

CHAPTER 4

METHODOLOGY

4.0 Introduction

Before software is fully developed, there is a series of predictable steps that are required to create a high-quality result. This process is called 'software process'. This process is important because it provides stability, control and organization to an activity. There are several software process models, such as linear sequential model, prototyping model, rapid application development model and incremental model (Pressman, 2001). Between these software process models, linear sequential model is selected in developing this project.

4.1 Linear Sequential Model

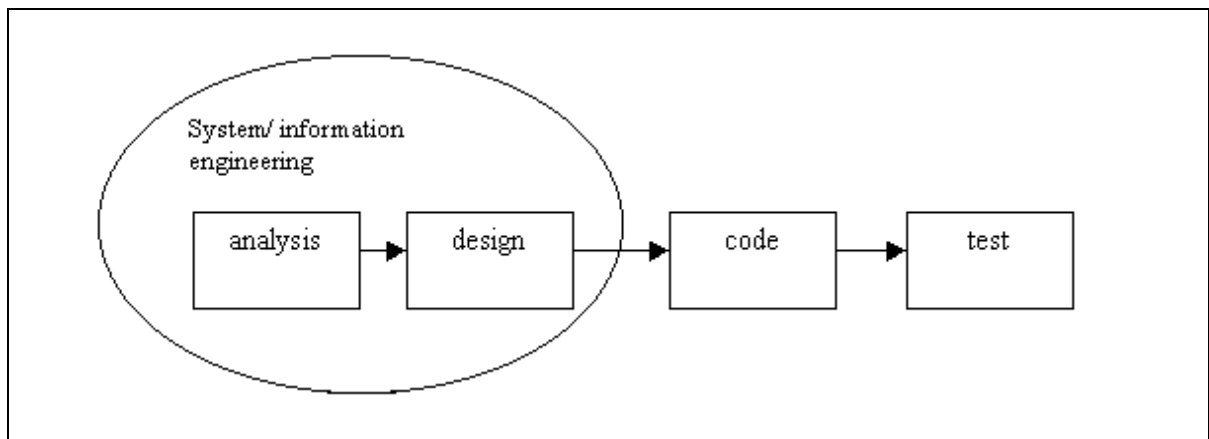


Figure 4.1 Linear Sequential Model (Pressman, 2001)

Linear sequential model sometimes is known as classic life cycle or waterfall model. This model suggests a systematic, sequential approach to software development that begins at the system level and progresses through analysis, design, coding, testing, and

support. This model is selected to use in developing this project because the life cycle phrases for this model are simple and clear, therefore separating all the phrases. By following this model, project activities are done in order. Figure 4.1 illustrates the linear sequential model.

4.1.1 System/ information engineering and modeling

System engineering and analysis encompass requirements gathered at the system level with a small amount of top-level design and analysis while information engineering encompasses the requirement gathered at the users needs level. In this stage, some preliminary processes has been done on defining, understanding and clearly stating project scope, project objectives, expected output and others. After this, literature review and survey are performed to get more information about the study and the needs for this project. The literature review resources are from journals, articles, books and researched papers from the library and Internet. At the same time, survey is made on students from the 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 is made based on the information collected. The analyses made in this level are analysis of survey and analysis of information from literature review. From the analysis of survey, the respondents' current learning behavior and 'recommendation of idea system' are known. From the analysis of literature review, the definitions, types, characteristics and others information that are related to Learning Objects approach are known. The analysis data are 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 translates requirements into a representation of the software that can be assessed for quality before coding begins.

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

4.1.4 Code generation

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

interoperated. Learning Objects developers are able to connect to the contents of Learning Objects for LOOOP system in others Learning Objects creation.

4.1.5 Testing

Once the codes have been generated, program testing begins. The testing process not only focuses 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 have been tested. Testing on the functional externals is to conduct test to uncover errors and ensures the defined input produces the actual results that agrees with the required results.

In this stage, Microsoft Visual Studio 6.0 debugger does all of the logic testing. The logic errors include syntax error, missing variable declaration. Besides, a list of input data is 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 testing stage, a user acceptance test is conducted to gather the user acceptance to the design and usage of the system. This test is performed as a survey. A group of 13 people are selected as the tester for the system and a set of questionnaire has been set up. The testers are asked to perform a test on the system and giving the feedback by answering the questionnaire. The results of the questionnaire are gathered and analyzed to recognize the weaknesses of the system.

4.1.6 Support

Support or maintenance is the last activity in linear sequential model. This activity starts if the system needs to be modified. Changes occur based on errors being encountered, system adapts to accommodate changes in its external environment or user

requires functional as well as performance enhancements. System support or maintenance reapplies each of the preceding phases to existing program rather than a new one. For example, new feature is added to the system such as media playing. The processes to add this new feature have to go through all the stages discussed. First, analyzes what type of media is needed and the medium is used to run the media. Next, designs the data flows, process flows and graphical user interfaces. Finally is coding and then is testing.

4.2 Investigation Techniques

There are two types of investigation techniques used in this project, survey and literature review. A set of questionnaire has been set up as part of the survey. A sample of 100 people is selected from the Faculty of Computer Science and Information Technology, University of Malaya and Systematic College Petaling Jaya campus to participate in the survey. 80 respondents have replied the questionnaire. The questionnaire has three sections, 'respondent information', 'about the study – Learning Objects' and 'recommendation'.

The objective of the first section is to get respondent's personal information such as gender and age range from respondents. The objective of the second section is to know what is the respondent's behavior in learning or their learning style and the efficiency of existing learning materials. The objective of third section is to know what types of functionality or features can be included in LOOOP system.

The data gathering from this questionnaire is analyzed and generated as a useful functional requirement list for LOOOP. The questionnaire with its analyzed results is placed at the Appendix 1 of this documentation.

In literature review, the collected information is related to the existing information for Learning Objects and object-oriented programming, including the definitions,

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

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

4.3 Summary

Linear sequential model is the software development life cycle that is used in this project. This model is selected because it follows a few simple and clear steps in its software development life cycle. The steps are system or information engineering and modeling, system requirement analysis, design, code generation and support. By following the steps, the system is properly develop step by step. Survey and literature review are the investigation techniques used in this project. The survey is conducted in University of Malaya and Systematic College. 80 people give their response in this survey. The information collected is analyzed for the study of this project and to design the system.