayList<BasicCompetencies>();

    public List<KnowledgeField> getKnowledgeFields(String blockName);
    public List<CompetencyStandart> getCompetencyStandarts(List<KnowledgeField> knowledgeFields);
    public List<BasicCompetencies> getBasicCompetencies(List<CompetencyStandart> competencyStandarts);
}
```

Figure 4. Skeleton code of the model
5. Conclusion

In this study, a class diagram model is proposed that can be used to accommodate two higher education curriculum systems, namely the credit-based curriculum and the block-based curriculum. The technique used is a class diagram composition technique. By using the class diagram model, stakeholders can easily carry out monitoring and evaluation, as a basis for improving the quality assurance system in the higher education system.

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