BIOLOGY E-LEARNING SYSTEM
(SPM STUDENT)

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"I hereby declare that I have read this report and in my opinion the report is sufficient in terms of scope and quality for the award of the Bachelor in Computer Science (Computer System and Networking)"

Signature : ……

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ABSTRACT

The E-learning system is an important field in the area of information communication technology for online learning. In Malaysia, the E-learning system is very popular. Traditional teaching method in secondary school causes some problems to student. Students have to bring a lot textbooks to school every day and sometime the weight goes up very heavy to carry every day. With the growing of Information and Communication Technology (ICT) in Malaysia, this situation should be changed. The Biology e-learning system can provide the solution for the above situation. There are three targeted users groups in this system which is admin, teacher and student. Firstly, admin are able to manage students and teachers record. Secondly, students are able to view their profile, update on their profile and view their result mark or study performance. They are also able to view extra notes, quiz and exercises from the system uploaded by their teachers. Thirdly, teachers are able to upload and view their student result and give comment according to their performance. Besides that, they are also able to upload extra notes, questions and exercises to the system according to subject of Biology. The entire user groups are able to take part in the interface discussion through forum especially student to student and student to teacher. Rapid Application Development (RAD) has been chosen as the methodology to develop this system which is planning, analysis design and development, testing and implementation. Adobe Dreamweaver CS5 will be used to develop this system. Security features like session registration will be implementing in this system, to make the system more secure. I believe at the end, this system could be suitable to implement in school if the SMK Sentul Convent are equipped with enough and suitable computer to run the system in order to increase the competitiveness of the school.

ABSTRAK

Sistem E-pembelajaran adalah satu bidang yang penting dalam bidang teknologi komunikasi maklumat untuk pembelajaran dalam talian. Di Malaysia, sistem E-pembelajaran adalah sangat popular. Kaedah pengajaran tradisional di sekolah menengah menyebabkan beberapa masalah kepada pelajar. Pelajar perlu membawa buku teks banyak ke sekolah setiap hari dan kadang-kadang berat buku naik sangat berat untuk membawa setiap hari. Dengan penanaman Teknologi Komunikasi dan Maklumat (ICT) di Malaysia, keadaan ini perlu berubah. Sistem e-pembelajaran Biologi boleh memberikan penyelesaian bagi situasi di atas. Terdapat pengguna yang disasarkan tiga kumpulan dalam sistem ini yang admin, guru dan pelajar. Pertama, admin, dapat menguruskan pelajar dan guru rekod. Kedua, pelajar dapat melihat profil mereka, mengemas kini pada profil mereka dan melihat tanda hasil atau prestasi pengajian. Mereka juga dapat melihat nota-nota tambahan, kuiz dan latihan daripada sistem yang dimuat naik oleh guru-guru mereka. Ketiga, guru-guru boleh memuat naik dan melihat hasil pelajar dan memberikan komen mengikut prestasi mereka. Selain itu, mereka juga boleh memuat naik nota-nota tambahan, soalan dan latihan kepada sistem mengikut subjek Biologi. Kumpulan-kumpulan pengguna keseluruhan boleh mengambil bahagian dalam perbincangan antara muka melalui forum terutamanya pelajar kepada pelajar dan pelajar dengan guru. Permohonan Pembangunan Rapid (RAD) telah dipilih sebagai kaedah untuk membangunkan sistem ini yang merancang, reka bentuk analisis dan pembangunan, pengujian dan pelaksanaan. Adobe Dreamweaver CS5 akan digunakan untuk membangunkan sistem ini. Ciri-ciri keselamatan seperti pendaftaran sesi akan melaksanakan dalam sistem ini, untuk membuat sistem yang lebih selamat. Saya percaya pada akhirnya, sistem ini boleh menjadi sesuai untuk melaksanakan di sekolah jika SMK Convent Sentul dilengkapi dengan komputer yang mencukupi dan sesuai untuk menjalankan sistem untuk meningkatkan daya saing sekolah.

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ABBREVIATIONS

UML – Unified Modeling Language

SPM – Sijil Pelajaran Malaysia

PHP – Hypertext Pre-processor

HTML – Hypertext Mark-up Language

RDBMS – Relational Database Management System

OODBMS – Object oriented Database Management System

DDML – Data definition and Manipulation Language

CHAPTER 1

INTRODUCTION

1.1 Background of Study

E-Learning is a system is representing Biology E-learning system for SPM students of SMK Sentul Convent. Nowadays, there are a lot of online education systems in Malaysia. The main purpose of those systems is to provide a better and effective way to help students to get learning materials and information.

In this project, a web base learning management system also known as e-learning management system will be developed for the secondary school. Purpose of this system is to enable teachers and students access the study materials at anytime and anywhere.

1.2 Problem Statement

i. Current teaching method more individualistic (a teachers teaching method) and student find boring and less interactive.

ii. Student spends a lot on buying study materials and extra classes like tuitions.

iii. There is time limitation for the student to communicate with teacher.

1.3 Objective

Objectives of Biology E-Learning system are:

i. To design and construct a database that supports the Biology E-Learning System.

ii. To gather and analyze the requirements for the e-learning system and provide a medium for discussion and communication between student and student or student and teacher.

iii. To develop a web-based e-learning Biology system for secondary school.

1.4 Scope

The Biology E-Learning System project consists of three modules(SPM student module, Teacher module and administrator module) which are only for the SPM science stream students of SMK Sentul Convent whom taking biology subject.

Targeted user of this project output is admin, teacher and student of form five. Student from selected secondary school initially selected in order to improve the overall Biology e-learning system. Adobe Dreamweaver CS5 will be use as main tool to develop this Biology e-learning system for SMK Sentul Convent.

1.5 Thesis Organization

There are 6 chapters included in this thesis.

i. Chapter 1

This chapter is to introduce to the readers about the project that will be developed later. This chapter contains introduction, problem statement, objective, and scope and thesis organization.

ii. Chapter 2

This chapter explains about the reviews for the chosen project. This chapter is divided into two sub reviews that require students to study to get complete information about the project.

iii. Chapter 3

In this chapter the approach and framework for the project, method, technique or approach that will be and will be used while designing and implementing the project will be included in the content. Justification and of method on approach used and hardware and software necessary is stated here.

iv. Chapter 4

This chapter acts to document all processes that involve in the development of the project. Designed project development is explained here. The content of this project depends on the system. It contains information of database and tools used. Data in database is shown in this chapter.

v. Chapter 5

The purpose of this system is to explain about the results and data analysis that had been acquired. Result analysis, project limitation and suggestion and project enhancement are contents for the chapter.

vi. Chapter 6

This chapter explains briefly and summarizes the developed project.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Literature review is a summary of the previous researches on all the related resources to a project. Resources are taken from books, internet, journal and online resources. In this chapter, a review of existing system is carried out. The literature reviews in this report are based on existing applications. Therefore, these reviews will be helpful in designing the methodology. Besides that, some of the techniques, methods, equipment and technologies from the reviews are very useful and can be applied into this project.

The main issues will be reviewed on this project is the end-users which are SPM students, teacher and admin. This research will help in understanding the system development for this project.

2.2 Existing System

E-Learning is the use of technology to enable people to learn anytime and anywhere. E-Learning can include training, the delivery of just-in-time information and guidance from experts. The target user for this E-Learning system is SPM biology student. Therefore the teacher will provide notes and learning materials to the student through the system. Student will be able to download the notes uploaded by the teacher. This system provides the student to communicate with teacher by messaging in discussion board. It also contains quiz which can help student to increase their knowledge.

In this section, the research on the existing website that has been developed in the internet will be discussed. This report will show two example of existing website that is related to the E-Learning. This report also will generally describe the E-Learning system. This research is mainly on how the existing system works.

2.2.1 E-Learning for biology

E-Learning for biology is a successful example of E-Learning system. It is a learning platform design specifically for biology in school of science, university, and in lifelong learning. The system has particular chapters then student can take the quiz to check their performance after reading the notes published in html form.

Figure 2.1: E-learning for Biology Homepage

It consists of 4 main chapters in biology. If user want to take the quiz, user needs to click on the map that written quiz.

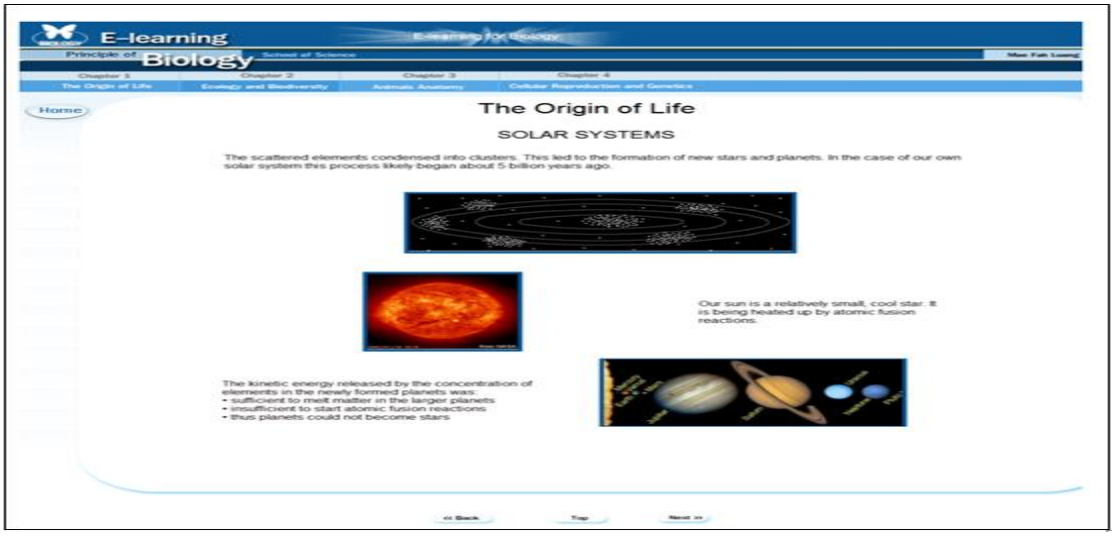

Figure 2.2: E-learning for Biology Learning Platforms

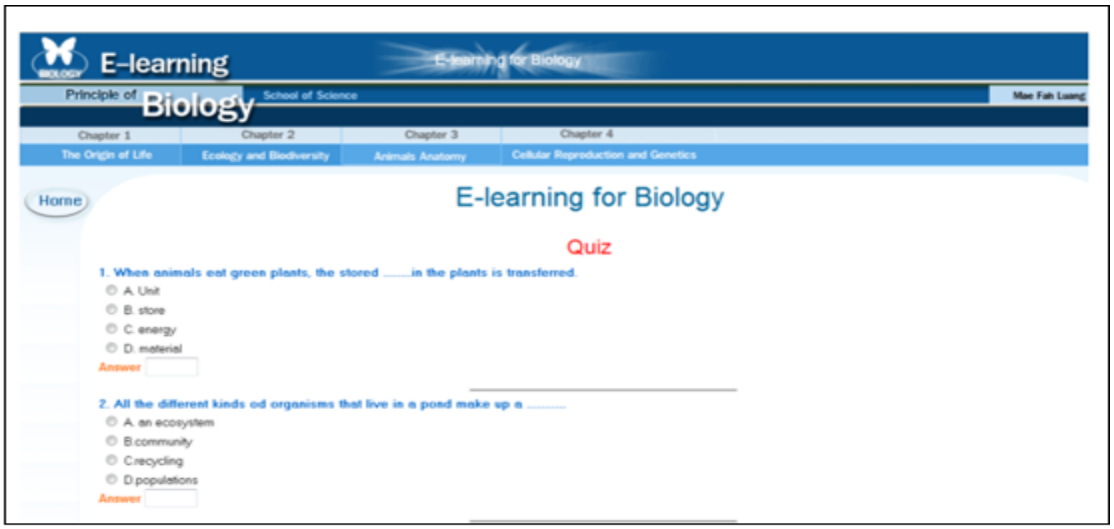

Figure 2.3: E-Learning for biology quiz

If the user click quiz in the main page, the quiz page will appear like above. After the user click submit, the answer will be submitted and the correct answer will be displayed in the box beside the answer.

2.2.2 E-Learning SMK Baling

The figure show the example login page of e-learning of SMK Baling

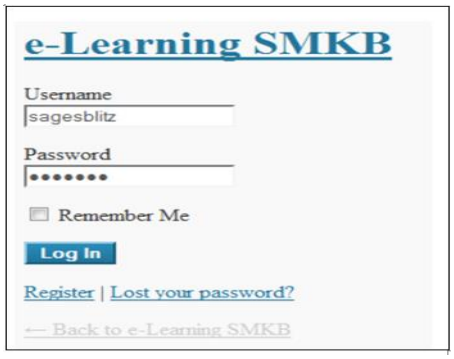

Figure 2.4: Login page of E-learning SMK Baling

If user is new to the website, users have to register first in order to use this system.

Figure 2.5: Homepage of E-learning SMK Baling

This system is developed for all type of Malaysia student, starts from UPSR to STPM. This site contains past year question from almost all the state in Malaysia.

Figure 2.6: Download file for E-learning SMK Baling

The main objective of E-Learning SMK Baling is to help student get past year question from all over Malaysia. Anyone can upload file and share their materials after they registered. It was created for all type of student starting from PMR, SPM and STPM. There is exercise post by the school teacher where anyone can download and do the exercise. The E-Learning SMK Baling looks more like; it is created for the school student of SMK Baling but can be access by anyone whom interested in getting information about result and past year. It acts more like a blog but it is a website.

2.2.3 Comparison of the Existing System

Table 2.1: Comparison of the Existing System

Adaptive E-learning system	Availability	Version or language available	Special feature provided
E-Learning for biology	For all user	English	User will be able to view notes and do quiz. It is more to overseas studies. Not dynamic and doesn't have download and upload function.
E-Learning SMK Baling	Registered user	English, Malay	Able to integrate to the entire user. Users are able to download and upload any learning materials they can share with. More to Malaysia school based web. Doesn't have quiz function.

2.3 Programming Tools

There are many tools can be used to create dynamic and interactive web pages. HTML, PHP and ASP.NET is the most popular programming tools for develop web pages.

2.3.1 PHP [1, 2]

PHP (PHP: Hypertext Pre-processor) is a widely-used Open Source general-purpose scripting language that is especially suited for Web development and can be embedded into HTML. PHP is a very fast programming language, and very easily can be understand than other programming languages.

The PHP code is controlled by a web server which includes a PHP processor module, which also generates the output web page: PHP commands can be embedded directly into an HTML source document rather than calling an external file to process data. It has evolved to have a command-line interface usage and in mobile application which are standalone system.

PHP distinguish it from such client side JavaScript code that is executed on the server. If you have the same script on your server, the client will receive the results of running that script, with no way of determining what the underlying code. You can even configure your web server to process all your HTML files with PHP, and then there's really no way that users can tell what you have up your sleeve.

The best things in using PHP are that it is very easy for a newcomer, but offers advanced features for a professional programmer. Do not be afraid reading the long list of PHP's features. You can jump in, in a short time, and start writing simple scripts in a few hours.

2.3.2 HTML [2]

The most basic of all is HTML programming. HTML, which stands for Hypertext Mark-up Language, is the predominant mark-up language for web pages. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraph, lists, links, quotes and other items. It allows images and objects to be embedded and can be used to create interactive forms. It is written in the form of HTML elements consisting of "tags" surrounded by angle brackets within the web page content. It can embed scripts in languages such a JavaScript which affect the behaviour of HTML Webpages.

2.3.3 Programming C [3, 20]

Programming C is a general-purpose programming language. It has been closely associated with the UNIX operating system where it was developed, since both the system and most of the programs that run on it are written in C. C provides the fundamental control flow constructions required for well-structured programs: statement grouping, decision making (if-else), selecting one of a set of possible values (switch), looping with the termination test (while, do, break). It is widely used programming languages of all time and there are very few computer architectures for which a C compiler does not exist.

2.3.4 Java script [4]

JavaScript is an implementation of the ECMAScript language standard and is typically used to enable programmatic access to computational objects within a host environment. It can be characterized as a prototype-based object-oriented scripting language that is dynamic, weakly typed and has first-class functions. It is also considered a functional programming language like Scheme because it has closures and supports higher-order functions.

2.3.5 Comparison between Programming Languages

Table 2.2: Comparisons between Programming Languages

Comparison between Programming Languages	**HTML**	**PHP**	**Programming C**	**JavaScript**
Features Security	High security	Recognized safety performance	Higher security level	High security
Platform incompatibility	Multiplatform	Multiplatform	Multiplatform	Multiplatform
Operating efficiency	Higher	High	Low	Higher

After compare with four best programming language, I choose HTML and PHP to do my project. This is because the HTML and PHP language have high security and have multiple platforms. The HTML languages also have high efficient operating system. If we come all of four programming the best choice is HTML and PHP.

2.4 Technique

System can be developed by using different technique. Technique that I have study is mobile application and web application.

2.4.1 Mobile Application

Mobile applications are speedily developing division of the worldwide mobile market. It is application that runs on mobile devices. Many mobile applications such as SMS/MMS music player are preinstall on mobile device.

They have emphasized about the graphical user interface (GUI) because it is playing an important part in development of application. Developers must be able to discover the pros and cons of the design. The usability of the mobile environment is important to improve the Development. The appearance of the buttons in screen playing particular attention in attracting customer to satisfied in using the application [6].

The mobile telecommunication industry has been a highly competitive. Developing mobile application is not that easy because of the specific constraints of mobile environment. The constraints that mention before are limited capabilities and rapid evolution of terminal devices, various standards, protocols and network technologies, operate on a variety of different platforms, specific need of mobile terminal users and strict time to market requirements [5]. It is more concern on physical characteristics such as size, weight, display size, data input mechanism and expandability. There also technical characteristics including processing power, memory space, battery capabilities and the operating system.

2.4.2 Web Application

A web application is an application that is invoked with a web browser over the Internet. It uses a web browser as a client. Web application development requires agility, the use of standard components, interoperability and close attention to user needs.

Web-based applications are easy to use and can be implemented without interrupting your existing work process. Whether you need a content managed solution or e-commerce systems, we can develop a customized web application that fulfils your business requirements [10].

2.4.3 Comparison between web application and mobile application

A mobile application is software written for mobile devices that performs a specific task, such as game, calendar and music player. While, a web application is one in which all or some parts of the software are downloaded from the web each time it is run. The advantage of web application is lower costs; updates also can be made easily and so on. Everybody can have this application because can access to this application if there is internet. But mobile application is not like that because only certain people can have the application depends on their type of mobile. On the other hand, mobile application can reach user earlier than web application.

Table 2.3: Comparison between web application and mobile application

Features	**Web Application**	**Mobile Application**
Operating system	Windows, Linux	Symbian, Android, Windows mobile, Mac OS, Blackbery
Device used	Computer	Mobile
Screen size	Bigger	Smaller
Capability of information	All information included	Limited information

2.5 Database [11, 12]

A database is a prepared compilation of records or data that is stored in a computer system. Besides storing data, a database should be able to offer a way for other computer programs to update desired pieces of data. In order to have a highly efficient database system, it needs to be incorporated with a program that manages the queries and information stored on the system. This is usually referred to as DBMS or a Database Management System. There are several common types of databases. Each type of database has its own data model. They are the Flat Model, Hierarchical Model, Relational Model and Network Model.

2.5.1 Structured Query Language (SQL)

The Structured Query Language (SQL) is a relational database language. It is a medium which is used to communicate with DBMS. SQL commands consist of English like statements which are used to query, insert, update and delete data. It makes SQL easier to learn and understand [13]. Commercial database management system allows SQL to be used in two distinct ways. First, SQL commands can be typed at the command line directly. The DBMS interprets and processes the SQL command immediately and result rows that are retrieved are displayed. This method of processing is called interactive SQL. The second method is called programmatic SQL [14].

2.5.2 MySQL Database

MySQL is a relational database management system (RDBMS) based on SQL. It was released in January 1998. MySQL is now one component of parent company MySQL AB's product line of database servers and development tools. Many Internet start-ups became interested in the original open source version of MySQL as an alternative to the proprietary database systems from Oracle, IBM, and Informix. MySQL is currently available under two different licensing agreements which is, free of charge under the GNU General Public License (GPL) open source system or through subscription to MySQL Network for business applications [15].

2.5.3 Microsoft SQL Server [16, 17]

Microsoft SQL Server is an application used to create computer databases for the Microsoft Windows family of server operating systems. It provides an environment used to generate databases that can be accessed from workstations, the web, or other media such as a personal digital assistant (PDA) [16]. Its primary query language is Transact-SQL. Transact-SQL is an implementation of the ANSI/ISO standard Structured Query Language (SQL) used by both Microsoft and Sybase [16].

2.5.4 Comparison between MySQL and MS SQL Server

Table 2.4: Difference between MySQL and MS SQL Server

	MySQL	**Microsoft SQL Server**
Developer	MySQL AB	Microsoft Corp.
Open-source vs. Proprietary	MySQL is an extensible, open storage database engine, offering multiple variations such as Berkeley DB, InnoDB, Heap and MyISAM.	Limited to a Sybase-derived engine. SQL Server is known to work better with other Microsoft products.
Licensing	MySQL is an open-source system under the GNU General Public License. Developers can use it at no cost as long as the associated projects are also open-source.	The best way to obtain a developer's license is to buy a license for the Microsoft Developer or Microsoft Visual Studio suite. Both provide a free SQL Server license for development use.
Technical Differences	Doesn't offer full support for foreign keys.	Considered a complete relational database.
Performance	Uses little disk space, memory and CPU. Therefore, it gives a good performance.	Complexity and the hogging of resources in the way of storage and memory, which leads to poorer performance.

Security	MySQL uses security based on Access Control Lists (ACLs) for all connections, queries, and other operations that users can attempt to perform.	Has adequate security mechanisms by default bearing user to follow the directions and keep the software updated with security patches.
Recovery	Power outrage could result in the corruption and loss of critical data.	SQL Server keeps track of the process, even if the system unexpectedly shuts down.

I prefer to choose MySQL as database compares Microsoft SQL Server. MySQL use little disk space, memory, and CPU. Therefore it gives a good performance compare Microsoft SQL Server which have complexity performance.

2.6 Web server

Web servers are computers that deliver (serves up) web pages. Every web server has an IP address and possibly a domain name. Any computer can be turned into a Web server by installing server software and connecting the machine to the Internet. There are many Web server software applications, including public domain software from NCSA, Apache and commercial packages from Microsoft, Netscape and others [18].

2.6.1 Apache

Apache is a software foundation that develops and provides open source software that is meant to run web servers. Their primary product is HTTP server which is the most popular HTTP server in use today. Apache is totally free of charge [19].

2.6.2 XAMPP

XAMPP is a free and open source cross-platform web server solution stack package. It consisting mainly of the Apache HTTP Server, MySQL database and interprets for scripts written in the PHP and programming languages. XAMPP is an easy to install Apache distribution containing MySQL, PHP [18].

2.7 Software Development Methodology

A software development methodology in software engineering is a framework that used to structure, plan and control the process of developing an information system. There is various software development approaches defined and designed which are used during the development process of software, these approaches are also referred as "Software Development Process Models". Each process model follows a particular life cycle in order to ensure success in process of software development. There are many claims about one development model is better than the others [20]. In this review there are three well known software process model to discuss and compare which are Waterfall Model, Rational Unified Model and Agile Model. However the discussion is limited to the important characteristic of the process model.

2.7.1 Waterfall Model

The Waterfall is one of the well-known examples of a software engineering methodology. It composed into the stages of system requirements, software requirements, preliminary and detailed design, implementation, testing, operations, and maintenance [17].

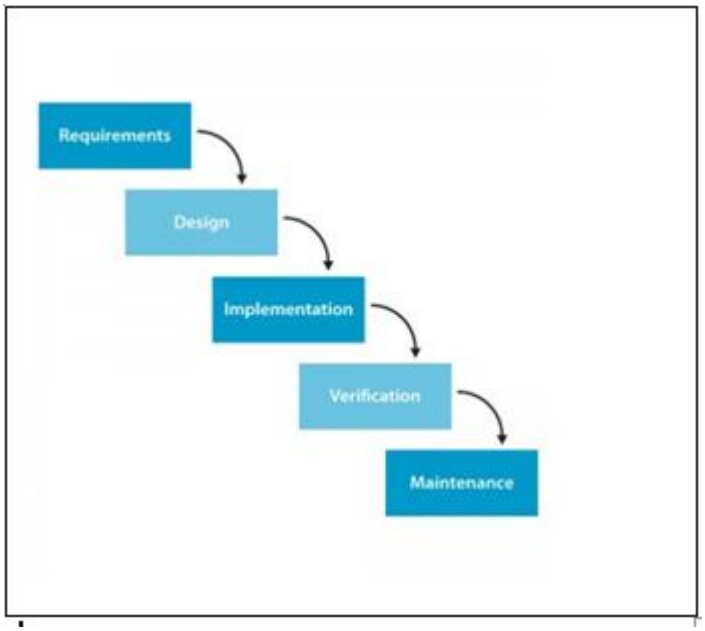

Figure 2.7: Waterfall Model

Figure 2.11 depict the phases in the traditional Waterfall model [18]. All these phases are cascaded to each other so that second phase is started as and when defined set of goals are achieved for first phase. Following are the stages involved in Waterfall model.

i. Requirement Analysis: All possible requirements of the system to be developed are captured in this phase. Requirements are set of functionalities and constraints that the end-user (who will be using the system) expects from the system.
ii. Software Design: Before a starting for actual coding, it is highly important to understand what we are going to create and what it should look like. The requirement specifications from first phase are studied in this phase and system design is prepared.
iii. Implementation and Unit Testing: On receiving system design documents, the work is divided in modules/units and actual coding is started. The system is first developed in small programs called units, which are integrated in the next phase. Each unit is developed and tested for its functionality. Unit testing mainly verifies if the modules/units meet their specifications.

iv. Integration and System Testing: As specified above, the system is first divided in units which are developed and tested for their functionalities. These units are integrated into a complete system during Integration phase and tested to check if all modules/units coordinate between each other and the system as a whole behaves as per the specifications.

v. Operations and Maintenance: Generally, problems with the system developed, which are not found during the development life cycle come up after its practical use starts, so the issues related to the system are solved after deployment of the system. Not all the problems come in picture directly but they arise time to time and needs to be solved. Hence this process is referred as Maintenance.

The waterfall model, as described above, offers numerous advantages for software developers. Following are the advantages of Waterfall model [18]:

i. The staged development cycle enforces discipline: Every phase has a defined start and end point, and progress can be conclusively identified through the use of milestones by both vendor and client. The emphasis on requirements and design before writing a single line of code ensures minimal wastage of time and effort and reduces the risk of schedule slippage, or of customer expectations not being met.

ii. Help improves quality: Getting the requirements and design out of the way first also improves quality. It is much easier to catch and correct possible flaws at the design stage rather than at the testing stage.

iii. Aid efficient knowledge transfer: Because the first two phases end in the production of a formal specification, the waterfall model can aid efficient knowledge transfer when team members are dispersed in different locations.

iv. Easy to understand process: The stages in waterfall model are much easier to understand. This will help the company to reduce cost as their staff does not require additional training just to understand the process flow.

2.7.2 Agile Model [18, 19]

Most promote development iterations, teamwork, collaboration, and process adaptability throughout the life-cycle of the project. There are many specific agile development methodologies for example Scrum, XP and Crystal Orange. Agile methods break tasks into small increments with minimal planning, and don't directly involve long-term planning. Iterations are short time frames that typically last from one to four weeks. The term “agile” leads to a development process that is more responsive to customer needs compared traditional methods.

i. Reduce the cost of change. In agile, multiple iterations may be required to release a product or new features. Each interaction is worked on by a team through a full software development cycle, including planning, requirements analysis, design, coding, unit testing, and acceptance testing.
ii. Emphasis on coding. Agile argue that the only truly important product of the system development process is code. Coding can be drawing diagrams that will generate code, scripting a web-based system or coding a program that needs to be compiled.
iii. Emphasis on testing. Testing is one of the core roots of agile development. Both acceptance tests and unit tests are used. Unit test should be automated tests that test the code. The programmer will try to write as many tests he or she can think of that might break the code he or she is writing; if all tests run successfully then the coding is complete.
iv. Listening to customer needs. Communication between the customer and programmer need to be established. The programmer has to try to understand the business problem, and to give the customer feedback about his or her problem, to improve the customer's own understanding of his or her problem.
v. Software Architecture Design is optional. Some of the agile methodology did not emphasis on design. Extreme Programming (XP) for example, believe that from the point of view of simplicity, one could say that system development doesn't need more than coding, testing and listening. If those activities are performed well, the result should always be a system that works.

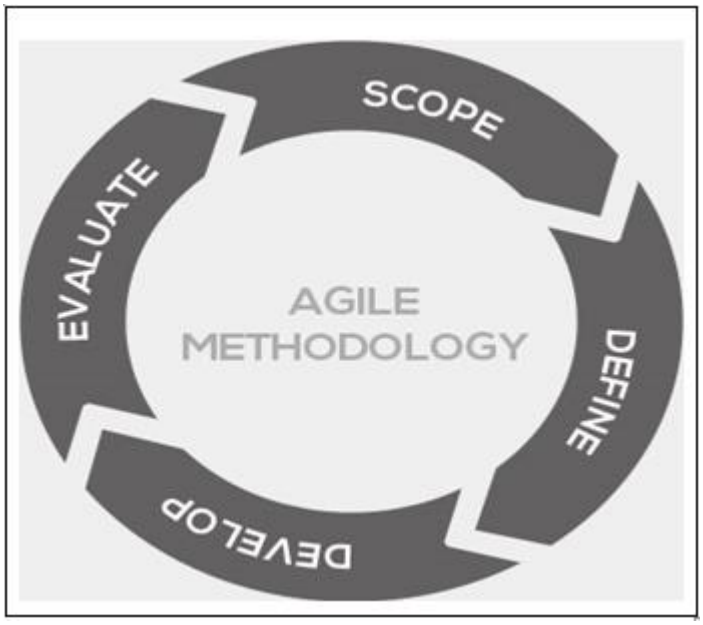

Figure 2.8: Agile methodology processes.

2.7.3 RAD (Rapid Application Development) [19, 7]

RAD was a response to non-agile processes developed in the 1970s, such as the Waterfall model. The problem with previous methodologies was that applications took so long to build that requirements had changed before the system was complete, often resulting in unusable systems. Starting with the ideas of Barry Boehm and Scott Shultz, James Martin developed the Rapid Application Development approach during the 1980s at IBM and finally formalised it by publishing a book in 1991.

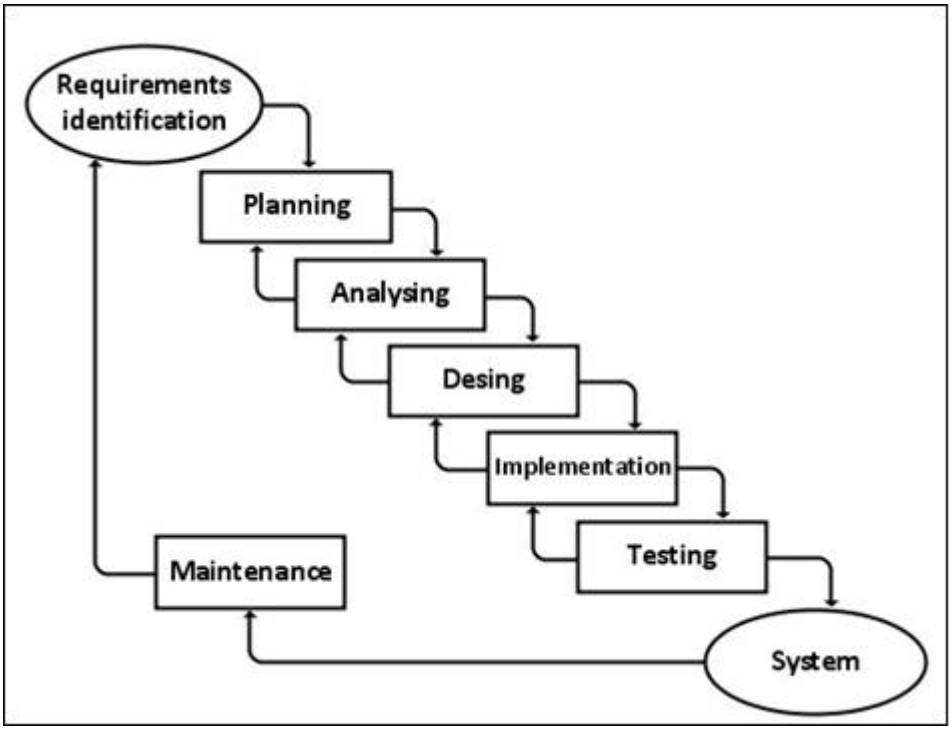

Figure 2.9: RAD process.

Figure 2.13 depict the phases in the RAD. All these phases are cascaded to each other so that second phase is started as and when defined set of goals are achieved for first phase. Following are the stages involved in RAD model.

i. Analysis: The Requirements Planning stage consists of a review of the areas immediately associated with the proposed system. This review produces a broad definition of the system requirements in terms of the functions the system will support. The deliverables from the Requirements Planning stage include an outline system area model (entity and process models) of the area under study, a definition of the system's scope, and a cost justification for the new system

ii. Design: The User Design stage consists of a detailed analysis of the business activities related to the proposed system. Key users, meeting in workshops, decompose business functions and define entity types associated with the system. They complete the analysis by creating action diagrams defining the interactions between processes and data. Following the analysis, the design of the system is outlined. System procedures are designed, and preliminary layouts of screens are developed. Prototypes of critical procedures are built and reviewed. A plan for implementing the system is prepared [7].

iii. Construction: In the Construction stage, a small team of developers, working directly with users, finalizes the design and builds the system. The software construction process consists of a series of "design-and-build" steps in which the users have the opportunity to fine-tune the requirements and review the resulting software implementation. This stage also includes preparing for the cutover to production. In addition to the tested software, Construction stage deliverables include documentation and instructions necessary to operate the new application, and routines and procedures needed to put the system into operation [7].

iv. Testing: The testing provide, independent information about the quality of software and risk of its failure to users [7].

v. Deployment: The deployment stage involves implementing the new system and managing the change from the old system environment to the new one. This may include implementing bridges between existing and new systems, converting data, and training users. User acceptance is the end point of the implementation stage [7].

2.7.4 Summary of Software Process Model

This section provides the brief comparison between Software Process Model. That studied in this project. However the comparison is not done in deep manner, rather the compare about the usage and common characteristic. Table 2.5 shows the comparison.

Table 2.5: Comparison between methods

No	Characteristic	Waterfall	Agile	RAD
1.	Flow	Sequential and back step between stage	Light/Small Iteration	Small
2.	Easiness	Easy to understand process	Easy to understand & emphasis on teamwork	Easy and clear to understand.
3.	Requirement & result	Did not specify any method	Based on user story and CRC card. Architecture	Promotes strong collaborative atmosphere and

			is optional.	dynamic gathering of requirements
4.	Flexibility	It is not flexible enough to cater variable user requirement	Fast development incremental process	Fast development incremental process.
5.	Documentation	Emphasis of complete documentation on every stage	Do not emphasis on documentation	Do not emphasis on documentation.
6.	Suggestion of usage	Suitable for project where requirement is very well known and do not change frequently.	Suitable for huge project with huge staff and deal with high risk issues.	Suitable for Project that have to be developed in short time provided a strong cohesive team.

The main advantage is the backward scalability in Agile. Under waterfall approach we cannot change the decisions and implementations that we had made under the previous stages. If we want to make changes under waterfall we will have to build the entire project from the scratch once again. The flexibility to error check under any part of the development stage makes Agile more bug free and less erroneous as compared to Waterfall which can only test bugs at the end of the development module.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter discusses the framework and approach taken to develop the system. It consists of type of methods and techniques from the analysis stage to the implementation stage of the system. It also discusses on the justification on method chosen, approach taken and the software that are used.

Biology e-learning system for SMK Sentul Convent is developed base on software Rapid Application Development (RAD). RAD is process used by the system analyst or system developer to develop this e-learning system which is planning, analysis, design and development, testing and implementation.

3.2 Planning

In this system, there have three type of user they are SPM Student, Teacher and Administrator. SPM Student and Teacher need to register as a member in order to log into system and access all the learning material and available function respectively.

Registered students are able to update their profile, post message, access the learning materials, take quiz or do exercises, download notes provided.

For teacher, they will be able to update their profile, upload learning materials, questions, replies the student message and view the student's profile.

Lastly, administrator is responsible to maintain and monitor activities by the Biology E-Learning System. Figure 3.1 shows the user hierarchy for this project and Figure 3.2 shows the use-case diagram for this system.

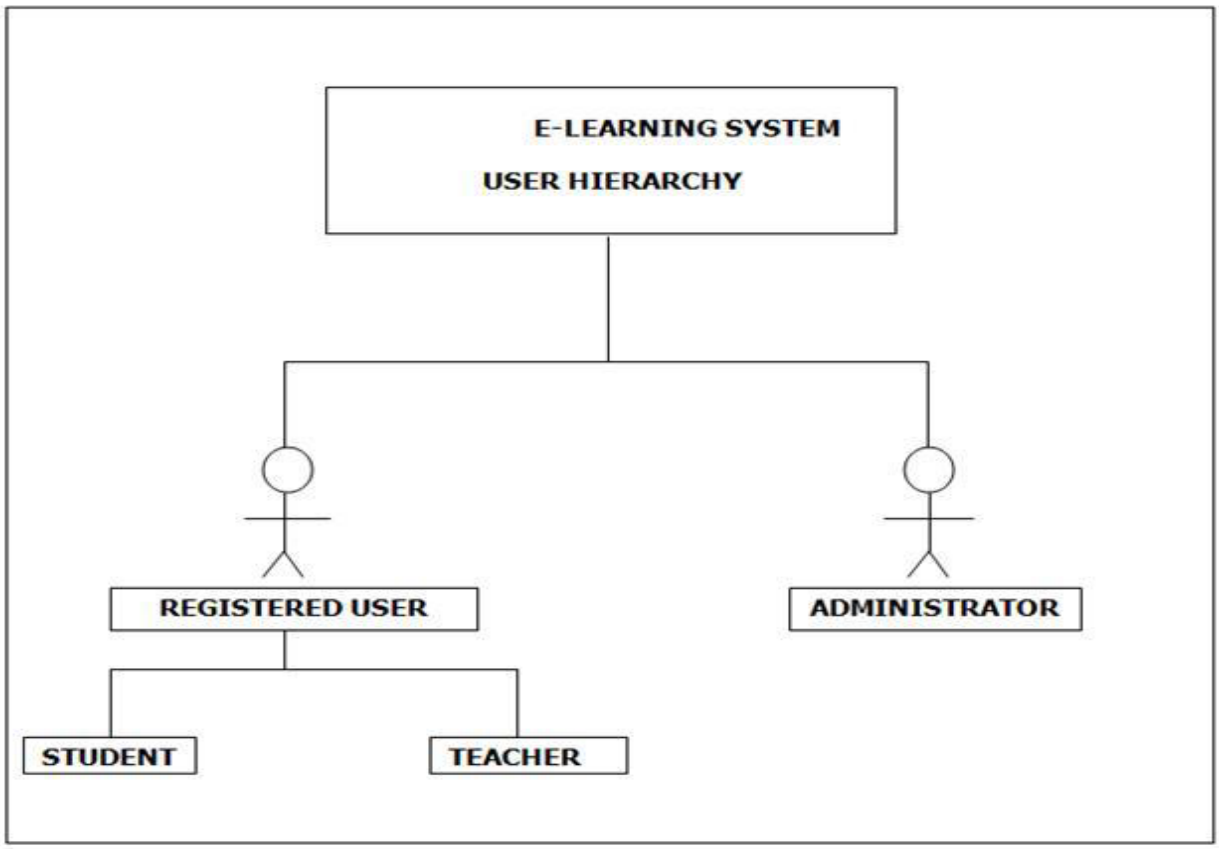

Figure 3.1: User hierarchy of Biology E-learning system

Figure 3.1 showing the user hierarchy for biology e-learning system that contain of three modules. It has two registered users which is student and teacher. The student and teacher need to register in order to use this system. Administrator is the one control the teacher registration. He/she approve or reject the teacher.

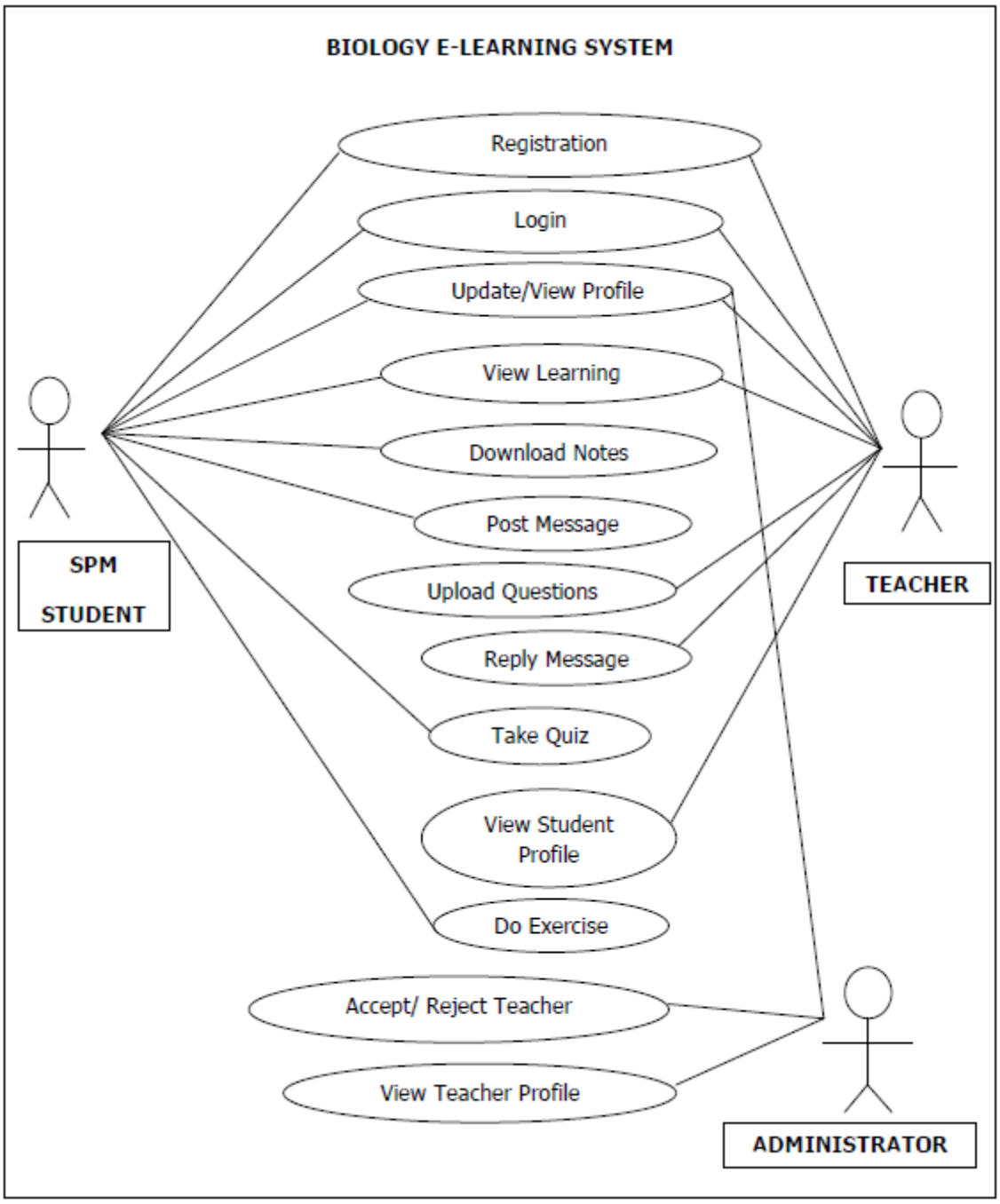

Figure 3.2: Use-case diagram of Biology E-learning system

Figure 3.2 is the use case diagram of biology e-learning system. It shows clearly what the teacher, student and administrator able to do in this system. According to the figure above, student can register, login, update or view profile, download notes, view learning material, post message, take quiz and do the exercise provided in the system.

3.3 Analysis

The requirement needed in assisting the development of for Biology E-Learning system is shown below. The requirements are divided into hardware requirement and software requirement.

3.3.1 Hardware Requirement

Hardware requirement are hardware needed in aiding the development of this project.

Table 3.1: Hardware to develop Biology E-Learning System

HARDWARE	DESCRIPTION
Graphic Display	Monitor
Data Storage	Hard disk and External Disk
Use to read or write CD	CD R/RW Drive and CD-R/DVD-R
Project document printout	Printer and A4 Size paper
CPU	Intel Centrino Duo, 1.50 GHz, 2.00 GB of RAM
Data transfer or backup	Pen drive and External hard disk

3.3.2 Software Requirement

Software requirement are software needed in aiding the development of this project.

Table 3.2: Software to Biology E-Learning system

Software Computer	Version	Purpose
Microsoft Windows 7 Ultimate	Home Premium	Operating system to done the project
Microsoft Visual Studio 2008	2010	Project development
Xampp Server	2012	To build database
Microsoft Office Word	2007	Project documentation
Microsoft Power Point	2007	Project presentation
Rational Rose 2002 Enterprise Edition	9.0.0.0	To create graphical representation
Mozilla Firefox	24.0	Information searching
Google Chrome	28.0.1500.72	Information searching
McAfee	13.5	Protection from virus
Nero	6.0	To burn project documentation
WinRar	12.0	File compressor
Dreamweaver	6.0	A software development kit that enables developers to create web application

3.4 Design and Development

Design phase is an important phase where a system is developed based on planning and requirement that has been discussed in previous chapters. System interface attracts customer and makes user interaction easier for customers. System coding plays a very important role in this implementation phase, where it is used to run the functions in this website. Developer has to that the website meet its requirement and objective and also to void system errors.

System design explains about the system design, database design techniques, user interface design, technique and related algorithm in detail that are applied for developing the Biology E-Learning System. This chapter also includes the Unified Modeling Language (UML) concepts such as sequence diagram, data dictionary and class diagram on the system development model used.

3.4.1 Sequence Diagram

Sequence diagram illustrates the object that participate in a use-case and the messages that pass between them over time for one use case. Sequence diagram depicts traces of messages passed between class instances.

In this report, the sequence diagram will focus on all three modules which consist of SPM Student use-case, Teacher use-case and Administrator use-case.

In SPM Student use-case (refer Figure 3.3), student who is a first time user need to register as a member before they can login into the Biology E-Learning System. Only the student whom registers will be able to access into the system. After register, they need to key in their user name and password to log into the system. Inside the system, students will be able to access learning materials, and take the quizzes or exercises provided in the system. Student can change their password, update profile, post question in discussion board, view message sent by teacher, download notes and search files in this system.

For the Teacher use-case (refer Figure 3.4), the teacher need to register for the first time in Biology E-Learning System but the registration will only be successful after the teacher have been approved by the administrator. Once the teacher has been approved by the admin, the teacher will be able to login into the system. In the system, the teacher can upload notes, past year questions, reply student question, post message and view student's profile.

In Administrator use-case (refer Figure 3.5), the admin need to login into the system and perform maintenance and monitoring activities. As for maintenance purposes, administrator has the privileges to accept or reject teacher's approval to avoid wrong information provided to the student. The administrator can view teacher profile, update and change password in admin profile.

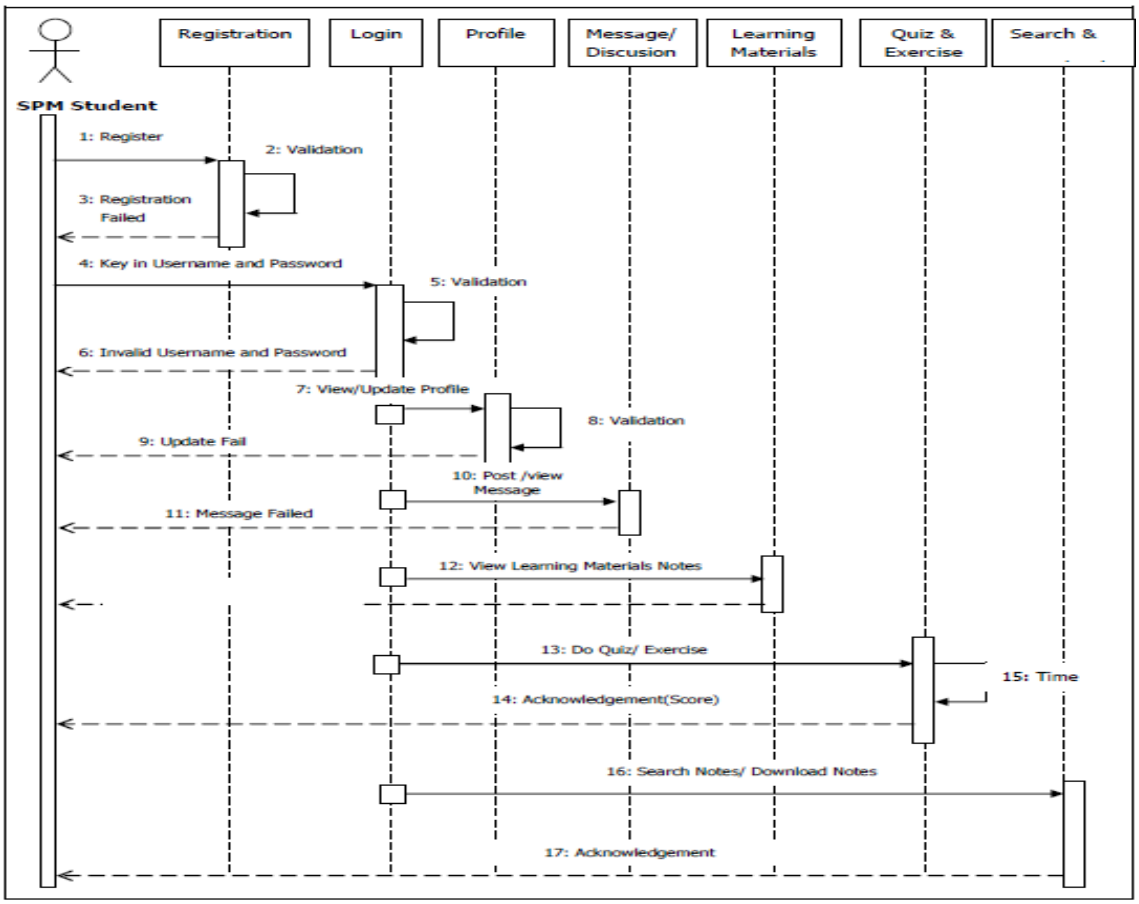

Figure 3.3: Sequence diagram of SPM student use-case

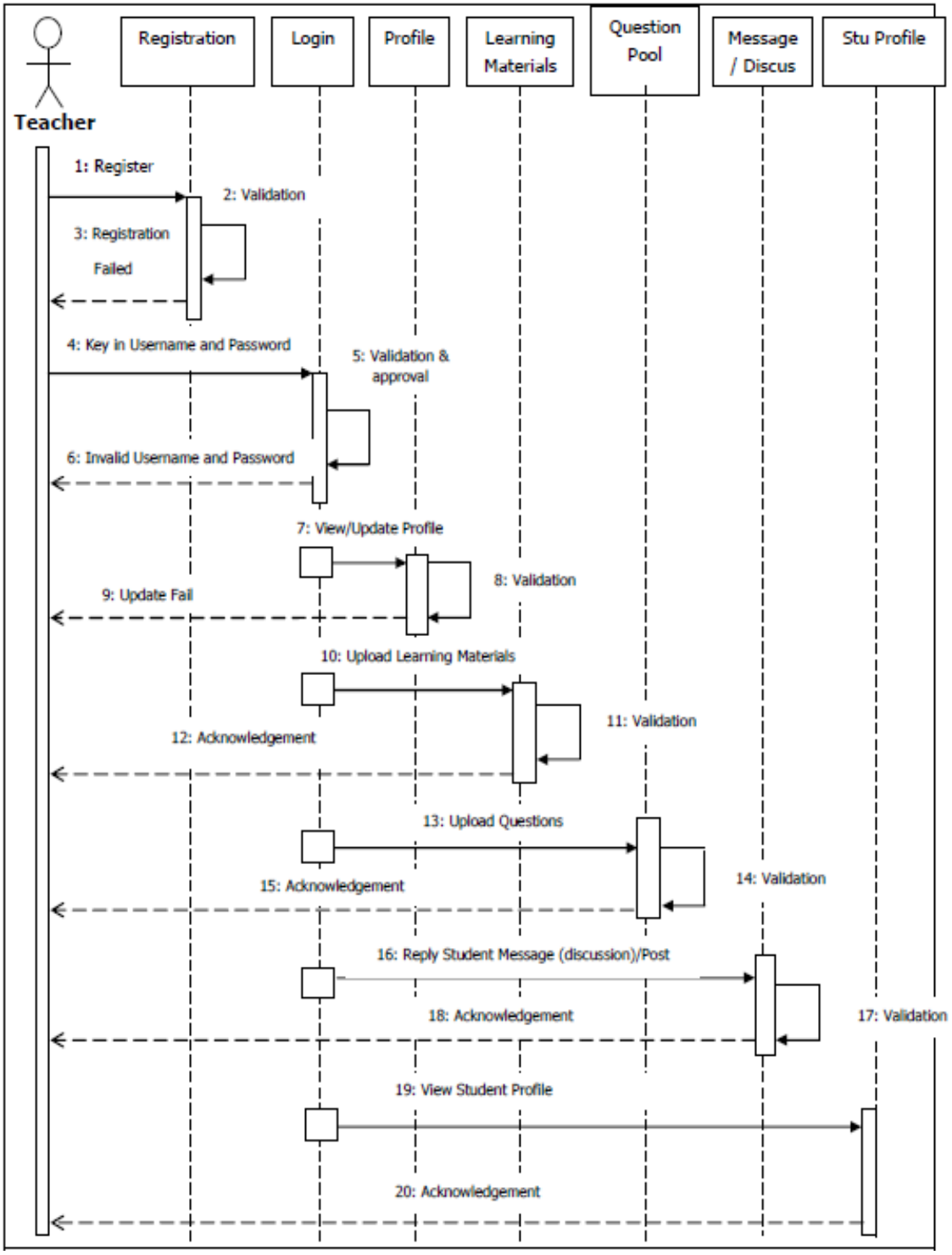

Figure 3.4: Sequence diagram of teacher use-case

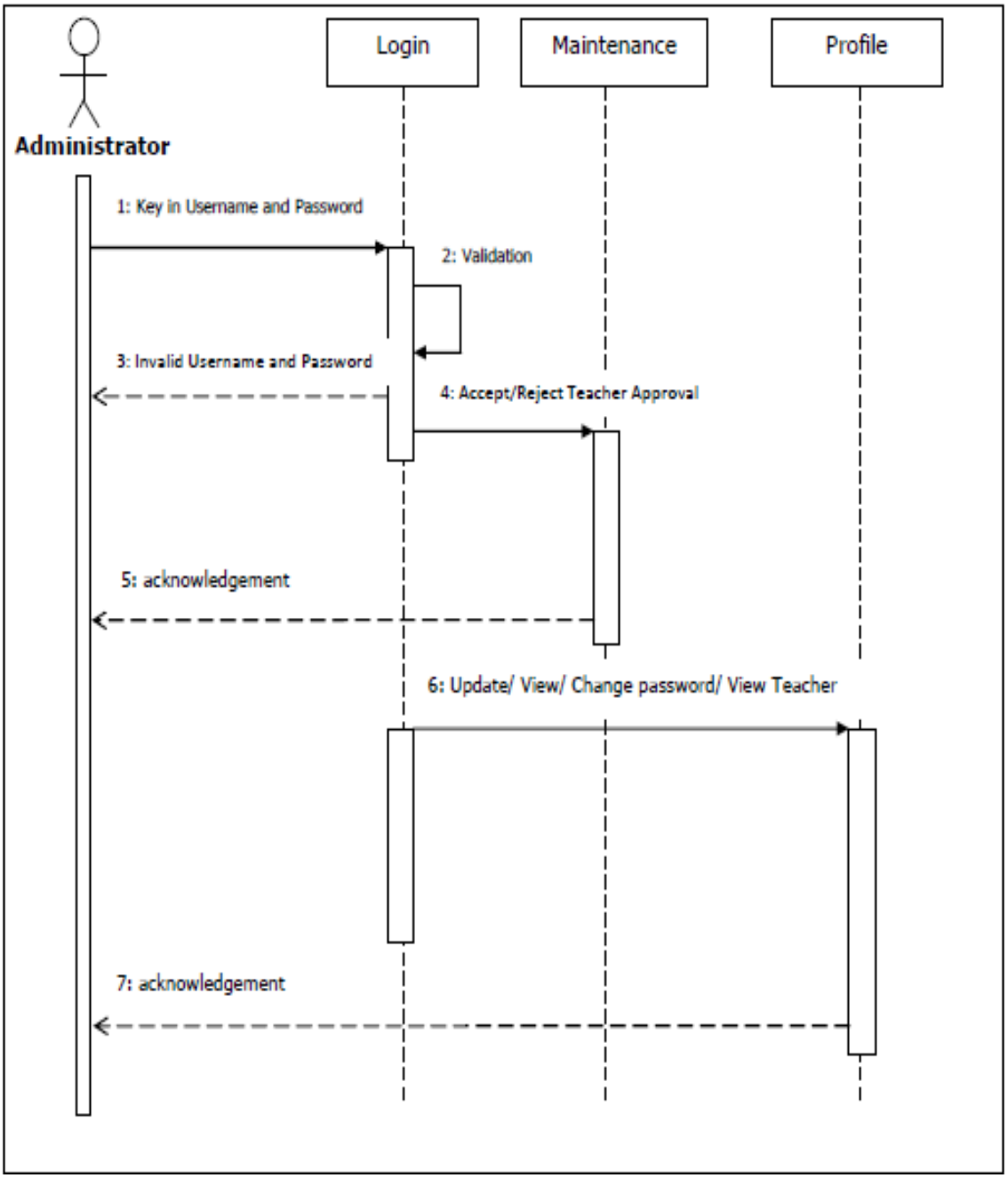

Figure 3.5: Sequence diagram of administrator use-case

3.4.2 Data Dictionary

Data dictionary is the central storehouse of information regarding the existing data in the system. A data dictionary contains a list of all the attributes, the number of fields, the names and types of each field. Table 4.1 shows the data dictionary for the Biology E-Learning System.

Table 3.3: Data dictionary of Biology E-learning system

Table Name	Field Name	Data Type	Field Size	Key Type
admin	adminID	Varchar	10	
	Name	Varchar	30	
	Password	Varchar	10	
	ContactNumber	Varchar	10	
	Email	Varchar	40	
	Picture	Varchar	100	
studentinfo	Name	Varchar	30	
	IC_No	Varchar	12	
	Gender	Varchar	6	
	ContactNumber	Varchar	10	
	Email	Varchar	40	
	Username	Varchar	20	Primary
	Password	Varchar	20	
	ConfirmPassword	Varchar	20	
teacherinfo	TeacherID	Varchar	5	Primary
	Name	Varchar	30	
	IC_No	Varchar	12	
	Gender	Varchar	6	
	ContactNumber	Varchar	10	

	Email	Varchar	40	
	Password	Varchar	20	
	ConfirmPassword	Varchar	20	
	Approval	Varchar	10	
announcement	ID	Int	11	Primary
	Topic	Varchar	50	
	Message	text		
	Name	Varchar	30	
	Date	Varchar	10	
discussion	ID	Int	11	Primary
	Message	text		
	Username	Varchar	20	
	Date	Varchar	10	
easy	easyID	Int	11	Primary
	Question	longtext		
	rightAns	text		
	wrongAns1	text		
	wrongAns2	text		
	wrongAns3	text		
	rAnswer	text		
medium	mediumID	Int	11	Primary
	Question	longtext		
	rightAns	text		
	wrongAns1	text		
	wrongAns2	text		

	wrongAns3	text		
	rAnswer	text		
hard	hardID	Int	11	Primary
	Question	longtext		
	rightAns	text		
	wrongAns1	text		
	wrongAns2	text		
	wrongAns3	text		
	rAnswer	text		
exerciseone	EOneID	Int	11	Primary
	question	mediumtext		
	rightAns	text		
	wrongAns1	text		
	wrongAns2	text		
	wrongAns3	text		
	rAnswer	text		
exercisetwo	ETwoID	Int	11	Primary
	question	mediumtext		
	rightAns	text		
	wrongAns1	text		
	wrongAns2	text		
	wrongAns3	text		
	rAnswer	text		
exercisethree	EThreeID	Int	11	Primary
	question	mediumtext		

	rightAns	text		
	wrongAns1	text		
	wrongAns2	text		
	wrongAns3	text		
	rAnswer	text		
upload	id	Int	11	Primary
	name	Varchar	30	
	type	Varchar	30	
	size	Int	11	
	content	longblob		
	TeacherID	Varchar	20	
	Date	Varchar	10	
quizscores	Username	Varchar	20	
	Score	Int	11	
	Date	Varchar	10	
scores	scoreID	Varchar	20	Primary
	Username	Varchar	20	
	Score	Int	11	
	taken	Int	11	
	Date	Varchar	10	
images	image_Id	Varchar	100	Primary
	adminID	Varchar	20	

3.4.3 Development

Development means turning the system specification into a functional system by development tools. In this phase, all three modules stated in design phase will be coded by using Adobe Dreamweaver CS5. Xampp 1.73 used as database to integrate with the system so that the system may retrieve and update data to the database.

Phase 1- Interface Design

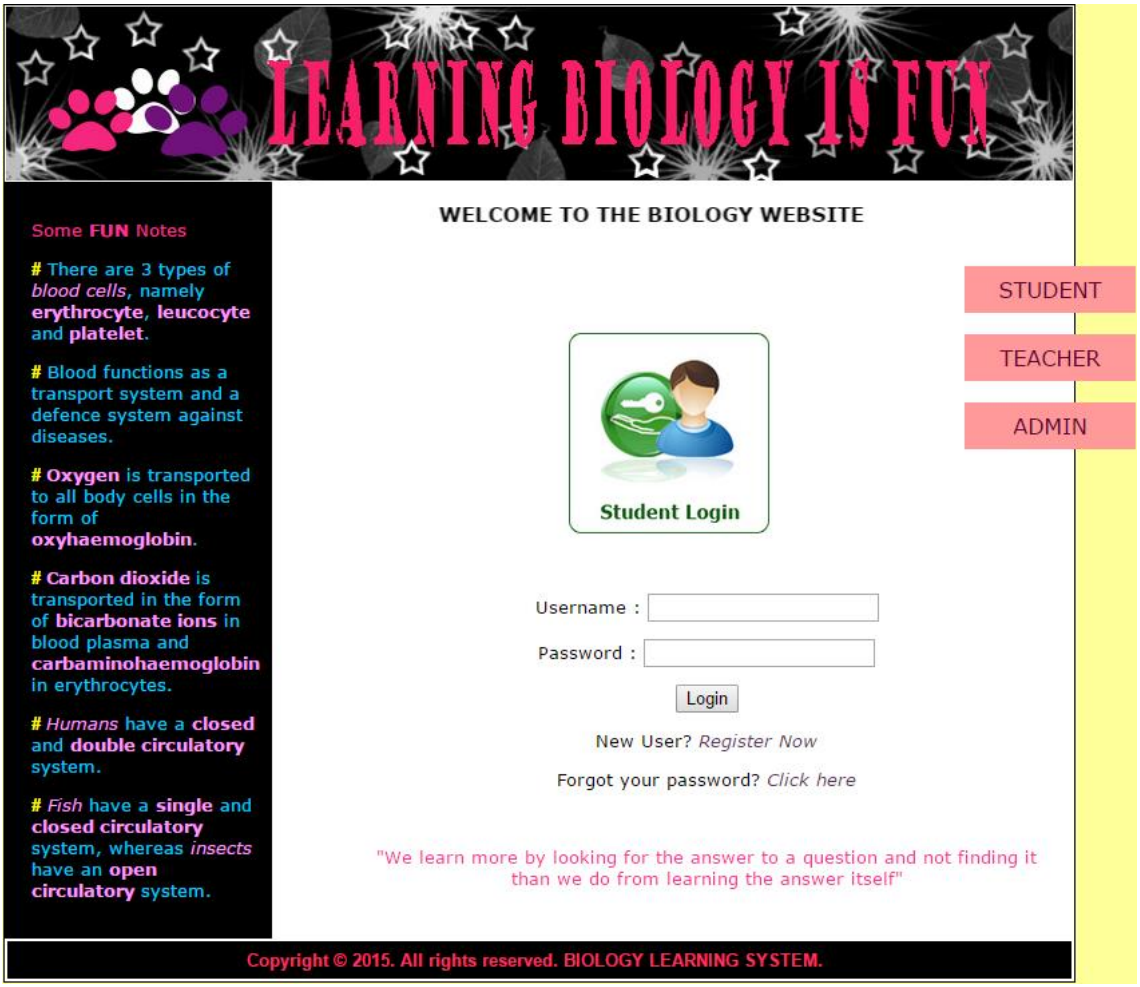

Figure 3.6: Student main login page

Figure 3.6 is the screenshot of student login page. This is the homepage for student module.

Figure 3.7: Teacher login page

Figure 3.7 is the screenshot of teacher login page. This is the homepage for teacher module.

Figure 3.8: Main login page of admin

Figure 3.8 shows the homepage of admin in the biology e-learning system

Phase 2 – Database Design

Database provides a framework that eliminates data redundancy, supports real time and dynamic environment. Database Management System (DBMS) is a collection of tools, features and interfaces that enable users to add, update, delete, manage access and analyze the contents of a database. The UML class diagram is used to illustrate the database design for the Biology E-Learning System, the relationship between users are determined and normalized accordingly.

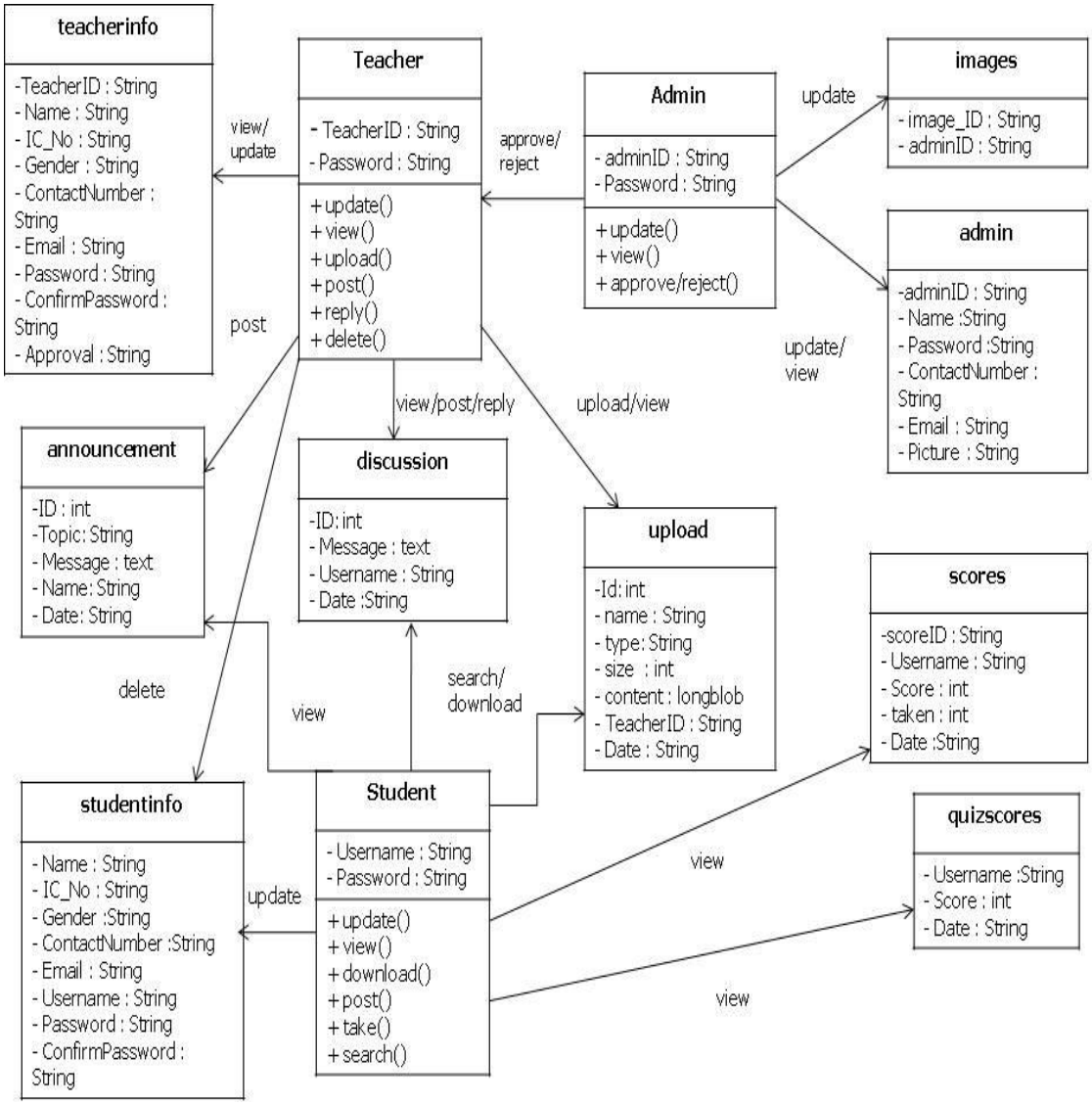

Figure 3.9: UML class diagram of Biology E-learning system

This figures continuation is at next page so its figure number will be written together with the second figure.

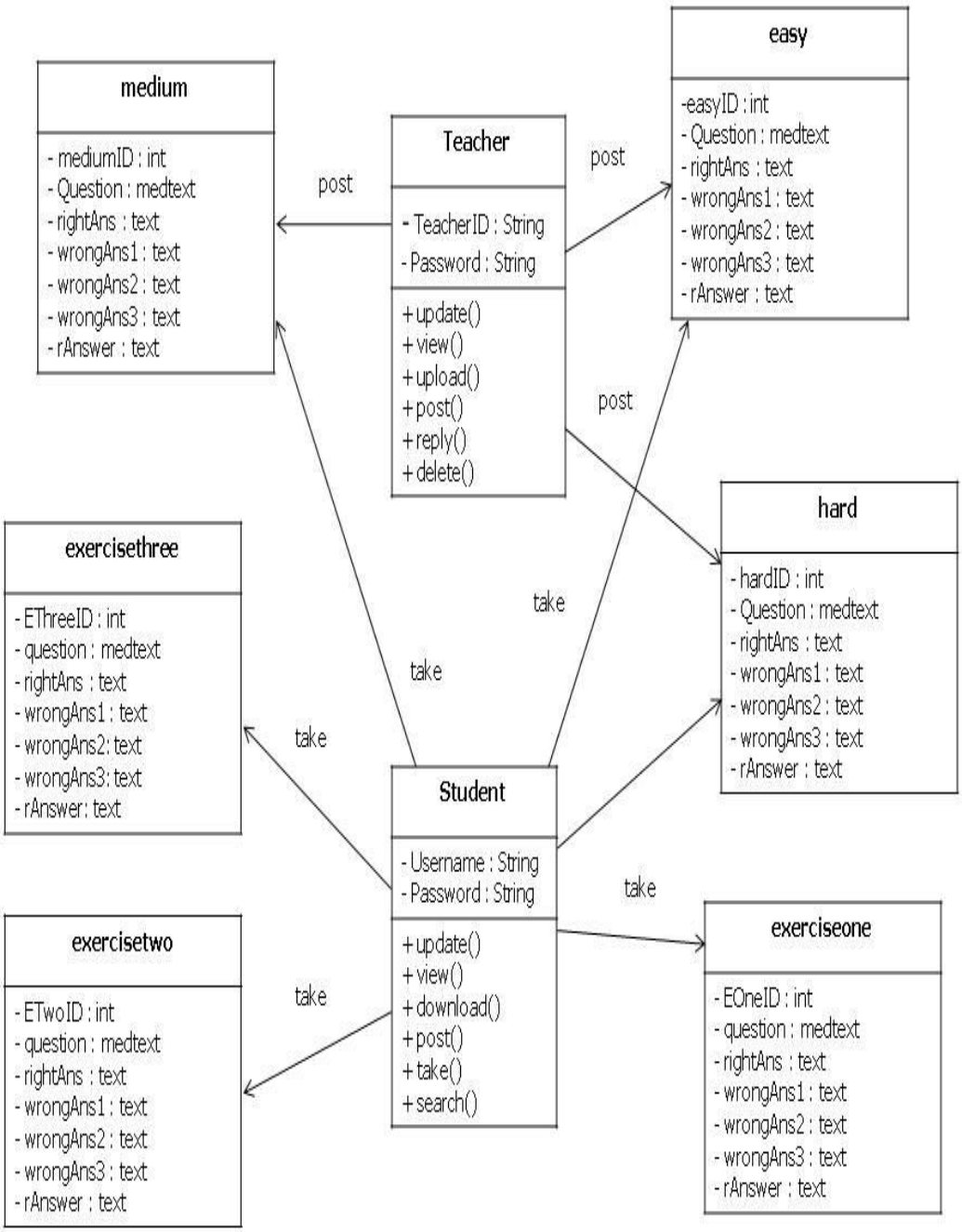

Figure 3.10: UML class diagram of Biology E-learning system

3.5 Testing

After finishing each phase, the system is tested over and over again to find out any error which may cause the system fail to function perfectly. All the coding and interface will be tested so that the system may function perfectly. Any bug discovers in this phase is debugged and tested again to full fill the system requirement. The test procedure shown in figure 3.11

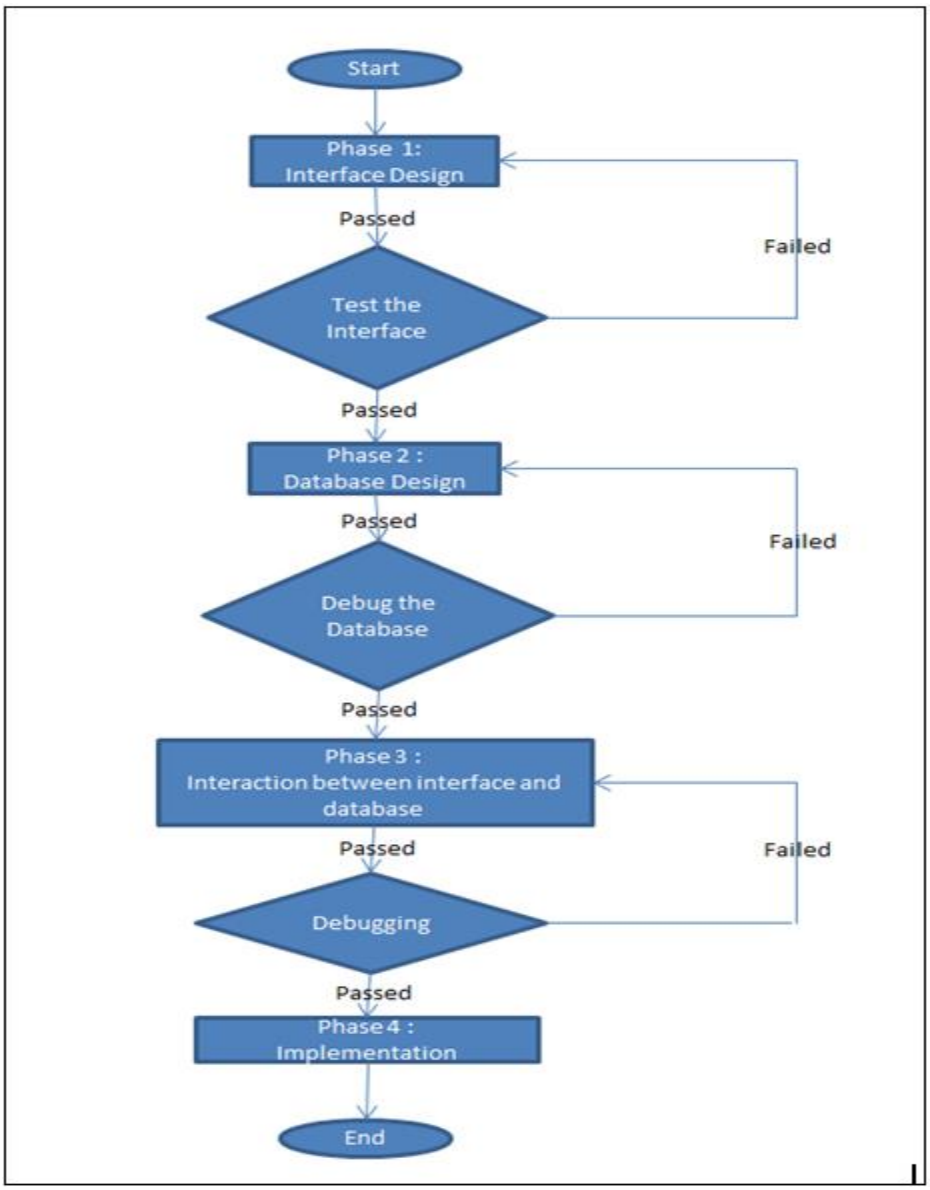

Figure 3.11: Phase of interface and database

3.6 Implementation

System development and implementation phase includes the development or construction of the system, testing, and installation. This phase is implementing the system development into real system. It will be done by implementing the code for the user interface, databases, organization structure, functionality and web security.

3.7 Summary

The conclusions emanating from the findings of this deliberation are suggestive of the fact that Rapid Application Development has brought about a new dimension in the software system development. The main points to be noted include the following:

i. RAD has successfully achieved the objective of reducing costs on project whilst not compromising on quality by effective reducing the project time-frame and the number of people involved in such project.
ii. It has also been successful in encouraging the involvement of customers in the entire process of its development lifecycle. This proves advantages in many respects but most importantly this improves the development process by ensuring full acceptance from the customer whilst the system is still being created.
iii. RAD has also demonstrated strength in being able to speed up the development process by appropriately fusing its methodology, people, management and high tech computer aided tools.
iv. RAD has also proven to have challenges. Amongst these challenges are the fact that it tends to learn too much on emphasizing more on delivery deadline and then compromising on other features that could have been added if there was not deadline set.

CHAPTER 4

IMPLEMENTATION

4.1 Introduction

This chapter is devoted to the implementation of database, interface and coding into the system.

4.2 Database Implementation

The e-learning Biology system for SMK Sentul Convent needed database to store the student record and study needed database to store the student record and study material for student. It is using pHp MyAdmin as the database management system. There are one database is uses in this system which are name biology sql which is shown from figure 4.1 until figure 4.4.

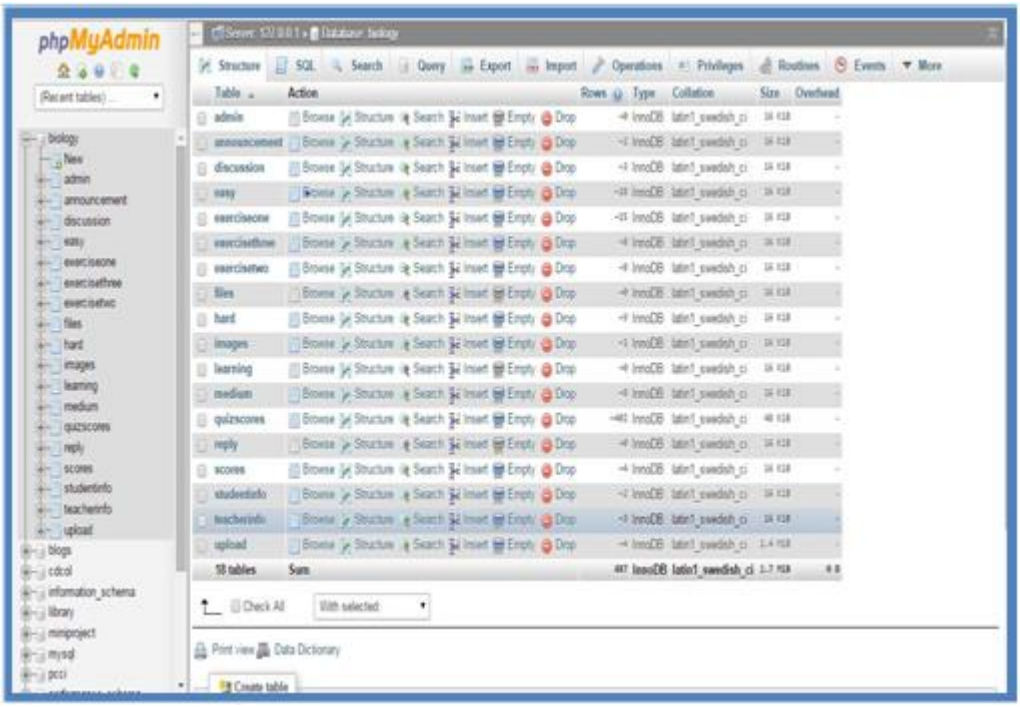

Figure 4.1: Database of overall Biology e-learning system

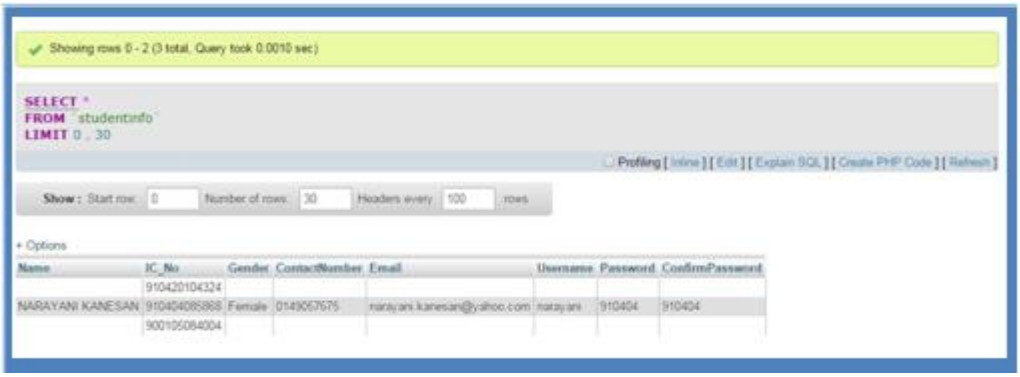

Figure 4.2: Database of student

Figure 4.3: Database of teacher

Figure 4.4: Database of admin

4.2.1 Database and server connection

The Biology e-learning system needs a server to host and link to the database. It using Apache Server as local host and using PHP and MySQL code to connect the system with server and database as shown in figure 4.5 until 4.7

```
<?php
//learning.php script for connecting the database
$hostname_biology = "localhost";
$username_biology = "root";
$password_biology = '';
$database_biology = "biology";

if(!($db = mysql_connect($hostname_biology,$username_biology,$password_biology))
{
        die("Error connecting to mysql");
}
else
{
        if(!(mysql_select_db("$database_biology", $db)))
        {
                die("Error connecting to db");
        }
}
?>
```

Figure 4.5: Connection of database to local host

```
<?
function dbconnect()
{
    require("Connections/learning.php");
    global $hostname_biology = "localhost", $username_biology = "root", $password_biology = '', $database_biology = "biology";
    mysql_connect($hostname_biology,$username_biology,$password_biology);
    @mysql_select_db($database_biology) or die ("Unable to select database !");
}

function query_db($query)
{
    dbconnect();
    return @mysql_query($query);
}
?>
```

Figure 4.6: Database that disconnect to local host

```
<?php
session_start();
include("Connections/learning.php");
?>
<html>
<head>
<script>
```

Figure 4.7: Local host that connect with PHP in each section

4.3 System Interface and Implementation

In this section, all screenshots of student, teacher, and admin modules will be shown.

4.3.1 Student Module

In this report, starting from figure 4.8 until figure 4.35, it's all about student module. The explanations of screenshot have been explained below the screenshot.

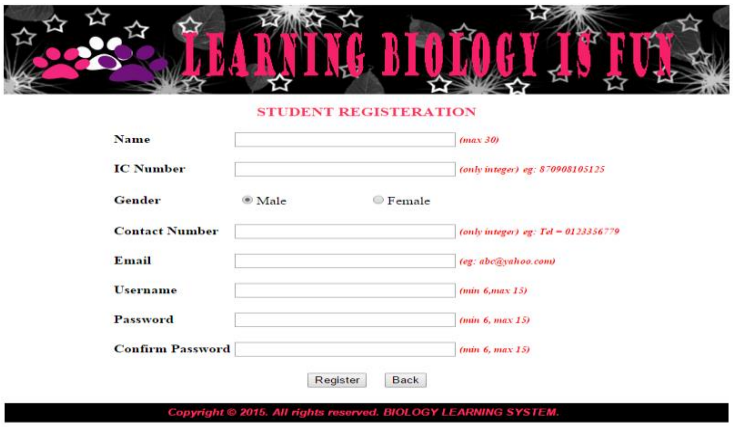

Figure 4.8: Student registrations page

Figure 4.8 shows the registration page of student. The student needs to fill up all the textboxes in order to register successfully.

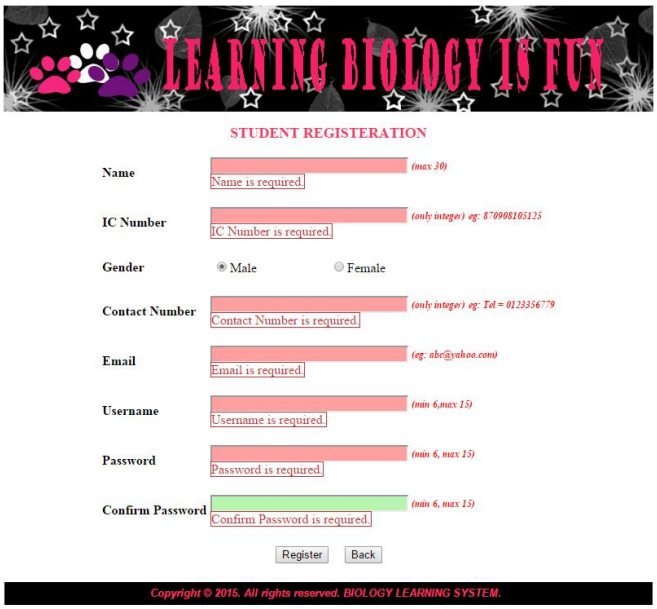

Figure 4.9: Validation for registration page

Figure 4.9 is the screenshot of error message shown in the system if the user forgets to key in any one of the field or all.

Figure 4.10: Validation for confirm password

Figure 4.10 is the screenshot for the error message if the password and confirm password is not the same.

Figure 4.11: The Page will look like this if all requirements fulfilled

Figure 4.11 is the successful registrations because all the textbox was filled in.

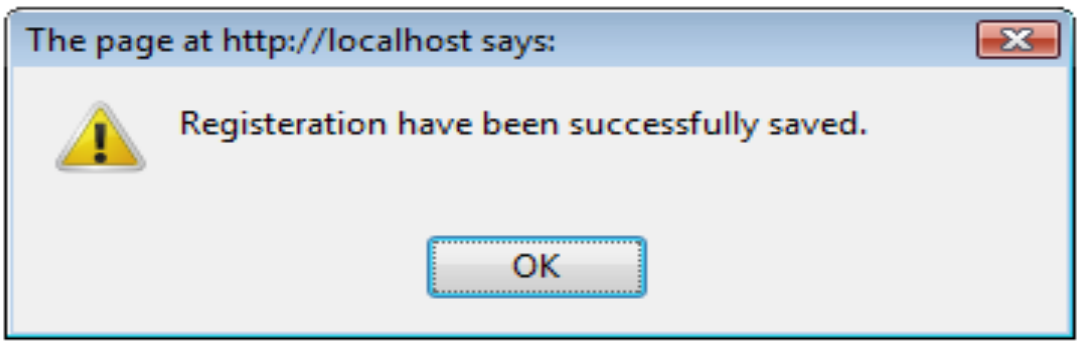

Figure 4.12: Registrations success message

Figure 4.12 is the message box will appear if the registration successfully inserted into the database.

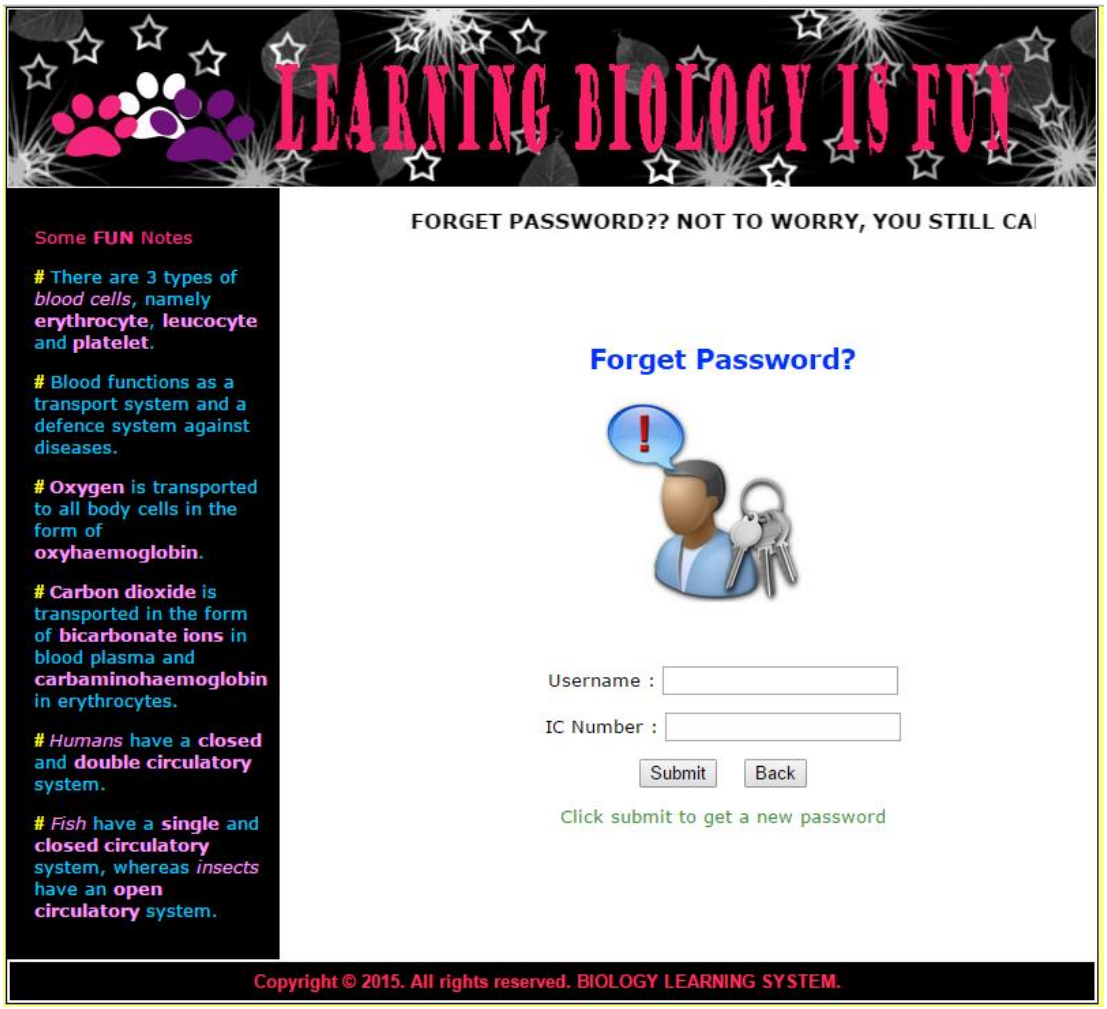

Figure 4.13: Forgot password page

Figure 4.13 is the screenshot of forgot password page. Users have to key in their username and password to get a new password.

Figure 4.14: Error page if the data entered was wrong

Figure 4.14 shows the error page if the user enters invalid username or password in the textbox.

Figure 4.15: If the data entered was correct

Figure 4.15 shows the correct data being entered in the system. If the data entered same in the database the message below will be shown.

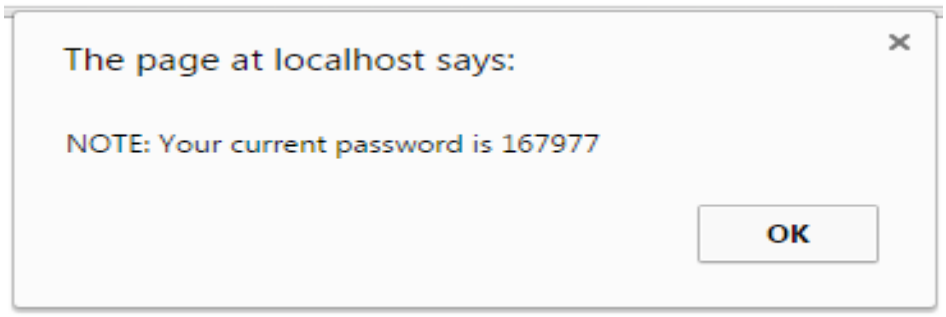

Figure 4.16: New password number generated randomly for user

Figure 4.16 is the message box shown if the user enters the correct username and ic number. The system will generate a random number for the user to use temporarily until they change their password in the profile.

Figure 4.17: After the registrations success, user able to login

Figure 4.17 shows the user enters the correct data to login into the system.

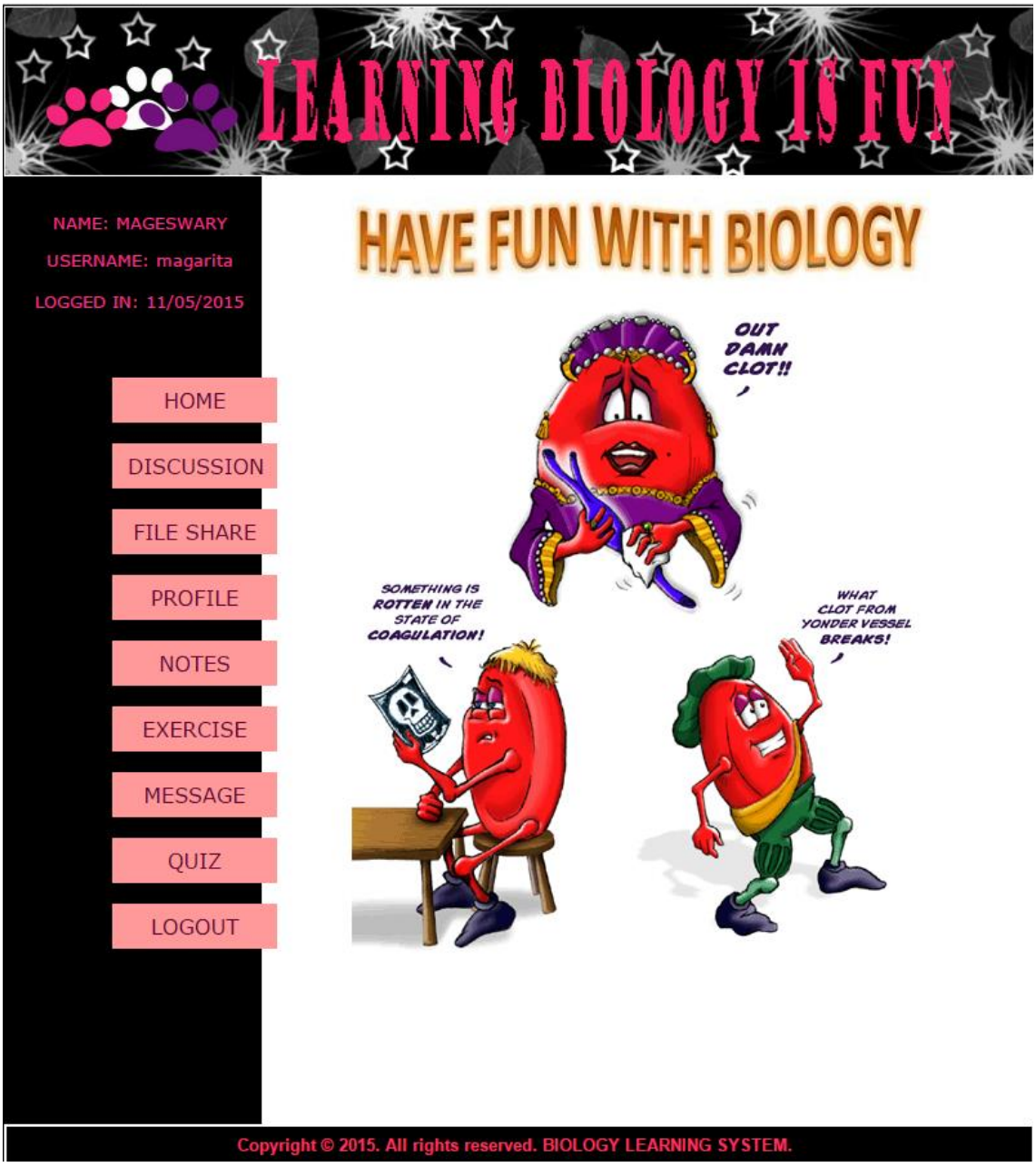

Figure 4.18: Main page of student module after successful login

Figure 4.18 is the screenshot of main page in student module. The student can choose any of the function buttons at left hand side.

Figure 4.19: Menu bar view

Figure 4.19 shows the screenshot for the menu bar. If the user clicks on discussion menu, the discussion menu has 2 submenus. User able to choose any action he/she wanted to do.

Figure 4.20: Interface for post question in discussion board

Figure 4.20 shows the discussion board. The student can post a new question in the system.

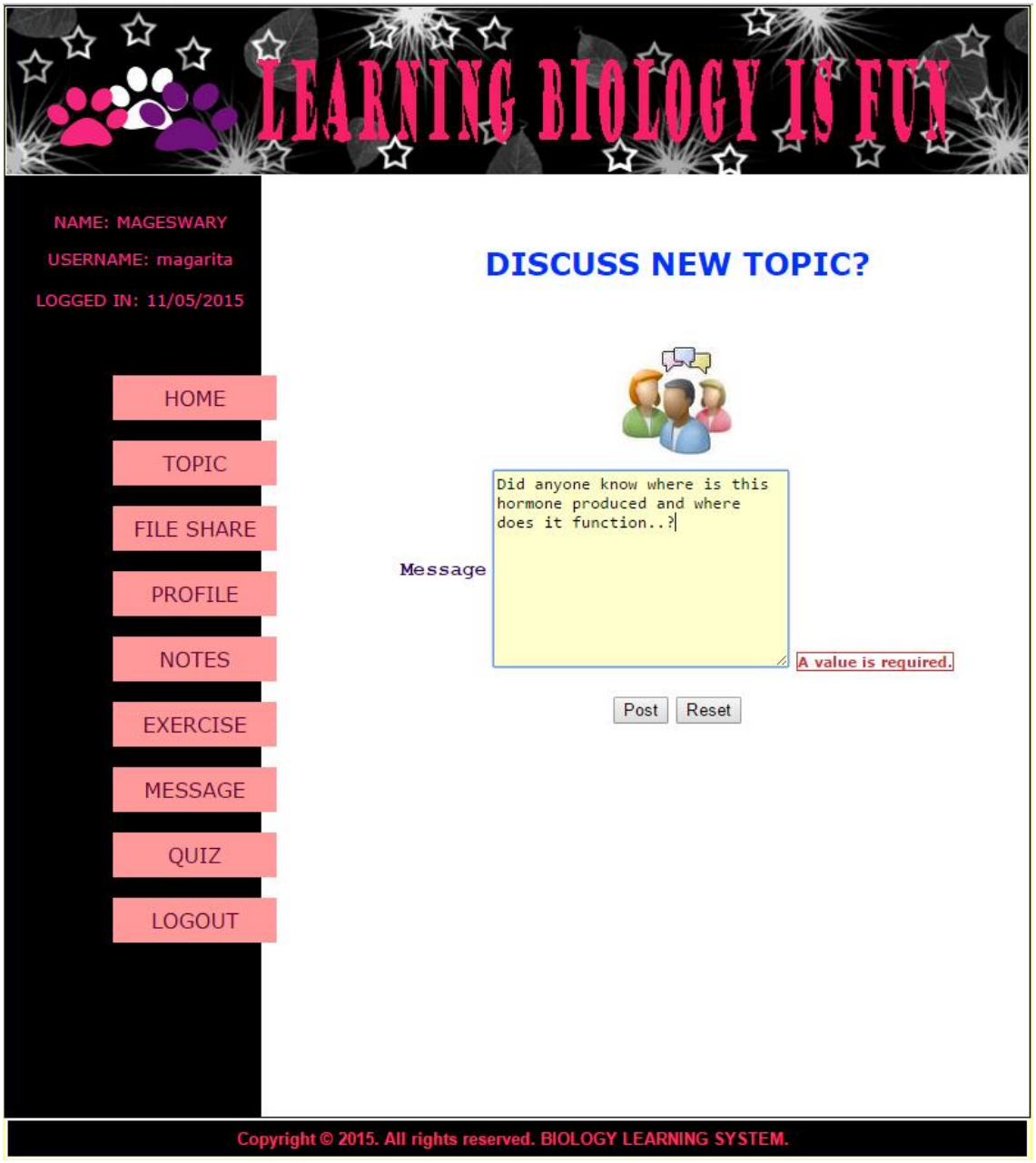

Figure 4.21: Interface to post question in discussion board after error page

Figure 4.21 is the screenshot of error message shown if the student post an empty field. Then the student writes a question in the field to show the message successfully updated in the database.

Figure 4.22: Student can view topic discuss in discussion board and reply

Figure 4.22 shows the topic post by the all students. The user able to click the reply button to reply or answer the question post by other students.

Figure 4.23: Student Search file page

Figure 4.23 is the screenshot of search file interface. The students can enter the file name they want to find in the system.

Figure 4.24: If the file not found

Figure 4.24 shows the message pop up if the filename entered by user not found in the database.

Figure 4.25: Design for the result of search file found

Figure 4.25 is the screenshot of the view file. If the file name entered by the user match with the file name in database, it will be shown as above.

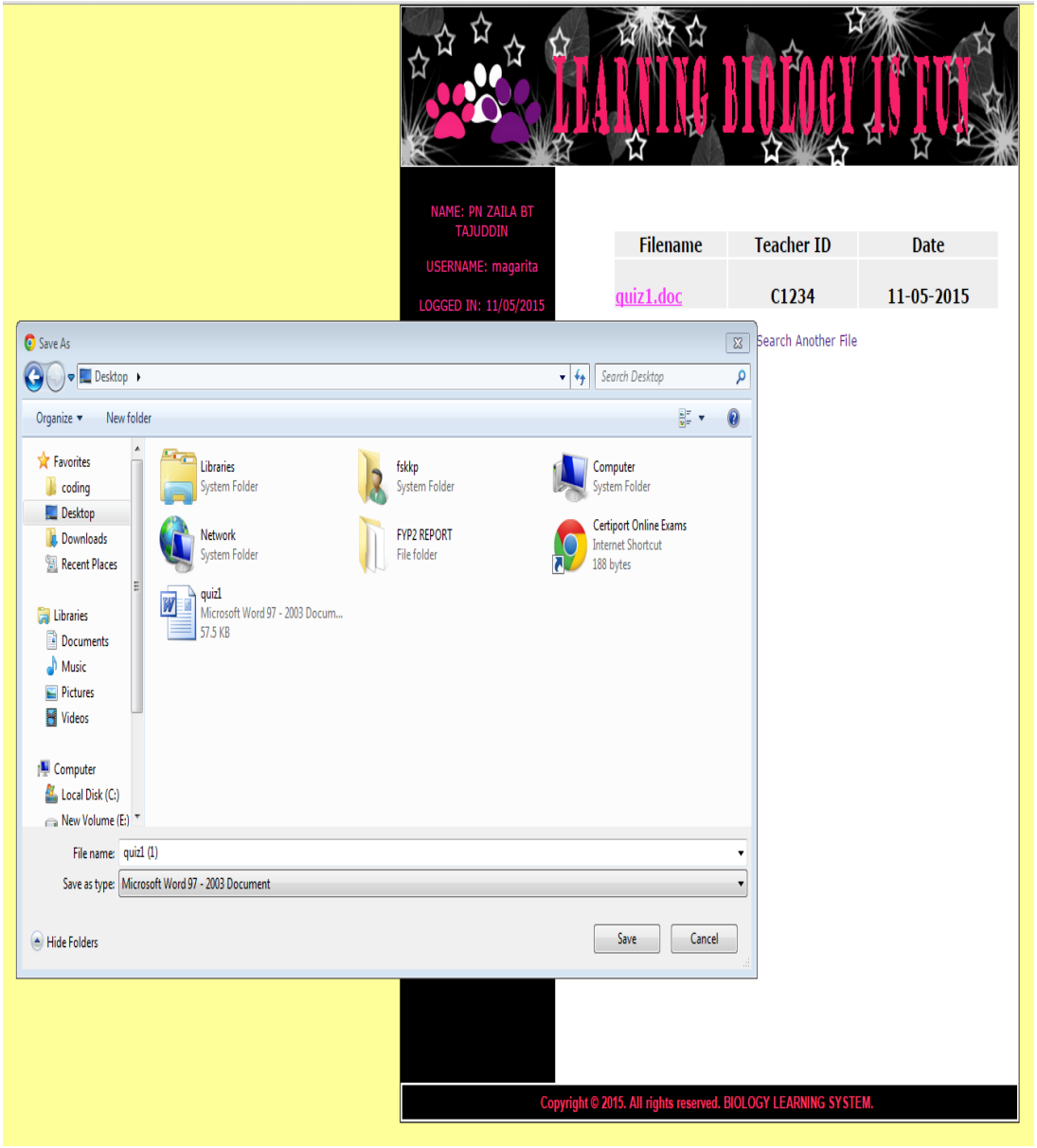

Figure 4.26: Download files uploaded by the teacher

Figure 4.26 shows the message box appears if the user clicks the file name to download the file. The user can choose to save or open the file.

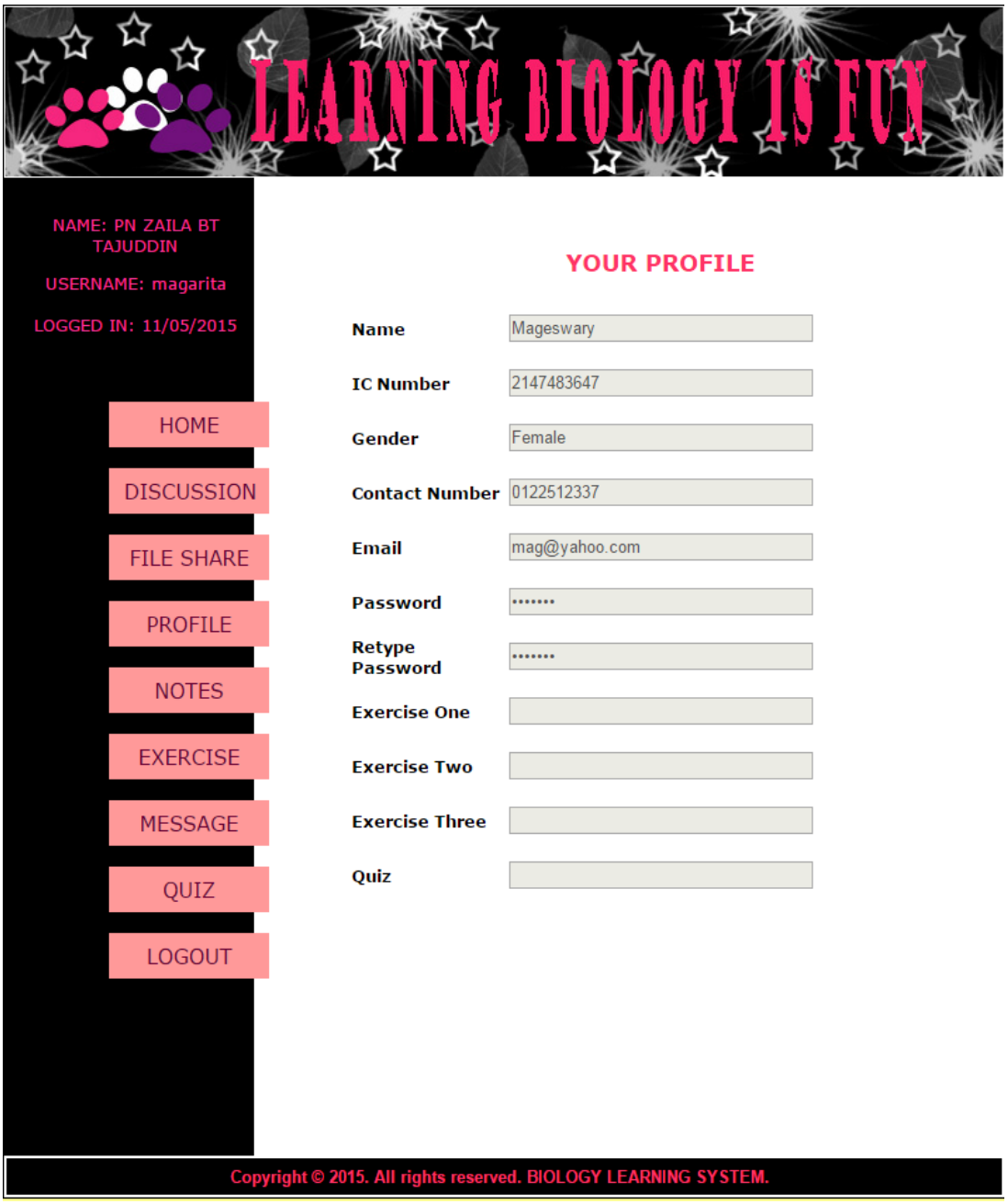

Figure 4.27: Student can view their profile

Figure 4.27 shows the profile information of the student. It is only can be viewed. No changes able to made in this page.

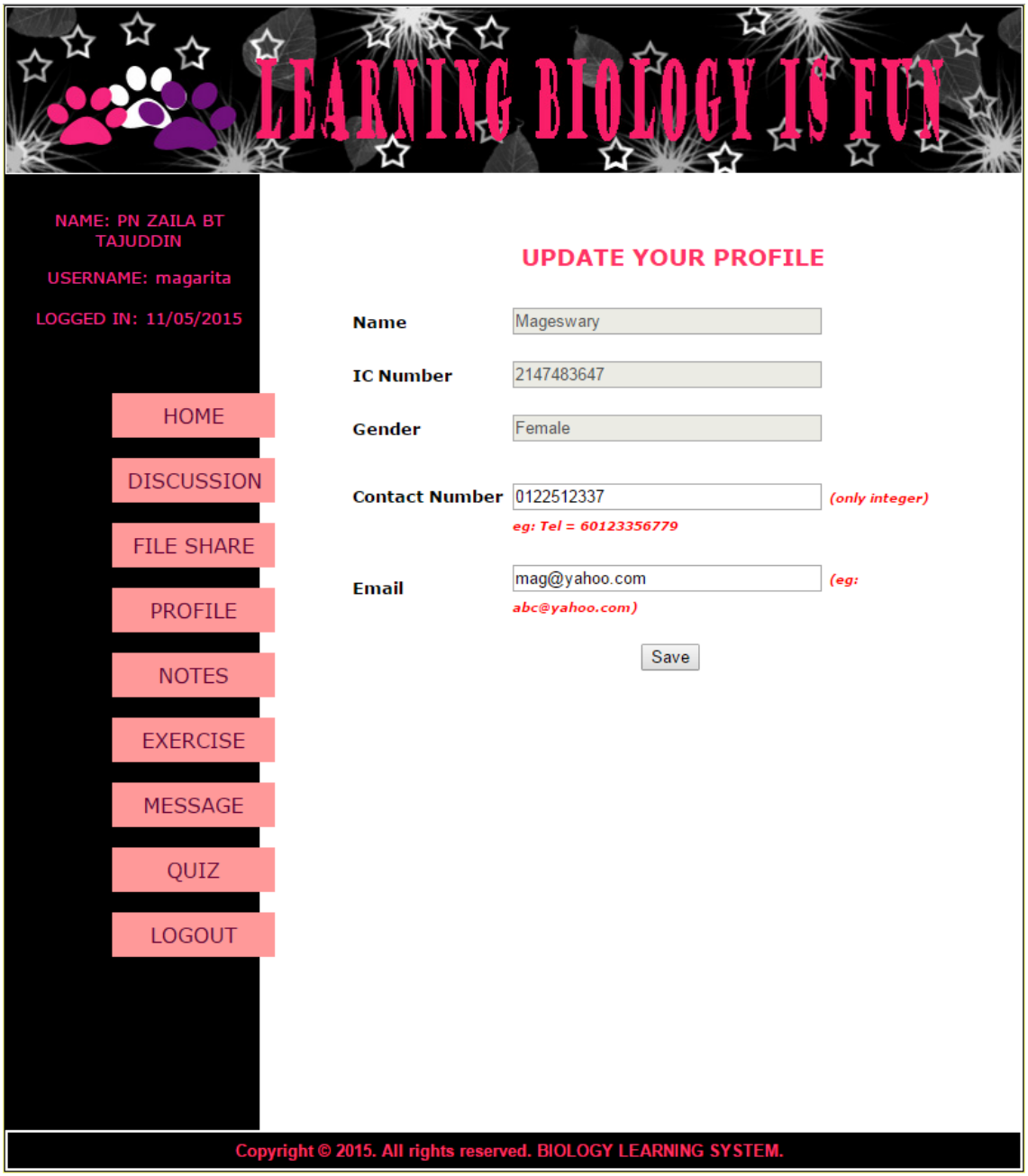

Figure 4.28: Student can update their profile

Figure 4.28 is the page for the user to edit their information. They only able to edit contact number and email because other information is standardize.

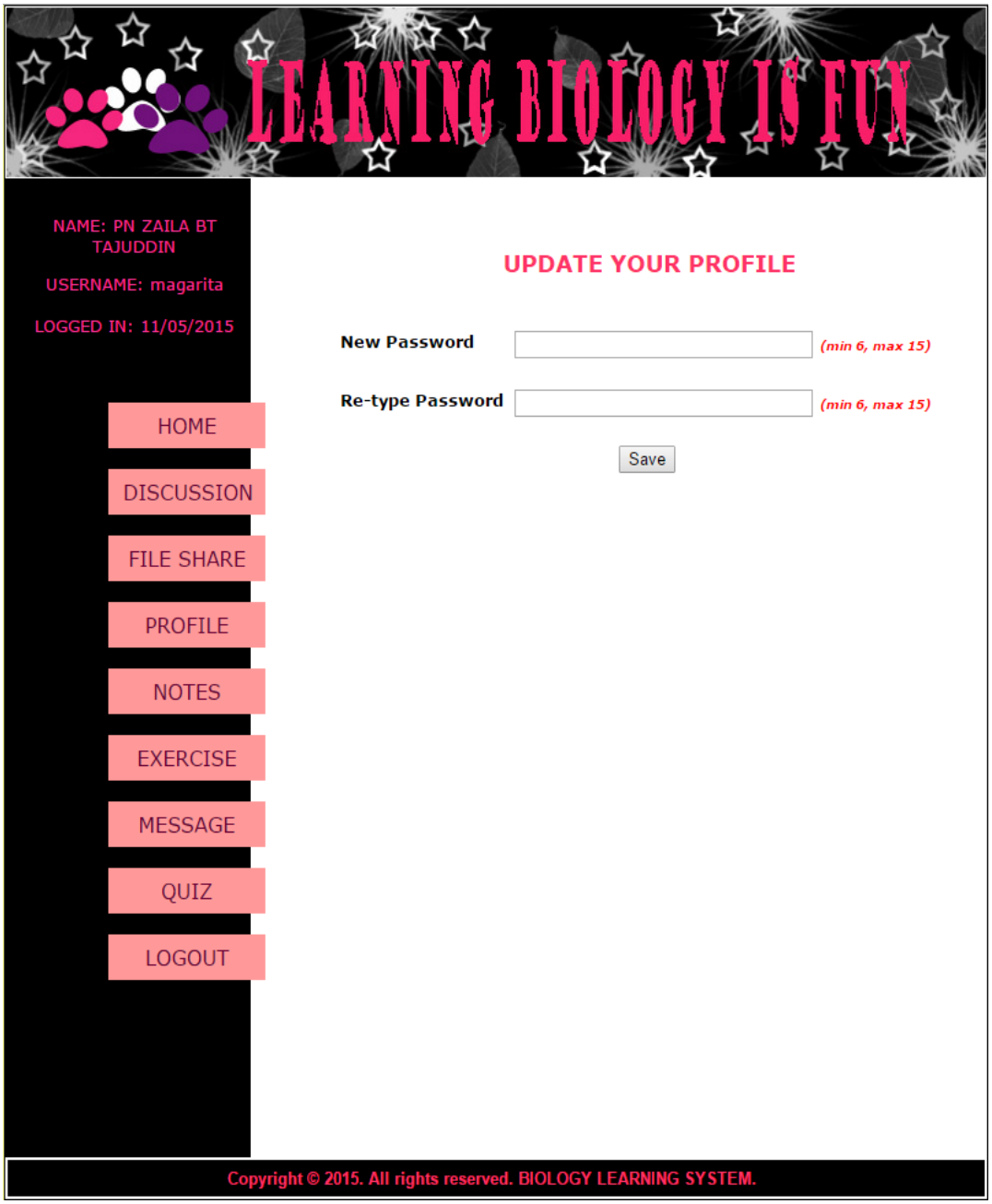

Figure 4.29: Student can change password

Figure 4.29 shows the page for the user to change their password. User need to type the same password twice in order to save the password successfully.

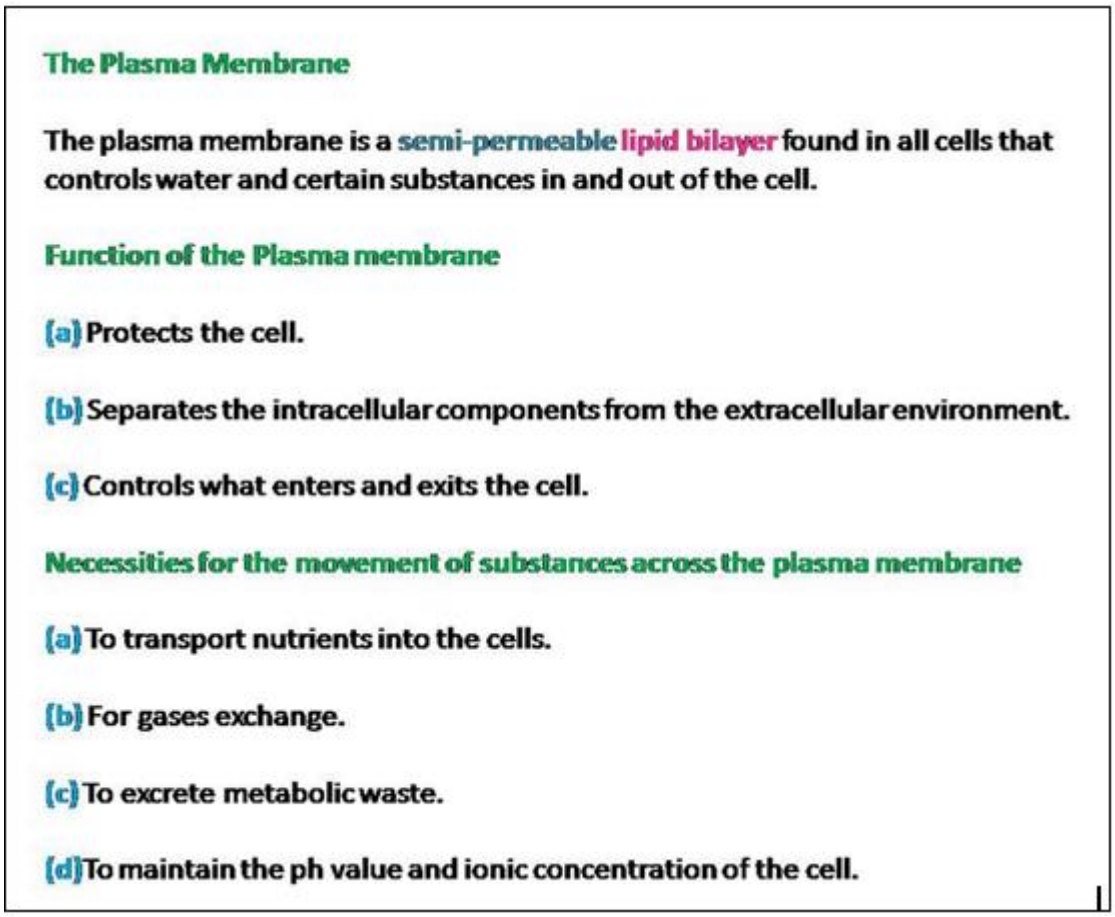

Figure 4.30: Chapter notes provided in the system

Figure 4.30 shows the notes available in the system. This is the example notes of chapter 1. The system contains 3 chapters with short and easy to understand notes.

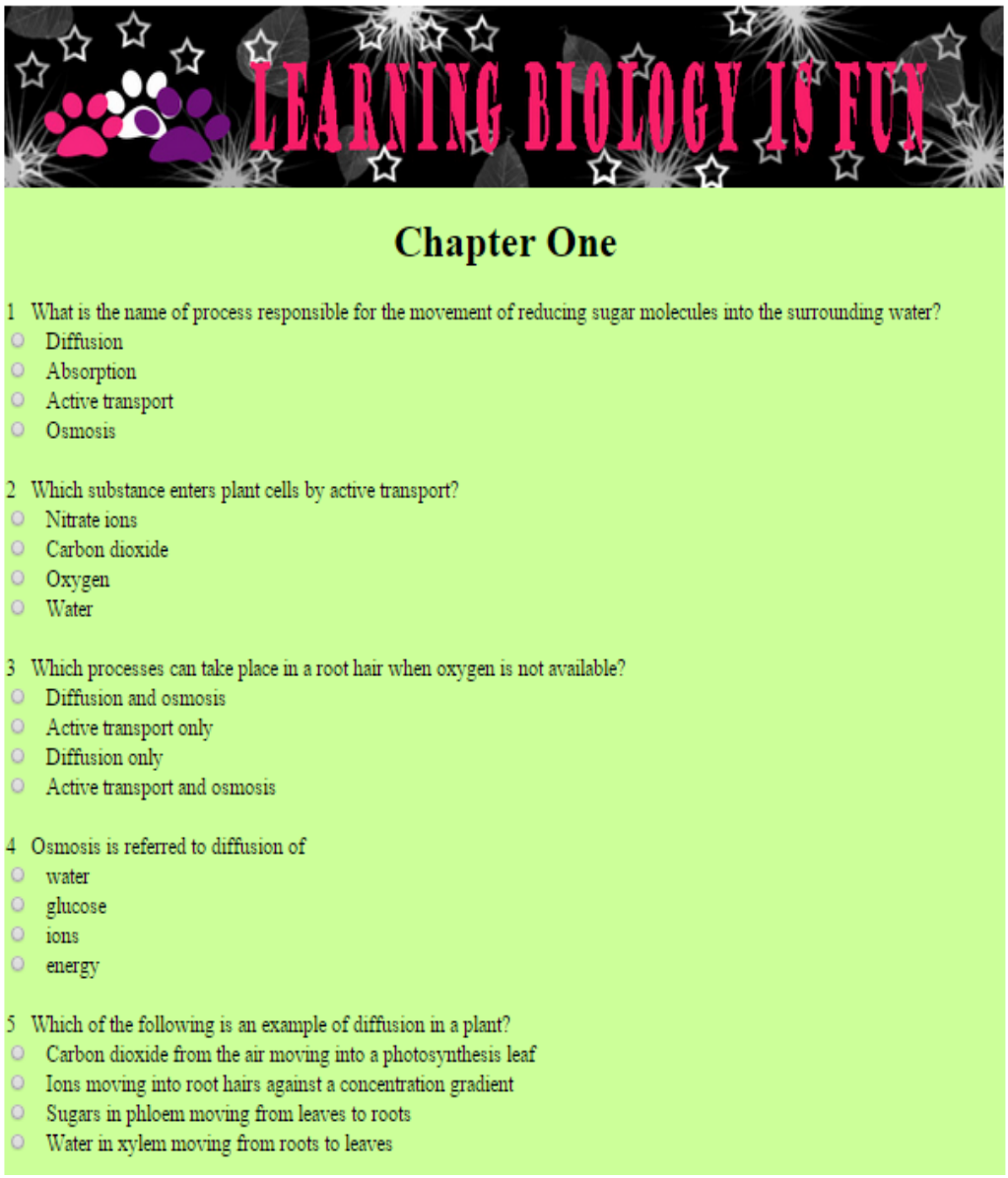

Figure 4.31: Chapter exercise for student

Figure 4.31 is the screenshot for the exercise module in the system. Once the user click submits, marks will be evaluated and stored into the database.

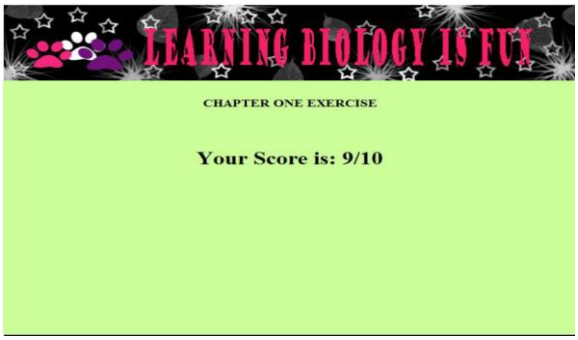

Figure 4.32: Display student score for chapter one exercise

Figure 4.32 is the screenshot of marks shown to the student once they submit the exercise.

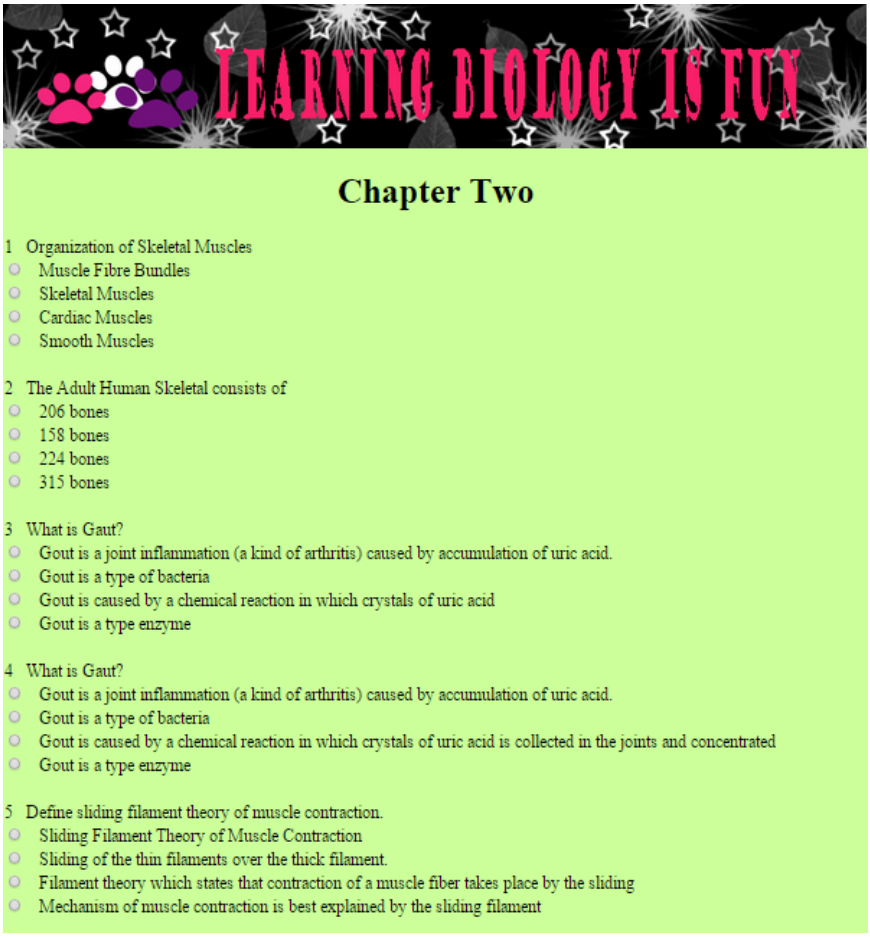

Figure 4.33: Chapter two exercise for student

Figure 4.33 is the screenshot of chapter exercise for chapter 2 in biology e-learning system.

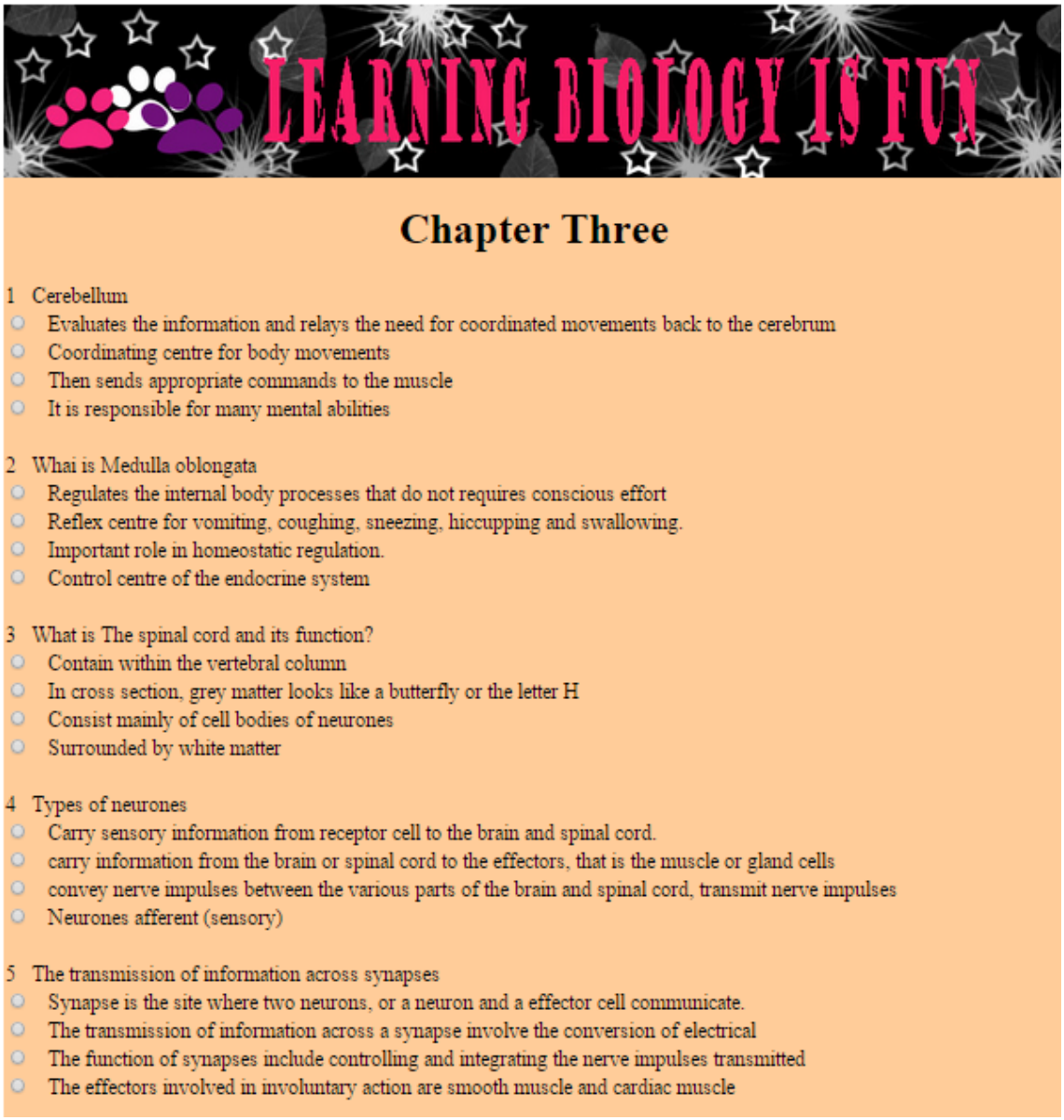

Figure 4.34: Chapter 3 exercise for student

Figure 4.34 is the screenshot of chapter exercise for chapter 3 in biology e-learning system.

Figure 4.35: View announcement send by the teacher

Figure 4.35 is the screenshot of view message sent by the teachers.

4.3.2 Teacher Module

In this report, starting from figure 4.36 until figure 4.46, it's all about teacher module. The explanations of screenshot have been explained below the screenshot.

Figure 4.36: Teacher's registrations page.

Figure 4.36 shows the registration page of teacher. The teacher needs to fill up all the textboxes in order to register successfully. The validation is same as the student page as shown as above just now. The teacher needs to wait for the admin approval in order to use this system.

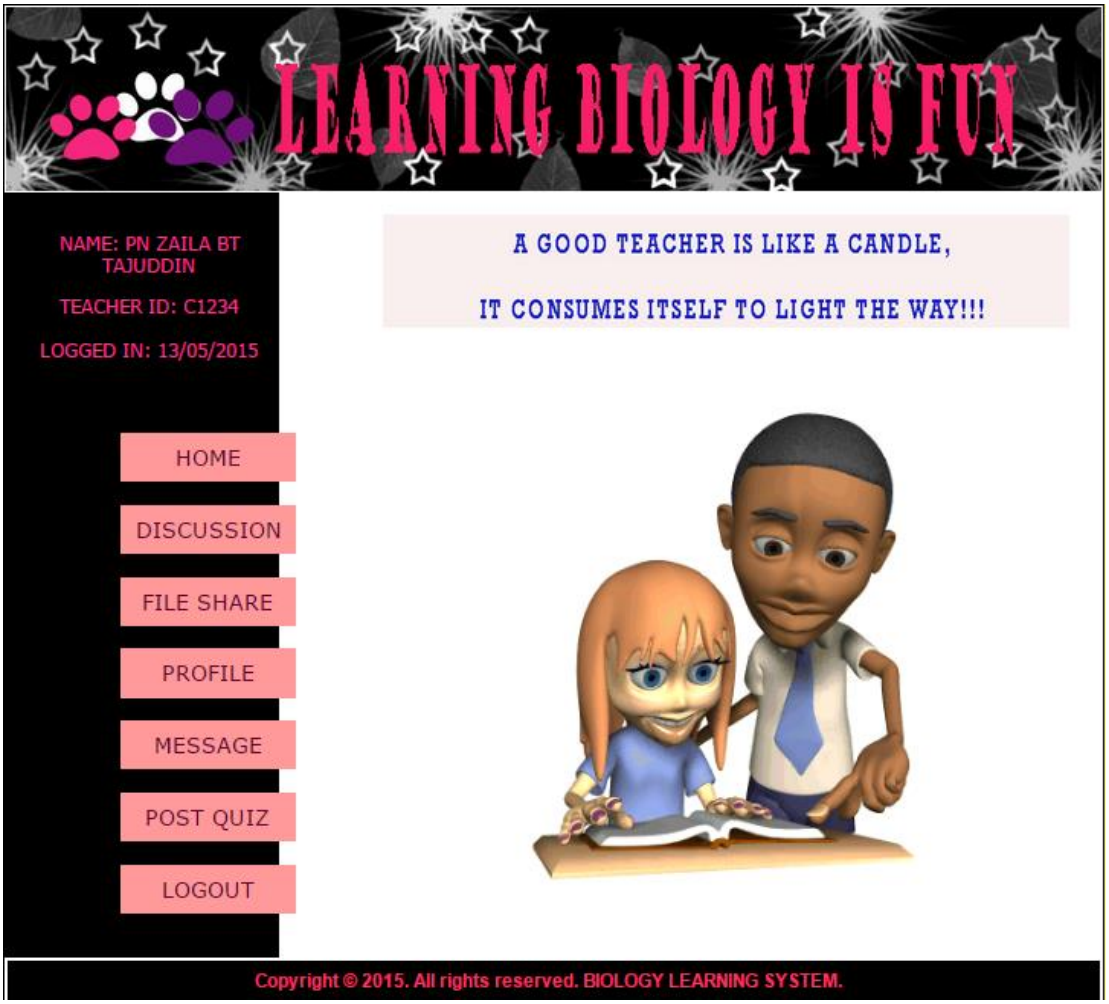

Figure 4.37: Teacher main page after successful login

Figure 4.37 shows the main page of the teacher module if the teacher successfully login into the system. The left hand side menu is the feature that teacher able to use.

Figure 4.38: Teacher discussion board

Figure 4.38 is the page for teacher to start a discussion if he/she wished to.

Figure 4.39: Teacher view discussion board

Figure 4.39 is the Q&A from student and teacher. The teacher able to delete the message if he/she feels the Q&A is not relevant.

Figure 4.40: Teacher view uploaded files

Figure 4.40 shows the page for the teacher able to view or delete files so that the space can be occupied for other files

Figure 4.41: Teacher upload notes/learning materials page

Figure 4.41 shows the screenshot of upload notes. The teacher able to uploads notes below 1MB. This is because to avoid the database become heavy and work slow.

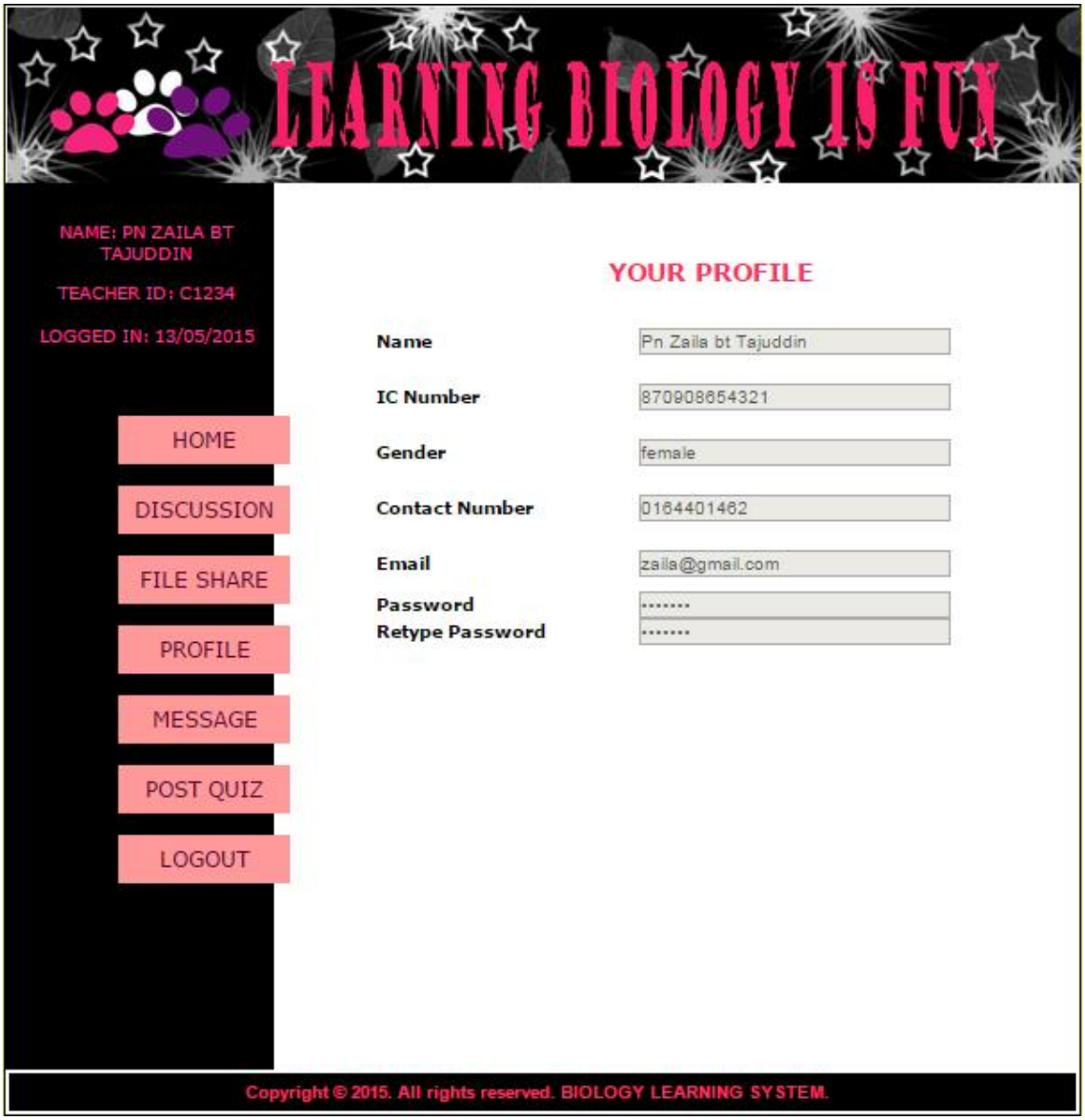

Figure 4.42: Teacher profile view

Figure 4.42 is the screenshot for teacher to view their profile. Changes cannot be made in this page.

Figure 4.43: Teacher edit profile

Figure 4.43 is the screenshot for the teacher to edit their information. The information will be updated once they click the save button.

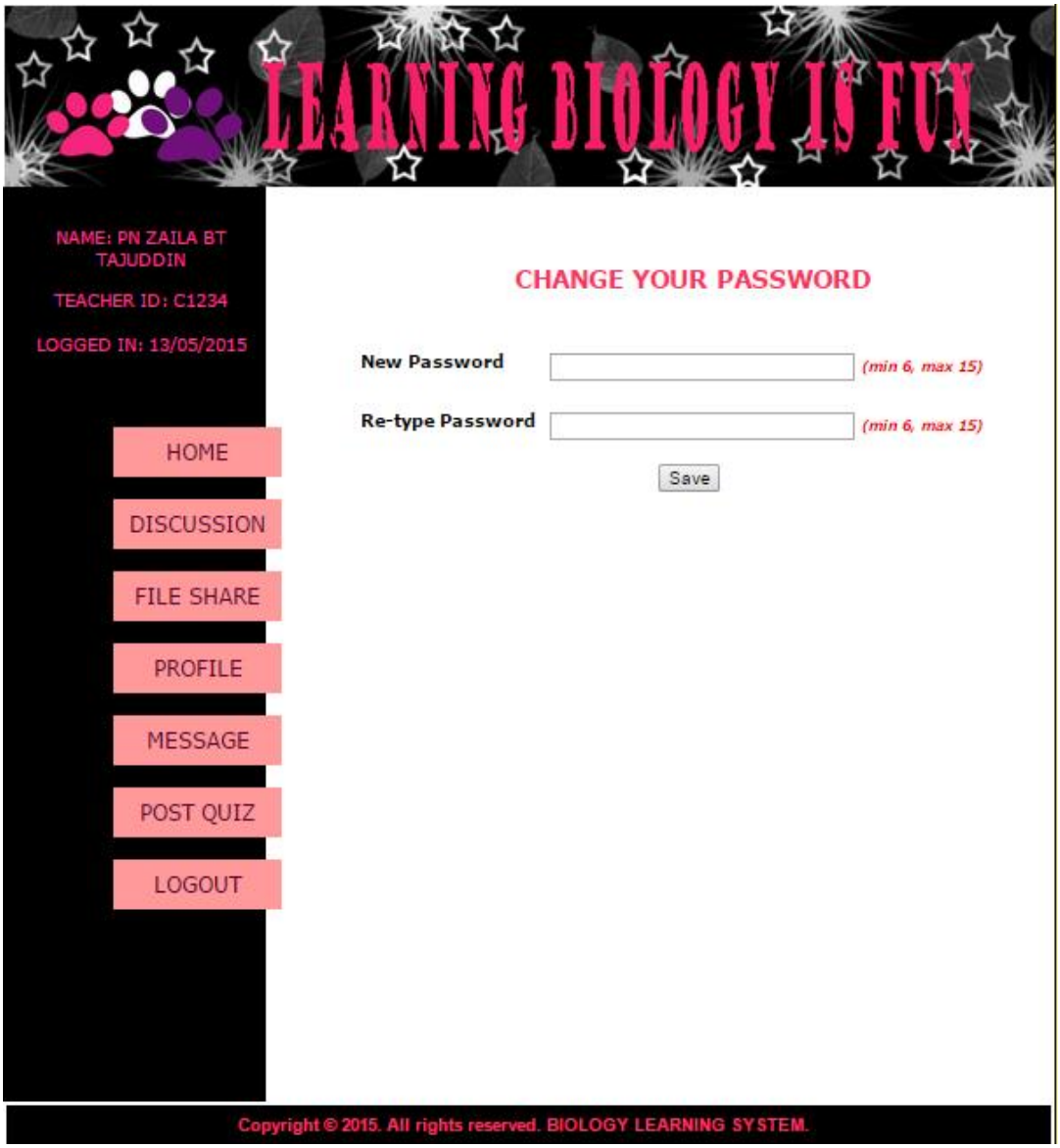

Figure 4.44: Teacher change password

Figure 4.44 shows the page for the teacher to change their password. It works same as for the student module.

Figure 4.45: Teacher Post Announcement view

Figure 4.45 is the screenshot of announcement. Teacher able to send message on (event, function, invites) using this system to students.

Figure 4.46: Teacher's post quiz page

Figure 4.46 is the screenshot of teacher post quiz question. Once the teachers enter post, the question will be saved into the database. This page interface is similar to medium and hard post quiz page.

4.3.3 Admin Module

In this report, starting from figure 4.47 until figure 4.54, it's all about admin module. The explanations of screenshot have been explained below the screenshot.

Figure 4.47: Admin main page after successful Login

Figure 4.47 is the main page of admin if the admin have successfully login. The menu bar at left hand side is the feature the admin can use in this system.

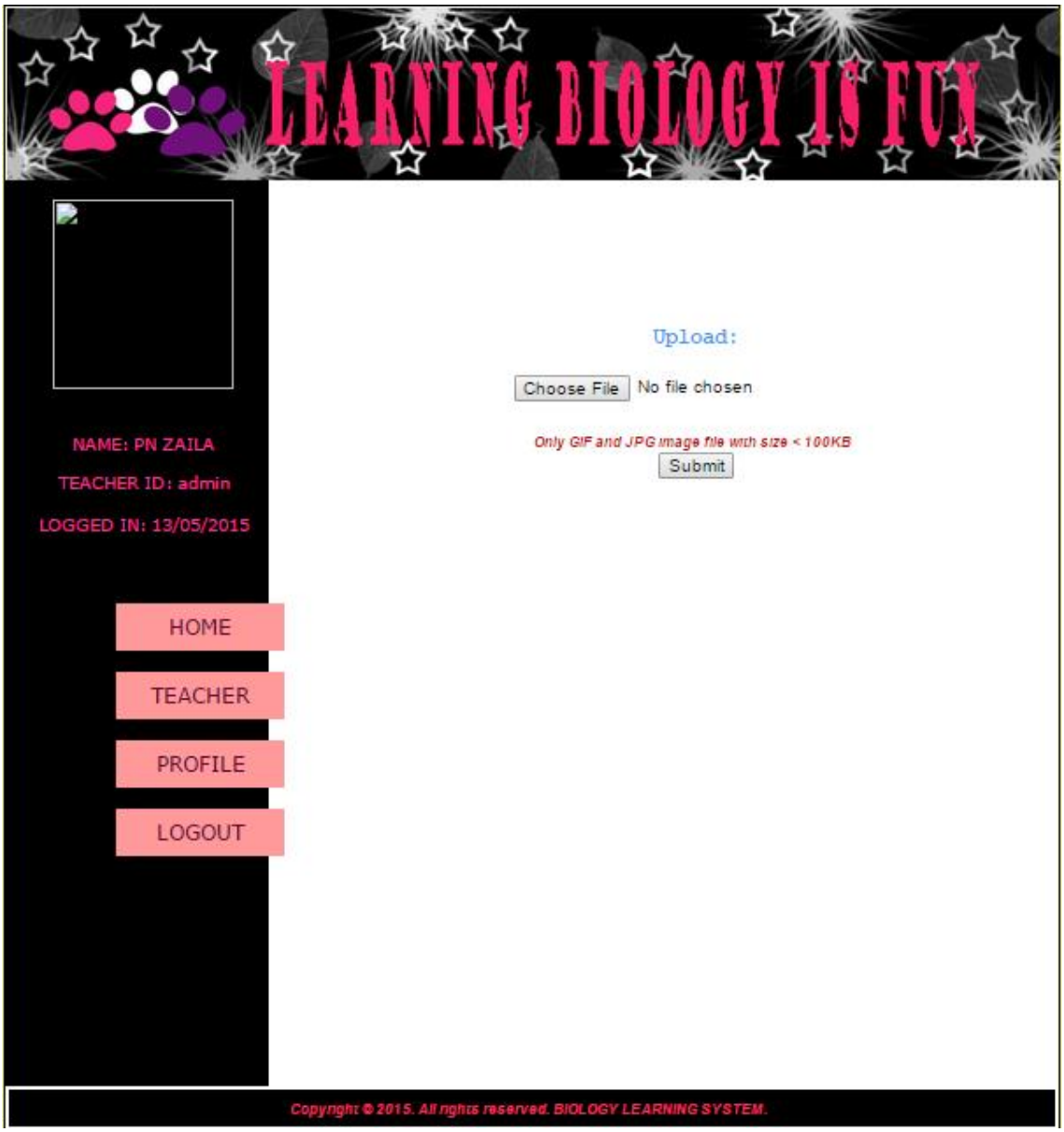

Figure 4.48: Admin upload image page

Figure 4.48 is the screenshot for the admin to upload his image in his profile.

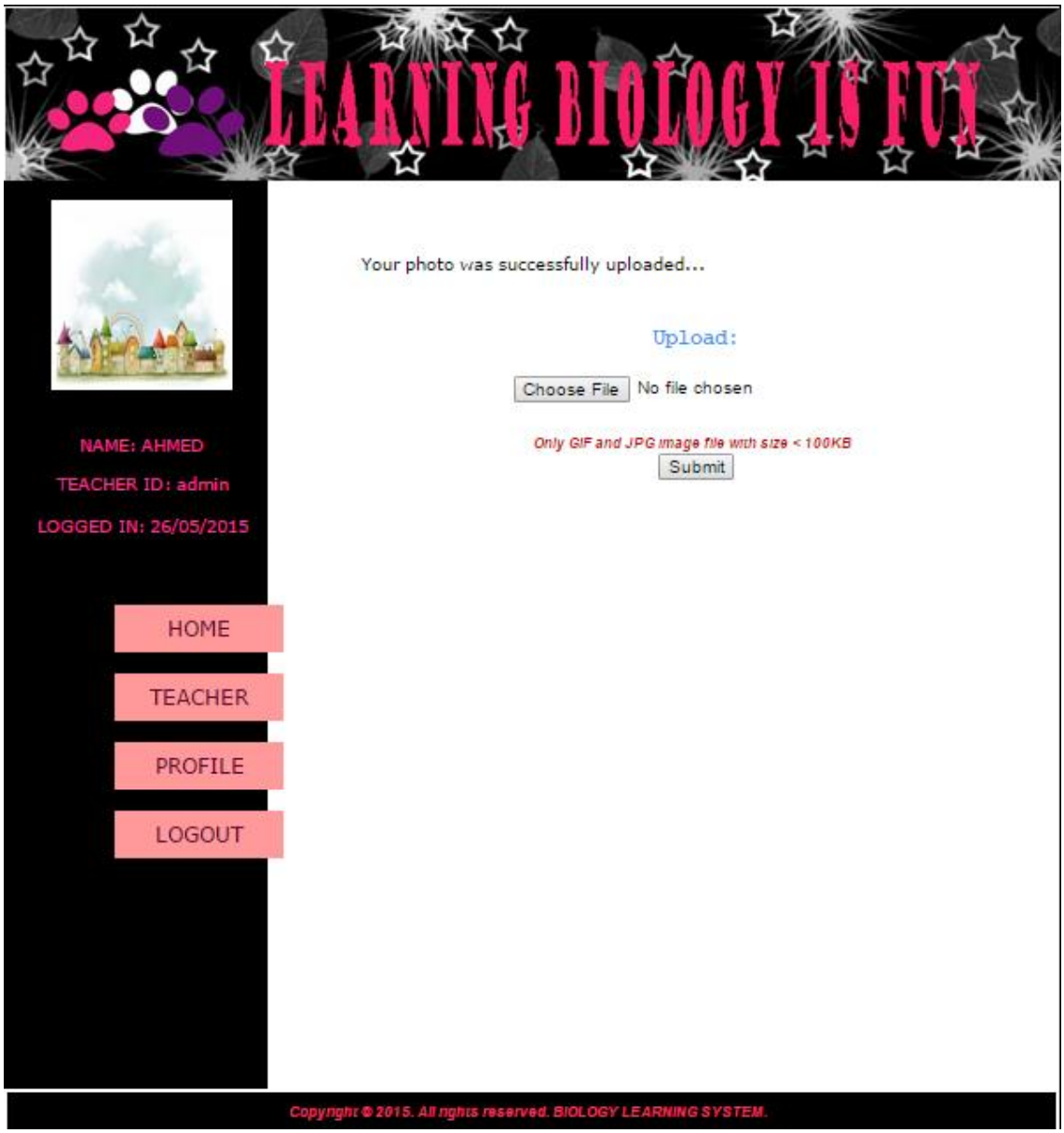

Figure 4.49: Successful image upload

Figure 4.49: After the admin upload the image successfully. The image will automatically display in the sidebar as shown in figure 5.46.

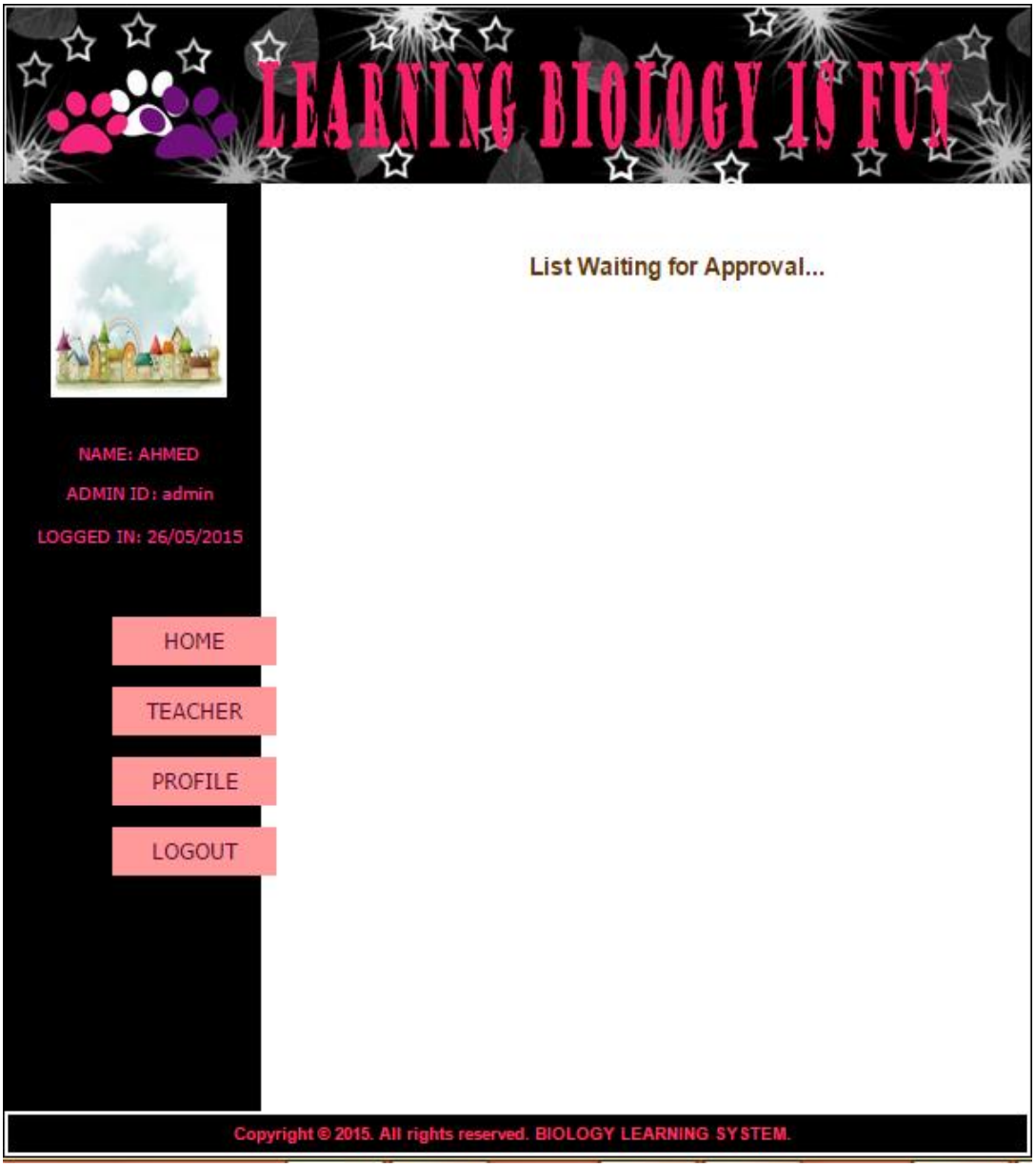

Figure 4.50: Teacher list waiting for approval

Figure 4.50 is the list of teacher waiting for approval. The admin can accept or reject the teacher. If the admin reject the teacher, the teacher won't be able to use the system.

Figure 4.51: View teacher profile.

Figure 4.51 shows the screenshot of admin to delete teacher account. The password is encrypted when the admin view the teacher profile.

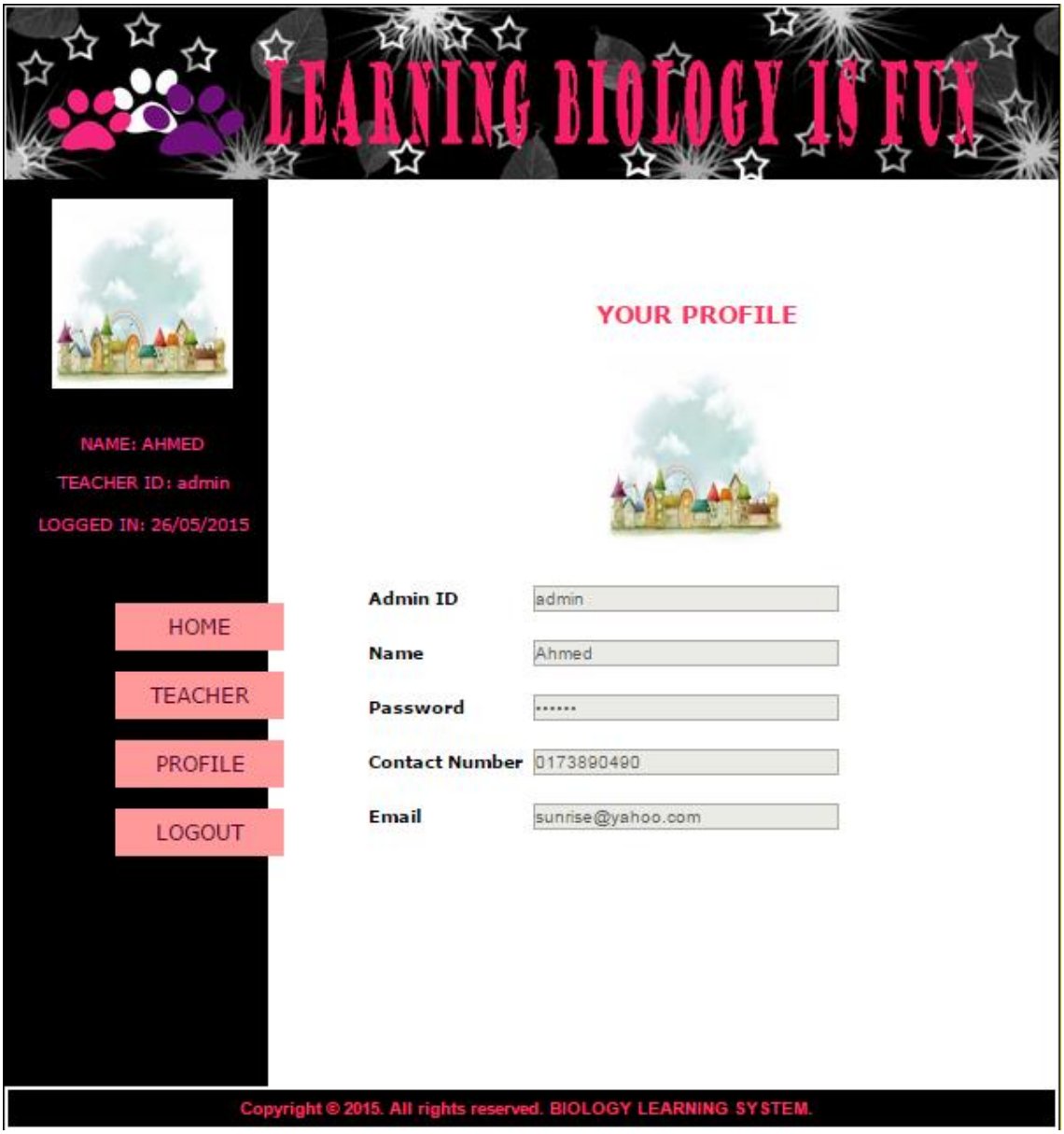

Figure 4.52: Admin view profile.

Figure 4.52 is the screenshot of admin profile. Admin can view his profile cannot make any changes in this page.

Figure 4.53: Admin update profile.

Figure 4.53 shows the edit profile of admin. The admin can edit their profile in this page. They have authority to edit all the information in his profile.

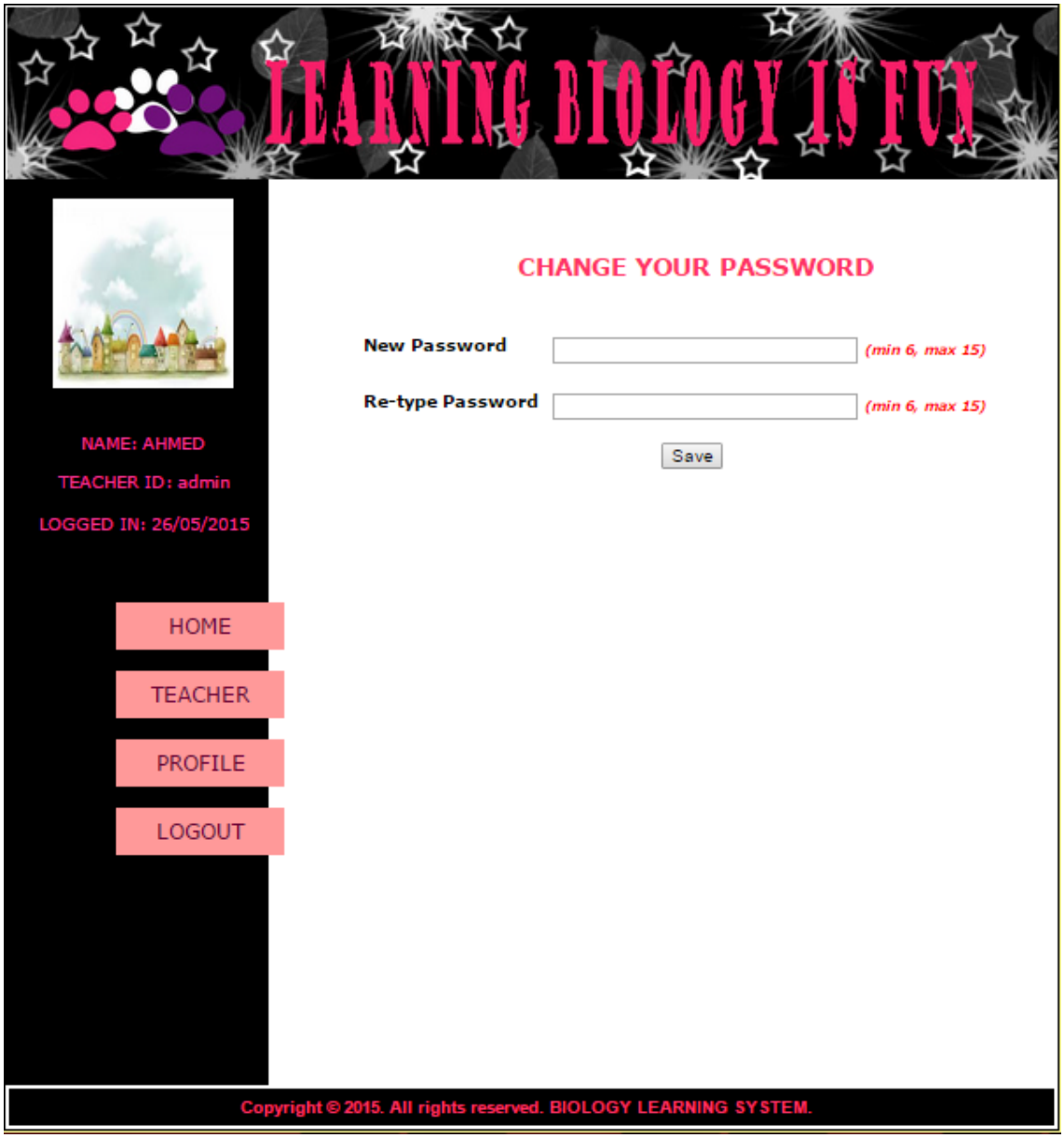

Figure 4.54: Admin change password.

Figure 4.54 shows the page for the admin to change their password. Admin need to type the same password twice in order to save the password successfully.

4.4 Coding Implementation

The Biology e-learning system used PHP and HTML coding to connect between interface and database of biology. The coding is used to make sure the entire button work properly in interface of Biology e-learning system without error.

```
      </select>
  </div>
  </label>
  <p align="center">
    <label>
    <input type="submit" name="button" id="button" value="Delete" />
    </label>
  </p>
</form>
<?php
mysql_free_result($getPro);
?>
```

Figure 4.55: Coding for teacher to delete student information

Figure 4.56: Teacher delete student profile

Figure 4.55 shows the screenshot of teacher view student's detail. Here, the teacher able to delete the student account.

CHAPTER 5

RESULT AND DISCUSSION

5.1 Introduction

In this chapter is discussed on the result output of the Biology e-learning system for SMK Sentul Convent. There are five main modules, every module is tested by using correct input and wrong outputs to make sure it come out with correct output. The testing part is to make sure the error handling the work. There are several advantage and disadvantage had been stated in this chapter. Finally, the enhancement and further research are stated in detailed.

5.2 Test Result

Unit testing is a testing module to identify and eliminate errors that could cause the program to terminate, and any logical errors that have been missed. It is used to test classes, components and other elements in the system environment. Besides, it also identifies and eliminates execution errors and bugs that could have been missed in the system environment. The testing for the Biology E-Learning System is just focused on the three modules; there are Student module, Teacher module, and admin module.

5.2.1 Student Module Test Check

Table 5.1 Student Module

TESTING ELEMENT / CRITERIA	SUCCESS	FAIL
1. Click on register and check whether system directing to provide a register from page for user.	/	
2. Click on forgot password and check whether system directing to provide a password page for user.	/	
3. After register, user signs in as member, user use username and password to login into the system.	/	
4. Check whether when student enter invalid format in register form message popped up.	/	
5. Check whether when student enter invalid data in forgot password form message popped up.	/	
6. Check whether when student enter invalid data in login page message popped up.	/	
7. Check whether when student post invalid format message in discussion board message popped up.	/	
8. Check whether when student enter invalid format in update profile form message popped up.	/	
9. Database connection	/	

5.2.2 Teacher Module Test Check

Table 5.2 shows the test check of teacher module in biology e-learning system.
Table 5.2 shows the test check of teacher module in biology e-learning system.

Table 5.2: Teacher Module

TESTING ELEMENT / CRITERIA	SUCCESS	FAIL
1. Click on register and check whether system directing to provide a register from page for user.	/	
2. Click on forgot password and check whether system directing to provide a forgot password page for user.	/	
3. After register and approved by admin user sign in as teacher, user use Teacher ID and password to login into the system.	/	
4. Check whether when student enter invalid format in register form message popped up.	/	
5. Check whether when teacher enter invalid data in forgot password form message popped up.	/	
6. Check whether when teacher enter invalid data in login page message popped up.	/	
7. Check whether when teacher post invalid format message in discussion board , quiz and announcement message popped up.	/	
8. Check whether when student enter invalid format in update profile form message popped up.	/	
9. Database connection	/	

5.2.3 Admin Module Test Check

Table 5.3 shows the test check of admin module in biology e-learning system.

Table 5.3: Admin Module

TESTING ELEMENT / CRITERIA	SUCCESS	FAIL
1. Admin use username and password to login into the system	/	
2. Check whether when admin enter invalid format in update profile form message popped up.	/	

5.3 Integration Testing

Integration testing is to test how the constructed components work together. This is to ensure all applications are in good condition and working properly after being combined. The objective is to take unit tested components and build a system structure that has been dictated by design.

Table 5.4: Test Check for Integration Testing

TESTING ELEMENT / CRITERIA	SUCCESS	FAIL
1. Test the inheritance of subclasses from super class a) Test whether the insert data of the student score is stored in the account of scores.	/	
2. Test attributes to behavior a) Test the function ACCEPT button, function of REJECT button, function of DELETE button of UPDATE button and function of INSERT button.	/	
3. Test whether module interactions work properly. a) Test whether admin, teacher, student module can communicate with each other. Teacher registration, admin acceptance, teacher upload, student download and discussion topics.	/	

5.4 System Testing

System testing is a testing conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements. System testing is a series of different tests whose primary purpose is to fully exercise the web application system. The system testing in this report includes content testing, security testing, database testing and others.

Table 5.5: Test Check for System Testing

TESTING ELEMENT / CRITERIA	SUCCESS	FAIL
1. Content Testing b) Test whether the teacher registrations insert in data and can only if the admin approve.	/	
2. Database Testing b) Check the table record in the database, when update (insert, delete, modify) is performed at student site, teacher site and admin site.	/	
3. User Interface Testing b) Click the link button to the information that is intended. Check whether system is able to direct the correct URL and listing the correct information.	/	
4. Security Testing a) Login using invalid username and password in student module b) Login using invalid username and password in teacher module c) Login to admin account using non admin module		/ / /
5. Navigation Testing a) Test the entire link within Biology e-learning system and determine it is directed to the URL.	/	

5.5 Advantage and Disadvantage

5.5.1 Advantages Gained From Project Development

From the project development, there are several advantages and benefits gained. The advantages and benefits are:

i. Learning problem solving skills in developing the project.

ii. Learning to interact and communicate with supervisor, examiner, panels and lecturers.

iii. Learning the importance of time management and project planning in order to make sure the project can run smoothly and produced on time.

iv. Gained lots of skills and knowledge in developing a web system by using PHP, JAVA script and MySQL.

v. Learn to communicate with different kind of people to ask information and suggestion in this project

5.5.2 Problem faced in Improving and Developing System

When improving and developing the Biology E-Learning System, there are several types of problems are occurred. These problems become a great challenge because it influences the process of system development.

i. Problem faced in the planning phase - The problem that encountered in the planning phase was lack of experience in dividing the modules and tasks. However, this problem has been solved after discussed with supervisor.

ii. Problem faced in the design phase - The problem faced was lack of exposure towards database management. For example, there were confusions to design the entity and attributes for each table in the database. More time was taken to do table for the quiz.

5.6 Project Limitation

There are some limitations discovered from this system:

i. Time left for the quiz couldn't be displayed to the user.

ii. Teacher could not post question which contains images.

5.7 Enhancement and further research

There are some future works suggested for Biology E-Learning System:

i. Add a function for the post quiz question so that image kind of question will be available.

ii. Add function to show time during the quiz attempt.

CHAPTER 6

CONCLUSION

6.1 Conclusion

In conclusion, since the Internet Communication Technology (ICT) in Malaysia is growing more and more advance from day to day, it is time for the SMK Sentul Convent to evolve from traditional to advance school. The e-learning system may help the SMK Sentul Convent school to evolve and be more compatible compared to other school in Malaysia.

In order to make the learning process become more efficiency, a forum is provided so that student and student or student and teacher may discuss problem and sharing knowledge among each other. This system has achieved the above objective which is providing a medium for discussion on study and management of student records. Since the objective achieved, means that the problem statement which is stated earlier has been solved.

Finally, this system could be suitable to implement in secondary school if the school are equipped with enough and suitable computers and network systems to run the system.

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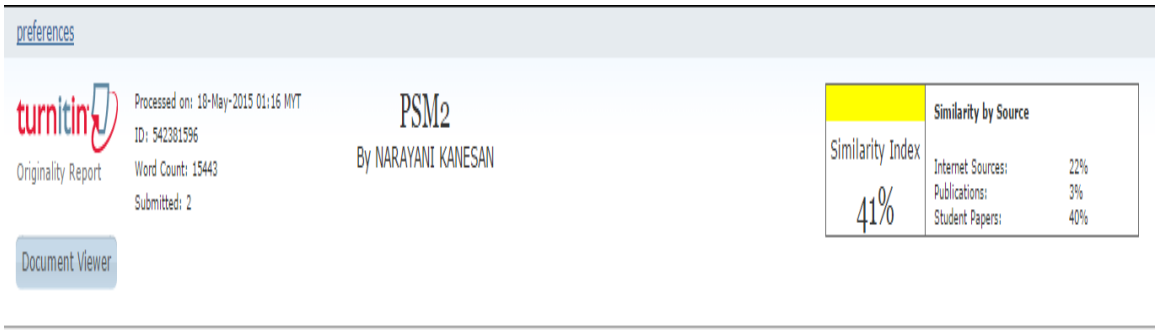
APPENDIX A:
Turnitin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