**Chapter 3**

**RESEARCH METHODOLOGIES**

This chapter discusses the methods of research used and how the developed system was designed accordingly to justify a transition from the current system to proposed system. Furthermore, considerations were taken into account by the researchers in deciding certain course of actions. This chapter also includes data gathering tools, analytical tools, locale as well as the methods used in developing the system.

**Research Design**

Research and Development was the method used by the researchers to complete the study. Research and Development, also called “R and D”, is a combination of any research method such as descriptive, historical or experimental research and a developed output, such as software, based on the solutions yielded from the research. In this study, the group used descriptive method for the part of research and developed the software that satisfied the stated objectives based from the yielded results of the research.

As stated by Calderon (2008) in the book Methods of Research and Thesis Writing, the descriptive method determines prevailing conditions of facts and such conditions can be repeated for verification and comparison, and it gives a description of the general characteristics of the subjects. Since the study was concerned in the grading and information management of student performance outputs, the descriptive method was the most appropriate method used that helped in the development of the proposed system. This method also defines the overall view and environment that will be included in the proposed system.

**System Development Methodology**

The researchers used the prototyping model for the software development since the study applies to the principles of the model in planning and building the development process of the system. It is suitable for the study since it gives refinement opportunity for the system since grading system are information system that are carefully designed to produce credible information for academic distinction of students based on their performance in school. The methodology of prototyping gives the active involvement of the client to the development of the system. Error could easily be detected and client feedbacks are faster that will lead to better solutions since the system developed is crucial to the information processing for student grading.

**The Prototyping Development Method**

The basic idea of prototyping is that instead of freezing the requirements before a design or coding can proceed, a throwaway prototype is built to understand the requirements. This prototype is developed based on the currently known requirements. Development of the prototype undergoes design, [coding](http://domains.googlesyndication.com/apps/domainpark/results.cgi?client=ca-afdo-pub-3366691112917527&url=http://freetutes.us/&hl=en&ac=r&q=coding&afdt=pnCHggu8yLUKEwiv7IP30--YAhUCWnoKHYNK1TwQAxgBIAIwx6f2DjgeUMen9g5Qy7qLD1DVrK8PUNq3tRFQquj_E1DfoK8pUP3IidUB) and [testing](http://domains.googlesyndication.com/apps/domainpark/results.cgi?client=ca-afdo-pub-3366691112917527&url=http://freetutes.us/&hl=en&ac=r&q=testing&afdt=pnCHggu8yLUKEwiv7IP30--YAhUCWnoKHYNK1TwQAxgBIAIwx6f2DjgeUMen9g5Qy7qLD1DVrK8PUNq3tRFQquj_E1DfoK8pUP3IidUB) (See Figure 3.1). But each of these phases is not done very formally or thoroughly. By using this prototype, the client can get an "actual feel" of the system, since the interactions with prototype can enable the client to better understand the requirements of the desired system.

Engineered Product

Customer evaluation of prototype

Quick Design

Building Prototype

Requirements gathering and refinement

Refining Prototype

Stop

Start

**Figure 3.0 Prototype Software Model**

* 1. **Requirements Gathering and Refinement**

The purpose of this phase is to identify clearly the nature and scope of the opportunity or problem. All possible requirements of the system to be developed are captured in this phase. Requirements are set of functionalities and constraints that the client expects from the system. The requirements are gathered from the client by consultation.

* 1. **Quick Design**

This phase focuses on what will the software “look-like” as well as the representation of features of the software that leads to the construction of the prototype. This design will be based on the requirements and needs gathered from the previous phase.

* 1. **Building Prototype**

By creating prototype models and simulations, the developers and the client can improve the understanding of what is to be developed. Once a prototype has been created for the project, it is easy to gain a 'sneak preview' of what the end system will look like and what it will do.

* 1. **Customer Evaluation of Prototype**

Once the prototype is created, it is given to the customer for evaluation. The customer tests the package and gives the feed back to the developer. In this phase, evaluations are usually informal and directly addressed to the developers.

* 1. **Refining Prototype**

Based on the customer’s evaluations, the developers will refine the software according to the specifications of the client and provide another quick design for another prototype to be built and evaluated. This allowed for particular operations to be tested and refined without the enormous effort that would be required if a design were to be implemented.

* 1. **Engineered Product**

After a finite number of iterations, the final system package was ready for implementation. In this methodology, the software is evolved as a result of **periodic shuttling of information between the customer and developer**. A plan was laid out by the developers for the implementation of the product. (see Appendix F)

**Research Locale**

The research was conducted at TFBC School, Inc. in both school premises; Main Building (located at Barangay San Vicente) and Annex Building (located at Barangay Carangian) both within Tarlac City. The intermediate and primary level teachers from the Main and Annex Building were the intended users of the proposed system. The said locale is an autonomous school under the Department of Education – Schools Division of Tarlac Province.

1. **Subject of the Study**

In this study the respondents are the teachers of the Grade School Department of TFBC School, Inc. in both Main (San Vicente) and Annex (Carangian). The respondents were composed of 17 teachers and class advisers, combined. Only the grade school department teachers together with the principal were included and all other department teachers were excluded.

1. **Population**

The total population for the study is 17 teachers which are directly involved in the use of the proposed system. The total population was taken as whole since the totality is impractical for sampling and that the members are homogenous enough. With these, data that will be gathered from the respondents are reliable and accurate enough for statistical treatment and analysis.

**Data Gathering Tools**

Clerical tools such as interview, questionnaire and empirical observation methods were the ways in collecting data. Such gathering tools reveal unsatisfactory conditions that need improvement or applications of these facts and principles to remedy such conditions that became the basis for the development of the software by the researchers.

Data gathered by the group based on the conceptual framework of the study were ensured first to be valid, reliable and suitable for the research topic. It contained items that are equivocal that led to the clear and definite directions for the completion of the study.

1. **Interview**

Interview is one of the techniques in data gathering through a purposeful face to face relationship between two persons who gathers (interviewer) and supplies (interviewee) information. In order to yield a more complete and valid information, the researchers used the interview method. Basically, this method is the initial data gathering technique that provides data directly from the source which makes it a reliable technique of gathering data.

The researchers wanted to gather significant and reliable information regarding the existing method used by the TFBC School, Inc. in terms of student performance records primarily on class records. The group interviewed the teachers, class advisers and the principal, Ms. Jennilyn F. Nunog, whom the researchers believed were the best people knowledgeable about the study.

1. **Observation**

It is the most direct way and most widely used in studying behavior. It is a means of gathering information by perceiving data through the senses. It enabled the researchers to gather empirical data and sufficient enough to supplement and verify information. This method was used to collect directly primary or first-hand information which makes the study more accurate in description and interpretation.

The group went to the school to observe the method, environment and materials used in recording and reporting student grades. The researchers had seen the processes undergone and methods used in computing performance-based grades of students and how the adviser consolidates all the grades from different subject teachers for periodical ranking of class. The principal was as well how she monitors the grade outputs to be accurate and reliable for release.

1. **Questionnaire or Evaluation Forms**

According to Calderon (2008), a questionnaire or evaluation form is a list of planned, written questions related to a particular topic, with space provided for indicating the response to each question, intended for submission to a number of persons for reply. The use of questionnaires made it easier for the researchers to tabulate gathered data and respondents replied and gave information freely with enough time to think reflectively or consult their records if necessary on their replies that made more accurate results.

The group prepared questionnaires which were showed for correction and suggestions for improvement to persons with adequate knowledge in questionnaires. After careful planning and editing of the questionnaires, the group administered the evaluation of the system through the questionnaires handed to the subjects of the study.

1. **Library and Internet Research**

Library is the most essential source of reliable information. It facilitates the process of gathering facts since the materials or resources in the library are arranged in standardized classification system which lessens or minimizes misleading information.

Internet is a powerful research aid since it has the ability to access the latest information. This tool is used to gather data by accessing and browsing sites and pages from individuals or entities around the world.

The group used these methods for further information gathering that may be helpful to the study. The AMA Computer College Tarlac Campus Library was the proponents’ reliable source for references that were relevant to the research study.

**Data Gathering Procedure**

The proponents used a survey questionnaire to gather the data needed. Upon presentation of the developed system the group administered the survey that allows the respondents to evaluate the system according to the criteria indicated in the survey form.

1. **Statistical Treatment**

Statistical treatments helped the researchers determine the validity and reliability of the research tools. It organized data systematically by ordered arrangement, ranking, score and frequencies. These treatments gave meaning and interpretation to data that are the basis for making conclusions. In this study, weighted mean, Likert scale, *t-test* and Rubrics method were used as statistical treatment.

Frequency distribution was used to describe the number of occurrence in each category. It shows the number of occurrences falling into each of several ranges of values. It shows either the actual number of observations falling in each range or the percentage of observations.

The formula for the weighted mean and average weighted mean:

where:

n = refers to the total number of respondents

f = refers to the number of times that a given number was chosen by a respondent as a rating for a given criterion

X = represents any one numerical rating for a given criterion

**Formula for Variance (**)

Where:

= Variance

= Weighted Mean

= total sample size

**Formula for t-test**

Where:

= t-test computed value

= Weighted mean of the Existing System

= Weighted mean of the Proposed System

= Variance of the Existing System

= Variance of the Proposed System

= Sample Size

**Table 3.0 Interpretation Table**

|  |  |  |
| --- | --- | --- |
|  | **Likert Scale** | **Verbal Interpretation** |
| 1 | 0.000 – 1.499 | Poor |
| 2 | 1.500 – 2.499 | Fair |
| 3 | 2.500 – 3.499 | Satisfactory |
| 4 | 3.500 – 4.499 | Very Satisfactory |
| 5 | 4.500 – 5.000 | Excellent |

The researchers used the Likert scale to determine the performance of the developed system. The mean was computed and was weighed by determining at which scale it falls. Each scale has its corresponding description to conclude the evaluation of the system.

The researchers used the Rubrics method for the performance evaluation of the developed system based on the stated objectives that leads to the final product. The group used specific criteria as basis for evaluating the system performance as indicated in narrative descriptions that are separated into two levels of possible performance related to the given objectives: Security, Efficiency and Reliability. The scoring points for the Rubric Method will be 1 point for the each response on the sub criteria with a total of five (5) points per criteria

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table 3.1** | | **Rubrics designed for evaluation of the criteria for Frequency Distribution** | | |
| **Criteria** | | | **Existing System** | **Proposed System** |
| **1.** | **Security** | |  |  |
|  | (5) Description of the developed system in terms of Security | |  |  |
| **2.** | **Efficiency** | |  |  |
|  | (5) Description of the developed system in terms of Efficiency | |  |  |
| **3.** | **Reliability** | |  |  |
|  | (5) Description of the developed system in terms of Reliability | |  |  |