CHAPTER 4

METHODOLOGY

4.0 Introduction

Before software is fully developed, there was a series of predictable steps that helped in creating a high-quality result. This process is called 'software process'. This process is important because it provided stability, control and organization to an activity. There are several of software process models, such as linear sequential model, prototyping model, rapid application development model and incremental model. Between these software process models, linear sequential model is selected in developing this project.

4.1 Linear Sequential Model

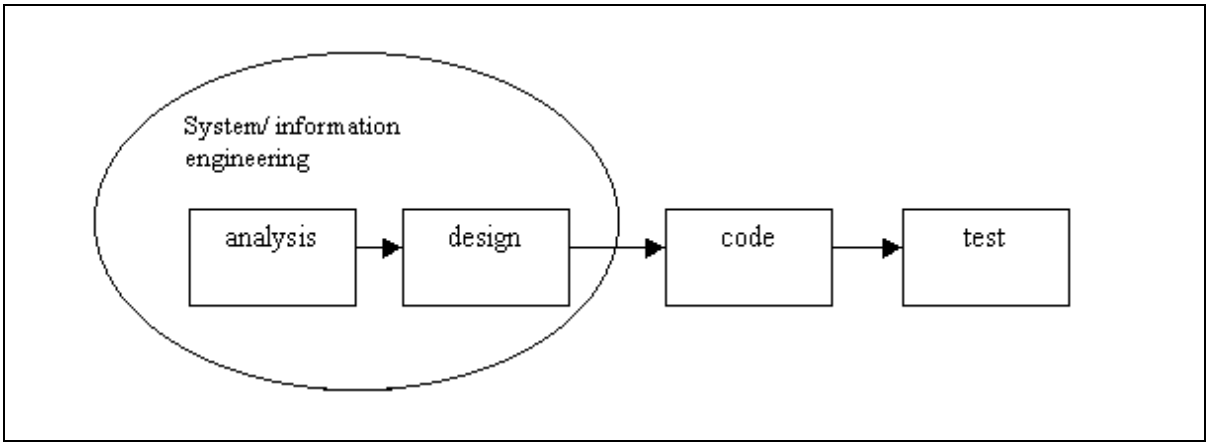

Figure 4.1 Linear Sequential Model (Pressman, 2001)

Linear sequential model sometimes called as classic life cycle or waterfall model. This model suggested a systematic, sequential approach to software development that begin at the system level and progresses though analysis, design, coding, testing, and support.

This model was selected to use in developing this project because the life cycle phrases for this model were simple and clearly separate all the phrases. By following this model, project activities were done in order. Figure 4.1 illustrated the linear sequential model.

4.1.1 System/ information engineering and modeling

System engineering and analysis encompassed requirements gathering at the system level with a small amount of top-level design and analysis while information engineering encompassed the requirement gathering at the users needs level. In this stage, some preliminary process had been done on defined, understanding and clearly stated of project scope, project objectives, expected output and others. After this, case study and survey were performed to get more information about the study and the needs for this project. The case study resources were those journals, articles, books and papers found from the library and Internet. By the same time, survey was made on students from Faculty of Computer Science and Information Technology, University of Malaya and Systematic College Petaling Jaya Campus.

4.1.2 Software requirements analysis

In this stage, software requirement analysis was made based on the information collected. The analysis made in this level were analysis of survey and analysis of information from case study. From the analysis of survey, the respondents' current learning behavior and 'recommendation of idea system' were known. From the analysis of case study, the definitions, types, characteristics and others information related to Learning Objects approach were known. The analysis data were used on system design consideration.

4.1.3 Design

Software design is actually a multi step process that focuses on four distinct attributes of a program, such as data structure, software architecture, interface representations and procedural detail (Pressman, 2001). The design process translated requirements into a representation of the software that can be assessed for quality before coding begins.

Just as what had been described above, the processes in this stage were done step by step. First, the Learning Objects presentation was decided whether to create as external file or database that included the entire Learning Objects. Second, was to design the LOOOP system architecture. Third was the process flow. Fourth, was defining the system entity relationship and its context diagram. After the context diagram had been verified, LOOOP system data flow and database design were analyzed and designed. With all those processes description done, the design of graphical user interfaces can only start. The design was documented and becomes part of the software configuration.

4.1.4 Code generation

Code generation step performed a translation from a design into a machine-readable form. If a design was performed in a detailed manner, then code generation could accomplish mechanistically. In this stage, the designs of the data flow and process flow were transformed to algorithm. Algorithm was a finite instruction for performing a computation or for solving a problem. From algorithm written, codes were generated using Microsoft Visual Studio 6.0. The codes were written in Visual Basic programming language. Visual Basic was an event-driven and object-oriented programming language. To meet object-oriented programming paradigm as stated for this project, DLL and ActiveX control technologies had been used in system architecture and designs. Both of

the technologies were reusable and interoperated. Learning Objects developers were enabled to connect to the contents of Learning Objects for LOOOP system in others Learning Objects creation.

4.1.5 Testing

Once the codes had been generated, program testing began. The testing process not only focused on the logical internals of the software, but also on the functional externals. Testing on the logical internals of the software is to ensure that all statements had been tested. Testing on the functional externals is to conduct test on uncover errors and ensured the defined input produced the actual results that agreed with required results.

In this stage, Microsoft Visual Studio 6.0 debugger did all of the logic testing. The logic errors included syntax error, missing variable declaration. Besides, a list of input data had been used in integration test and system test. For example, to register a user, check for the user validity, retrieve data from database and others.

At the final of testing stage, a user acceptance test was conducted to gather the user acceptance to the design and usage of the system. This test was performed as a survey. A group of 13 people were selected as the tester for the system and a set of questionnaire had been set up. The testers were asked to perform a test on the system and giving the feedback by answering the questionnaire. The results of the questionnaire were gathered and analyzed to recognize the weaknesses of the system.

4.1.6 Support

Support or maintenance was the last activity in linear sequential model. This activity was started if the system needed to be modified. Changes occurred based on errors being encountered, system adapted to accommodate changes in its external environment or

user requires functional as well as performance enhancements. System support or maintenance reapplied each of the preceding phases to existing program rather than a new one. For example, add a new feature to the system such like media playing. The processes to add this new feature had to go through all the stages discussed. First, analyzed what type of media needed and the medium used to run the media. Second, designed the data flows, process flows and graphical user interfaces. Third was coding and fourth was testing.

4.2 Investigation Techniques

There were two types of investigation techniques used in this project, survey and case study. A set of questionnaire had been set up as a part of the survey. A sample of 100 people selected from Faculty of Computer Science and Information Technology, University of Malaya and Systematic College Petaling Jaya campus participated in the survey. 80 respondents had replied the questionnaire. The questionnaire had three sections, respondent information, about the study – learning object and recommendation.

First section purposed to get respondent's personal information such like sex and age range from respondents. Second section purposed to know what the behavior in learning or learning style used by respondents and the efficiency of existing learning materials. Third section purposed to know what types of functionality or features should be included in LOOOP system.

The data gathering from this questionnaire were analyzed and generated as a useful functional requirement list for LOOOP. The questionnaire with its result analyzed was placed at the appendix section of this documentation.

In case study, the information collected was related to the existing information for Learning Objects and object-oriented programming included the definitions, characteristics

and others. The information was collected from several resources, such as papers, articles, journals, books and Internet.

The data or information collected was reviewed, analyzed and categorized. The needed information was kept for the use in this project and the unused information was kept for references.

4.3 Summary

Linear sequential model was the software development life cycle that had been used in this project. This model was selected because it followed a few simple and clear steps in its software development life cycle. The steps were system or information engineering and modeling, system requirement analysis, design, code generation and support. By following the steps, the system was properly developed step by step. Survey and case study were the investigation techniques used in this project. The survey was conducted in University of Malaya and Systematic College. This survey involved of 80 respondents. The information collected was analyzed for understanding the study of this project and to design the system.