WEB-BASED STUDENT EVALUATION INSTRUMENT GENERATOR

A Research Project

Presented to

The Faculty of Graduate Studies

SAMAR STATE UNIVERSITY

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In partial Fulfillment

Of the Requirement for the Degree

Master of Science in Information Technology

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APPROVAL SHEET

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- The Researcher

DEDICATION

The researcher dedicates this piece of academic work with deepest gratitude to all the people who bear with me to make this work be realized.

To our Almighty Father, for His glory and compassion, blessings and guidance in the accomplishment of this study.

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- The Researcher

ABSTRACT

With today's technological era, it is expected from teachers to do more in less time yet, maintaining quality education. The basic method of manually preparing table of specifications (TOS) and question paper is challenging and time consuming. To overcome these issues and problem, this study aimed to develop a web-based student evaluation instrument generator. This study utilized the iterative SDLC Model to map out the whole process of the study. This means that the process starts with the primary requirements in hand and iteratively enhances the evolving versions until the complete system is implemented and ready to be deployed. Designed and developed a fully functional system specifically, a web-based student evaluation instrument generator. Particularly, the developed system comprises of different software tools and packages that execute and define its functions, processes, and executions. Successfully designed and developed a web-based student evaluation instrument generator. It was able to automate the process of creating the Table of Specifications (TOS) and Multiple-choice Test Questions with answer key. Based on the system evaluation, the developed Web-based Student Evaluation Instrument Generator promises an easy, fast, simple, amd effective tool that can assist faculty member in creating TOS and multiple-choice test questionnaire. The researcher recommends to enhancement of software quality attributes that should promote easy maintainability and provide easy and user-friendly system.

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CHAPTER I

INTRODUCTION

Background of the Project

In education, teaching involves many important duties, from planning, developing and organizing instruction to managing the classroom. These major tasks make teaching a challenging job. The moment that creating instruction started, the next task is to choose ways on how to evaluate student's learning. The purpose of this evaluation is to enhance students' learning as well as to guide classroom instruction on a day-to-day basis (Carter & Nunan, 2001). Similarly, evaluating the whole process of teaching and learning by giving mutual feedback to learners and teachers helps enhance their respective tasks (Sethusa, 2012). Evaluation is a main concern in education that determines whether students attain the goals of the course of study.

Evaluation is done through assessing students' learning. Assessment is a part of evaluation which includes measurement and analysis of information about the student's learning (Jabbarifar, 2009). In order to assess student's learning, a formative evaluation can be used which is determined through tests, quizzes, term papers, major exams. This serves as a final review on the teacher's instruction to gauge the quality. It is the final step of the instructional process. A product-oriented. This type of formative evaluation tool commonly comes in a

multiple-choice type. Multiple-choice assessments are sets of test items each of which comprises of a stem or question, the correct answer and distractors. It is still being widely used as an effective assessment or grading students (Nguyen, et.al, 2011). It has also proved to be an efficient instrument for vocabulary assessment. Above all, it measures test takers' achievement.

These multiple-choice questions are useful to help learners identify their knowledge deficits since, most of the learners have difficulty recognizing them. These are very versatile and useful for testing the ability to interpret graphs, diagrams, tables, sketches, and related material. These are very easy to grade, and are commonly used in large classes. However, manually creating a good test items is very tedious, time consuming and challenging. Each test items should conforms to the course content being taught by the teacher. Normally, in an educational system before the multiple-choice test is given to students, it is first then subjected for scrutiny by the examination committee. This process makes sure that the requirements for creating test questions were followed. On the other hand, teachers also do the table of specification (TOS). A TOS, referred as test blue print, is a table that guides teacher align objectives, instruction and assessment (Alade & Omoruyi, 2014). A Table of Specification is a two-way chart that presents the topics to be covered by a test and the number of points or items that will be associated with each topic. TOS provides the teacher with evidence that a test covers the topics that needs to be covered and that it has content validity. The TOS is the basis for creating multiple-choice test item thus, it is made beforehand. With the sounds

of it, designing TOS is also one of the challenging task of a teacher. In fact, doing the computation itself is already a challenge especially for some teachers who does not like numbers. Some teachers find it hard to have a well-distributed number of items vis-à-vis to the level of critical thinking. Likewise, they experience difficulty in selecting items or points at the cognitive level specified in the TOS tool (Di-Donato-Barnes, et.al., 2013). It is another 'to-do list' for teachers to comply.

Aside from the above mentioned, living in the digital age makes the teacher's tasks more demanding. In turn, educators need to change the way they educate. The digital world is continuously penetrating the education and skills domain, technology is progressively used to deliver instruction, knowledge and skills in new and innovative ways (Grand-Clement, 2017). This penetration is paired with future changes to the pattern and mode of work. Today, educational systems around the globe are undertaking changes and efforts to move beyond the ways they operated. Student-teacher communication are now becoming computer-mediated. With the use of android phones, computers, microphones, and earphones, students can access online education and instructional resources anytime and anywhere, from universities, and inside or outside their home (Cascio and Montealegre, 2016).

With this, knowing the demands of the rapidly changing world the proponent decided to develop a web-based student evaluation instrument generator of table of specification (TOS) and multiple-choice test questions. Question generation has received a great deal of attention in recent years from the

researchers in the field of education, psychology and computer science (Liu, et.al, 2017). Considering this idea, this paper proposed an alternative to the lengthy, time-consuming and demanding tasks of creating table of specification and multiple-choice test questions manually into an automated system, based on the university's evaluation instruments' requirements. The said system also serves as a question or item bank for teachers thus, eliminating the traditional way of keeping records of test questions. Since teachers are doing the same activities frequently for formative evaluation, automating this part of the process will remove the drawbacks and complexities. Moreover, this project can assist and help teachers to develop assessments more efficiently and consistently.

Objectives of the Study

With today's technological era, it is expected from teachers to do more in less time yet, maintaining quality education. The basic method of manually preparing table of specification (TOS) and question paper is challenging and time consuming. To overcome these issues and problem, this study aimed to develop a web-based student evaluation instrument generator based on the following problems:

1. What web-based student evaluation instrument generator can be designed and implemented based on the following features:

   1.1 Automated generation of table of specification (TOS);

1.2 Automated generation of multiple-choice test question paper; and

1.3 Database storage of test questions

2. What design evaluation strategy can be employed to evaluate the effectiveness of the developed system?

Conceptual Framework

The conceptual model of the study served as the guide of the researcher in the development of the said study. As shown in Figure 1, IPO model was implemented in order to have an idea on how the system works and how it can be developed. It is composed of three components: the input, process and output.

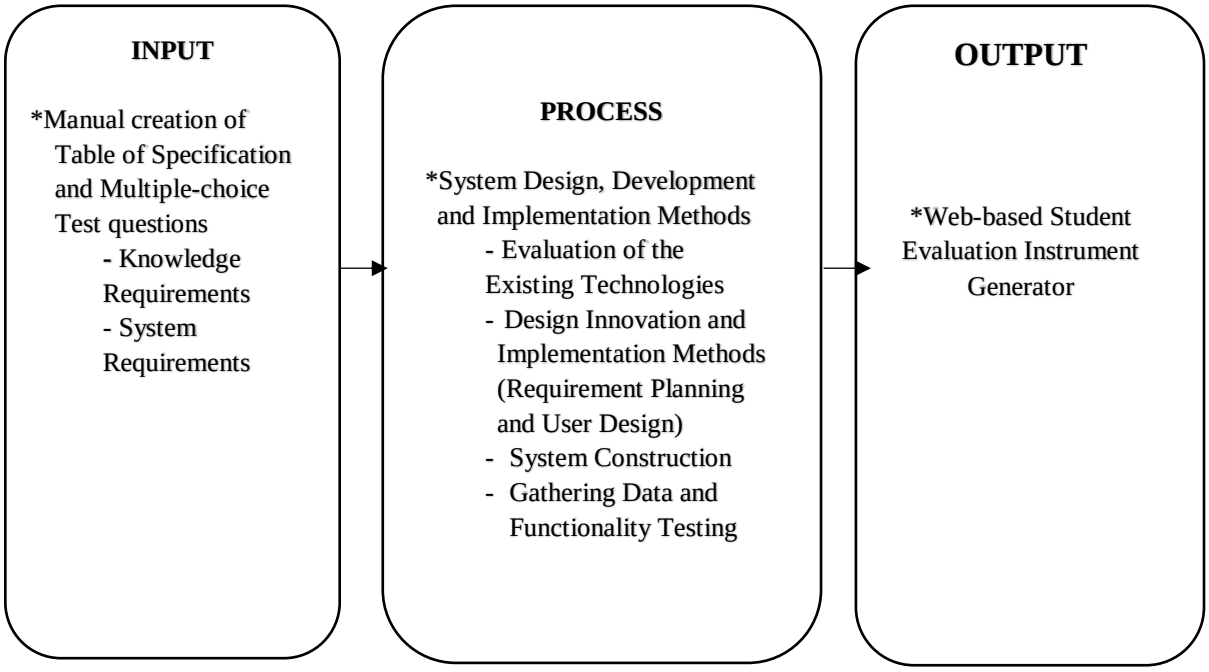


Figure 1. The Conceptual Model of the Study

The initial stage of the study is the Input wherein the researcher gathered all the necessary knowledge through reviews of the different related literatures and studies. Information on the problems and issues on designing table of specification and creating of multiple-choice test questions were gathered. Another purpose of this stage is to come up with the system requirements. The acquisition of knowledge and information lead to the realization of the project.

The second stage includes the Process of the study. It focuses on the design, development and implementation methods of the system. This stage was done through the evaluation of the existing technologies related to the study as well as requirements planning, user design, system construction, implementation and functionality testing.

Lastly, the third stage is the Output of the study, which is the developed Web-based Student Evaluation Instrument Generator.

Scope and Delimitation

The proposed system is web-based, it allows the user to design table of specification (TOS), frame multiple-choice test question, and keep, manipulate, maintain, and retrieved stored questions. The system has two (2) main tasks, which is TOS generation and multiple-choice test question generation. These functionalities are of different and separate tasks from each other. The output generated from the Table of Specifications is not linked with that of multiple-

choice test questions generation. Further, the data created in the generation of TOS are not to be stored in the system database. In other words, these data will not be retrieved in case the user logs out from the Table of Specification Task.

The developed web-based student evaluation instrument generator was intended for testing in Samar State University since; its target users are teachers/instructors of the said university. It is also because that the system was designed based on the university's evaluation instruments' requirements such as the computations/formulas used in creating of TOS as well as the format required for the output generation.

Since the system is web-based, it is internet reliance. The speed of internet or data connection may affect the performance of the system. The system will likely operate at a slower speed if there is a limited internet connection. Moreover, you will not be able to access the system if there is no connection.

Although the system is web-based, which can be accessed over the internet, web-hosting services has not been considered. But it is to emphasize that during the functionality testing, the system has been tested through a short-webhosting services. In other words, the system is delimited on a web-based system with a provision that the said system can be used via web-hosting services.

Significance of the Study

The output of the study is significant to the following persons concerned:

Faculty Members. Faculty members will be provided with an automated generation of table of specification (TOS) and multiple-choice test questions. It will be easy for them to do these tasks within a short period of time, removing drawbacks and complexities. The developed web-based student evaluation instrument generator also allows the faculty member to have a database (question bank) where they can store, manipulate, and retrieve their test questions. Questions within the system can be used to manually or automatically generate exams.

Academic Administration. Not only teachers will benefit the system but, the entire institution as well. It will help improve the productivity of the institution since seemingly tedious tasks are smoothly manage by the system. Academic administrators are responsible for most of the back office tasks that must be performed in order to keep educational institution running. Many of these tasks comes after the submission of documents from teachers. Since the teachers can generate the TOS and test questions in easily, they can submit these documents in the office on time. In return, the office can also do and finish their tasks early. This allows the faculty and academic administrator to focus and dedicate more time to academics and other activities of greater importance.

Students. The system delivers increased productivity and time liberation to faculty and academic administrators. With this, students can also receive test/exam more quickly, fairly and accurately. For instance, the multiple-choice test question given does not have any more repetition of questions since the system already remove this drawback.

Future Researchers. This system will help future researchers to conceptualize similar or related studies and use this as their valuable research material or guidelines for their study.

Definition of Terms

For better understanding of the study, some technical terms are hereby defined:

Automated. Something that is controlled by a machine rather than a person. Automated is the integration of technology, performing tasks that were previously done manually. In this context, it is automating the process of making the Table of Specification (TOS) and Multiple-choice Test Questions.

Beta testing. One of the Acceptance Testing types, that adds value to the product or system as the end-user validates its usability, functionality, compatibility, and reliability. The inputs provided by the end-users are used in improving the quality of the product or system further and in turn leads to its success. Operationally, this is the test conducted to evaluate the system.

Cognitive Skills. The fundamental skills that the brain uses to think, read, learn, reason, remember, and pay attention. There are six levels within the cognitive domain according to Bloom's Taxonomy, which are Remember, Understand, Apply, Analyze, Evaluate and Create. These levels of cognitive domain were the basis for developing the TOS generation of the system.

Database. In the general sense, a database is an organized collection of information. More specifically, a database is an electronic system which allows data to be easily accessed, updated and managed. Most databases use structured query language (SQL) in writing and querying data. Operationally, it is where information such as User Account information and Questions Added are saved and stored.

End-user. A person that a hardware device or software program is designed for. Specifically, the end-user are those faculty of this University.

Evaluation Instrument. In this context, evaluation instrument is referred as the tool or instrument (table of specification and multiple-choice test question) prepared and handed out students for the purpose of assessing whether they have achieved a particular learning.

Field. A space allocated for a particular tem of information. Operationally, this is a set of data values, of the same data type, also referred as column. Example of fields in the system are Topics field, Number of Hours field, Percent field and Total field.

Form. A web page that contains questions or form fields asking for user input. In database context, a form is a screen or window that contains spaces or fields to which the end-user (faculty) enter data, example of these form is the Sign Up form and Log In form.

Graphical User Interface (GUI). GUI, pronounced as "gooey", is a system of interactive visual components for software programs. Operationally, a GUI displays objects that represents information and actions which can be taken by the user. These include icons, cursors, and buttons.

Multiple-choice test question. A form of an objective assessment in which respondents are asked to select only the correct answer/s from the choices offered as a list. It is composed of two (2) parts: a stem that identifies the question or problem, and a set of alternatives or possible answers that contain a key which is the best answer to the question, and a number of distractors that are likely but incorrect answers to the question. In this context, multiple-choice test question is one of the tasks being automated in the project which user adds, updates, and saves.

Portable Document Format (PDF). A file with the .pdf file extension. Portable Document Format are commonly use to distribute a read-only documents which preserve the layout of a file. It is usually used for documents like eBooks, user manuals scanned documents, and application forms. In the developed system, a PDF is one of the features where user can save or print their generated output of TOS and Multiple-choice Test Questions.

Question Bank. It is a collection of questions prepared for a given subject and useful for students and teachers. Operationally, a question bank is a repository of questions stored in the database. This feature allows the user to create, preview, edit, and delete questions in the database of question categories.

Table of Specification (TOS). A blueprint for test. It is a plan designed by the teacher as a basis for test construction. A TOS is a chart that shows the topics that will be covered on a test. Its primary purpose is to ensure that the items or elements of an assessment are aligned with the content, skills, or constructs that the assessment intends to assess. In this context, Table of Specification is the other task of the system that is being automated.

Web-based. It is relating to or done using the Web such as web-based system. Operationally, web-based system is a software you use over the internet with a web browser. The Web-based system is internet reliant; the speed of internet connection may extremely affect the performance of the system.

Web hosting. A necessity for any website. The Web hosting service providers maintain the server where the data associated with your website resides, and at the same time manage the technology that makes your website connect to the Internet. Operationally, web hosting is the physical location on the Internet. It is an online storage which holds the images, information, as well as other content that covers the said system.

CHAPTER II

REVIEW OF RELATED LITERATURE AND STUDIES

Related Literatures

Today, technologies rapidly changes everything. With the aid of information technology, tasks that were once done manually are now becoming computer-aided. It changes how people live. Because of this advancement we are now getting into what is so-called 'smart living', digital age, and cloud-computing and so on, where things and devices can communicate with each other through a network. These technologies are not only helping people to do things faster and better, but they enable profound changes in the ways that the work is done (Casio and Montealegre, 2016). The mode and pattern of work are changing. As Murray (2015) contends "Together these innovations are hurtling us towards a new industrial revolution. Savvy corporate leaders know they have to figure out how these technologies will transform their businesses or face disruption by others who figure it out first".

In this digital age, new skills needed arises. Two different types of skills are required that are necessary today and in the future. These skills are the digital skills and digital navigation skills. The digital skills are technical skills needed to use technologies, whereas digital navigation skills are the wider set of skills required to succeed in the digital world (Grand-Clement, 2017). The digital

navigation skills include prioritizing information, finding information, and assessing the reliability and quality of information. Since there is no point of delaying the inevitable, begin plunging into the tech world by fortifying employee's hard skills with hands-on training courses and webinars (Wroblewski, 2018).

Technology has greatly affected and impacted many areas of life. Another area in which technology is taking a significant difference is in education. It changes the way things are presented and taught in the classroom. It offers a more demanding work. In fact, this leads a strong demand to experienced professional worldwide, preferably graduated in Information Technology (Zampirolli, et.al, 2016). On the contrary, one of the best thing about technology is that it is constantly changing. As technology changes, so will the effect it has on education (Muhtadi, 2013). For instance, in the old days, teachers are using the traditional chalkboard since this was the only technology available. Today, classrooms have now smart board or interactive board for lecture. Just about everything in the classroom can now be done electronically. Technology in the classroom can be so much better and so much more as time goes by. According to Lynch (2017), seven (7) ways technology is impacting modern education include: (1) use of real-world issues, (2) active engagement with the learning material, (3) discussion and debate boards and forums, (4) simulation and modelling (5) coaching, (6) working groups and (7) formative assessment. As to formative assessment, teachers make sure that students are not just learning the concepts, but, as well as how to use the

technology resources and materials they have. Since, technology-focused activities mostly require problem-solving and criticall-thinking skills.

Integration of technology in formative assessment are not only limited to students but, also to teachers. Technology can be utilized to create formative assessment. An important responsibility of a teacher is to test students whether they have mastered the subject content covered in class (Vockell and Fiore). With this, computers can assist teachers in making good tests.

The computer-aided generation of test items is a new and innovative research area with just a handful of work reported so far (Mitcov, et.al, 2006). In the study of Hedge et.al entitled "Multiple Choice Questions with Justification", it was pointed out that multiple-choice questions have been the focus of educational research for several years. Over the last decade, numerous academic institutions worldwide have had to cope simultaneously with the increased student numbers and/with the limited resources, and have increased their use of multiple-choice questions for assessment (Nicol, 2007). Multiple-choice questions are widely used as an efficient tool to grade large number of students. Prior to this various types of automated question generation, systems were proposed to support different learning strategies, such as vocabulary assessment, reading comprehension, and academic essay writing.

Related Studies

Due to the growing field of education, administering exams and preparing appropriate papers for the same is proving inefficient, difficult, time consuming and a redundant task for the faculty. Thus, there are significant numbers of research that has been undertaken to address this situation. Some of these studies dealt on automated generation of test questions.

In particular, the study of Rahim, et.al (2017) proposes an Automated Exam Question Generator using Genetic Algorithm. The said generator can automatically generate exam questions set using Genetic Algorithm and covers the six (6) levels of Bloom's Taxonomy to create high quality test questions that can assess different level of learners based on Bloom's cognitive domains and the selection of chapters made by educators. Similar study was also conducted but, using a different algorithm. Pagare, et. al (2018) used a Fuzzy Logic Algorithm to generate question paper. Fuzzy Logic Algorithm is an approach to computing based on degrees of truth rather than the conventional true or false. While Huang and He, (2016) presented a method to automatically generate short-answered questions for reading comprehension assessment. The method used by the researchers can generate questions which uses sentence selection and paraphrasing to improve the effectiveness and cognitive complexity of questions. Moreover, Mostow et.al, (2016) presents the development, pilot-testing, refinement, and four (4) evaluations of Diagnostic Question Generator, that

automatically generates multiple-choice cloze (fill-in-the-blank) to test student's comprehension while reading a given text. Note that these test generators are made as software applications which needs to be downloaded and installed. In other words, it is a desktop-based. Also, these are not intended for generating a multiple-choice test – with one correct answers and distractor.

In the study of Liu, et.al, they developed an automated Chinese multiple choice question generation with the use of mixed similarity strategy. Another approach and this time it is for multiple-choice test generation. Their study explored a novel automated Chinese multiple choice question generation approach using a machine learning approach, where distractors are generated by a regression model considering the similarity between distractor and the target character in appearance, semantics meanings and pronunciation. As to the different platform, there are few automatic test items generator that presents new ideas and approach of formative assessment. Fatangare, et.al, (2018), developed an Android-based Exam Paper Generator (Android Based E-PAGE) that provides solution to choose well-framed and challenging questions, and make it easy for the teacher to generate it within a least period of time. While this study worked on the android platform, the study UW-La Crosse Exam Generator by Domagalski, (2010) offers an online web application that was developed to aid teachers with creating and maintaining exams. The advantage of these test generators with the previous studies mentioned above is that it can be extended to be used for any

kind of exam questions and can be used for the preparation of formative assessments, whether a short answer test or multiple-choice test.

Although the studies presented introduces an automated test generator that resolve issues in preparing a test, it can be viewed that innovation of such technologies can still be conducted. Thus, the researcher developed a web-based student evaluation instrument generator that will automate the creation of multiple-choice questions and create a repository of questions that faculty members can manage and maintain. Aside from being a web-based application, the difference of the said proposed system with that of the previous studies is that this is made specifically for multiple-choice test generation. Above all, the design and development of system is based on the university's evaluation instrument demands and requirements which cannot be found in the existing studies.

Another feature added in the system is the automation of the table of specification (TOS). Having this functionality is new since, there is no related studies conducted on this yet. The said system therefore consists of three (3) main capabilities, automated TOS and multiple-choice test questions as well as the question bank.

Chapter III

METHODOLOGY

Research Design

This study utilized the Iterative SDLC Model to map out the whole process of the study. Iterative SDLC Model was used since the development of the system needs an incremental model. This means that the process starts with the primary requirements in hand and iteratively improves the evolving versions until the complete system is implemented and ready to be deployed. The procedures of the said approach are as follows:

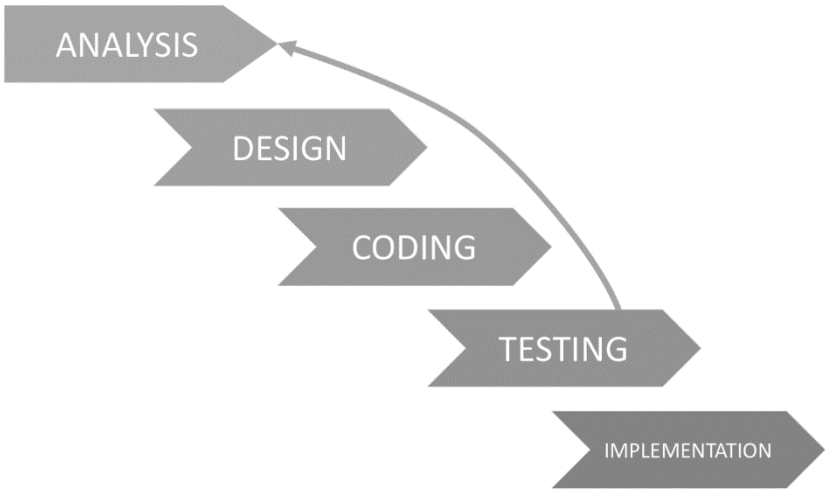


Figure 2. The Iterative SDLC Model

Analysis: In this phase, the acquired knowledge and information through reviews of related literatures and studies were synthesize and becomes the basis in the formulation of methods and strategy in the study. Necessary inputs on the issues

and challenges on the conventional process of creating the Table of Specification (TOS) and multiple-choice test question were taken into consideration as well. This is the planning stage where specification documents and software requirements was established. Since the study is a web-based system, web development tools were used. The researcher decided to use HTML, CSS, PHP, and JavaScript Vue.js for languages and scripts. For the database, MySQL was utilized. This stage also nailed down the database models, appropriate logic, and the like that will be required at this stage in the project.

Design Stage: The design stage was the establishing the technical requirements to meet the needs of the analysis phase. Designing the overall functionality and features of the system was the focus of this phase. Flow charts, schematic and block diagrams, and graphical-user interface were made.

Coding: After the system design phase, the next stage is coding. This is where the programming task takes place. The researcher started to build the entire system by writing code using the selected programming tools and packages. Specifically, Visual Studio Code editor was used. This was the longest phase of the Iterative SDLC approach.

Testing: After the development of the system, it undergone through a series of testing procedures to confirm the functionality of the system. This means to verify whether the entire application works according to its function. Furthermore, this stage identifies the potential issues, bugs and errors. The testing involved both technical experts and end-users. The results from testing were then analyzed and

evaluated to make sure that all functionality of the system have been met. After this, careful decision making whether to redesign the whole system was considered. As a result, iterative cycle of analysis, design, code and test may occur repeatedly until the system work as it supposed to be.

Implementation: Once the whole system is error-free, stable and working according to the needs of the system then the final process starts which is implementation.

Research Procedure

For the development of the project, the researcher had gathered information from literature reviews of existing relevant studies and technologies, and inputs from target users (faculty), which in turn served as a source of drawing up implications and concepts about the proposed system. The researcher have to have a clear view and understanding on the concepts including its components and operations that will make up the whole system. The researcher also gathered information from the internet, books, journals and other references, as well as suggestions and ideas from the users and experts.

After the acquisition of knowledge, system requirements, design, construction and implementation methods and strategies were then realized. In the development of the system, the following considerations were taken (a) Automated Table of Specification (b) Automated Question Paper Generation (c) Question Bank (d) Accuracy of Percentage Distribution in the Design of TOS, (e)

Input and Output Parameters, and (e) Flexibility in management of questions. The researcher planned to have 2 modules in the system: the administrator module and the instructor module. The Admin is the one who is responsible in managing all user accounts while the User/s are the teachers who can access the functionalities of the system. A non-registered user cannot access the tasks provided in the system. On the other hand, in order to check whether the system achieved the desired functions, the researcher conducted an evaluation of the system. In this regard, beta testing has been performed to test the effectiveness of the said system. A questionnaire was provided to user-respondents to gather their perspective.

Research Instrument

To evaluate the performance and design of the system, the researcher conducted a beta-testing through a survey. A rating sheet was introduced as the primary instrument to evaluate the functionality, accuracy, security, reliability of the system. The ISO 9126 software model was used as a guide in crafting the survey evaluation. ISO 9126 software model is an assessment tool for determining software quality. The researcher utilized the Likert-type scale. Based on the scale, the respondents will rate the system according to the specified scale 1-5, where 5 as the highest score and 1 is the lowest.

Validation of Instrument

To ensure the validity of the prepared rating sheet, the researcher gathered data from related studies and consulted the said study to experts for comments, suggestions and revisions. After the system development, its performance and design were tested using the two-way testing. The two-way testing was participated by the experts and target users.

The researcher has provided a rating sheet to five (5) experts or professionals and twenty (20) end-user respondents. A purposive sampling method was used to determine the respondents. The system was evaluated in terms of:

Functionality. The system was tested and observed to test the functionality of the whole system using the guided rating sheet. The system was evaluated if the application and the features of the system such as menus, tabs and etc. are working fine during the operation process. In other words, this test if the proposed system satisfy the desired operation of each part and the whole system.

Reliability. The system was evaluated to test the operation process on repeated trials. Testing for reliability was performed to ensure that the system is reliable; if it satisfies the purpose for which it is made, for a specified amount of time in a given environment and if it is capable of rendering a fault-free operations.

Accuracy. The system was tested if it performs as per requirements of the user, without depicting any defects or issues. Accuracy of the numerical result in generating the TOS was tested. Also, if all questions generated in multiple-choice

test is what the user has chosen. In other words, the system was tested if it runs accurately according to its functions.

Security. The system was also subjected for security testing to uncover vulnerabilities of the system and to determine if the data and information are protected from possible threats or risks that can cause a loss.

Ethical Considerations

Ethical considerations were given throughout the study with regards to access, confidentiality and consent. In the conduct of survey evaluation of the system, the researcher seek an approval from the office of the University to allow the faculty member to be the respondent. Also, upon giving the research instrument, a consent letter was given to respondents before answering the questions. The researcher has responsibilities on the sources used to ensure that the information are not brought into disrepute. The researcher cite sources and included it in the references for authors and researchers recognition.

Software Design

Following the conceptual framework of the study presented in Figure 1, the software design should be incorporated in order for the system software to work properly.

System Block Diagram. The system block diagram shows the major components and operations in the system. As shown in the figure, since the system

is web-based, it needs internet connection for it to be functional. The internet serves as a link to the main functionality of the system. The automation of TOS and multiple-choice test question will only be possible if there is an internet connection. Through the internet, user will be able to manage question information stored in the database.

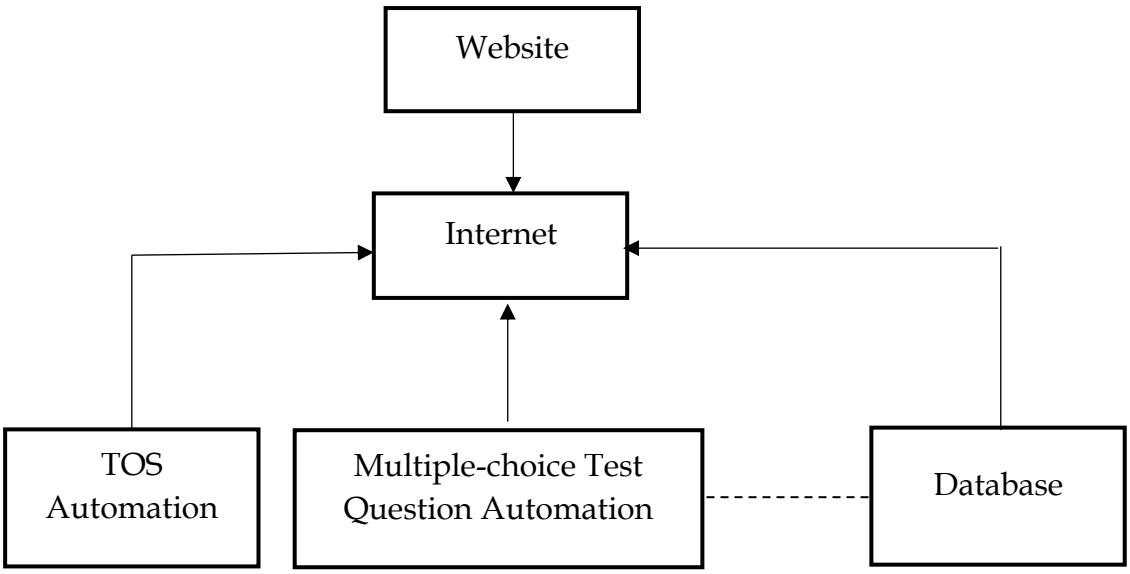


Figure 3. The System Block Diagram

System Flowchart. The system flowchart as shown in figure 4 reflects the logical operation of the system. It symbolically shows how the data flows throughout the system and how event-controlling are made. The said flowchart was used as basis in system design and integration.

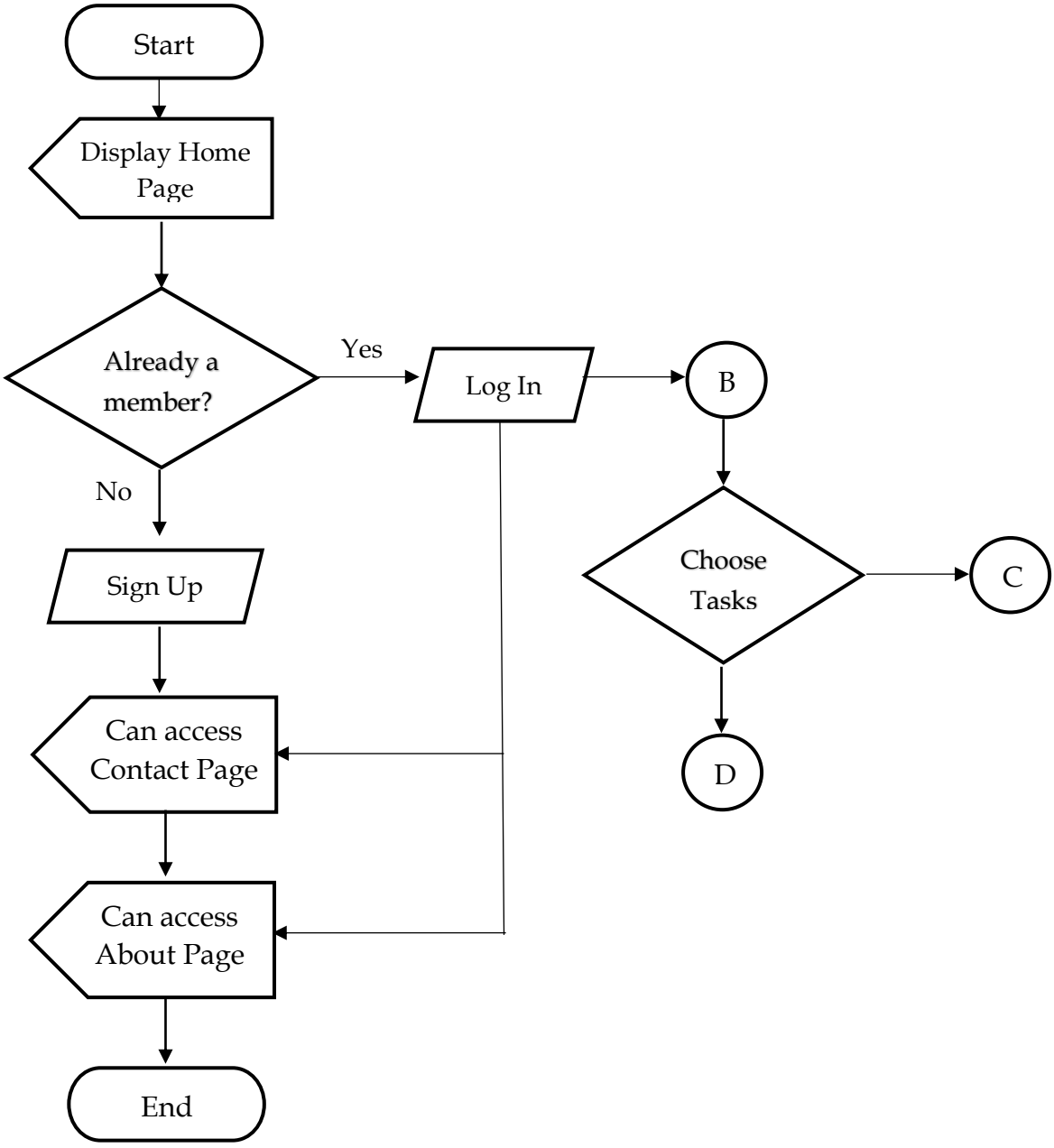


Figure 4. Flowchart for Login

Table of Specification Menu

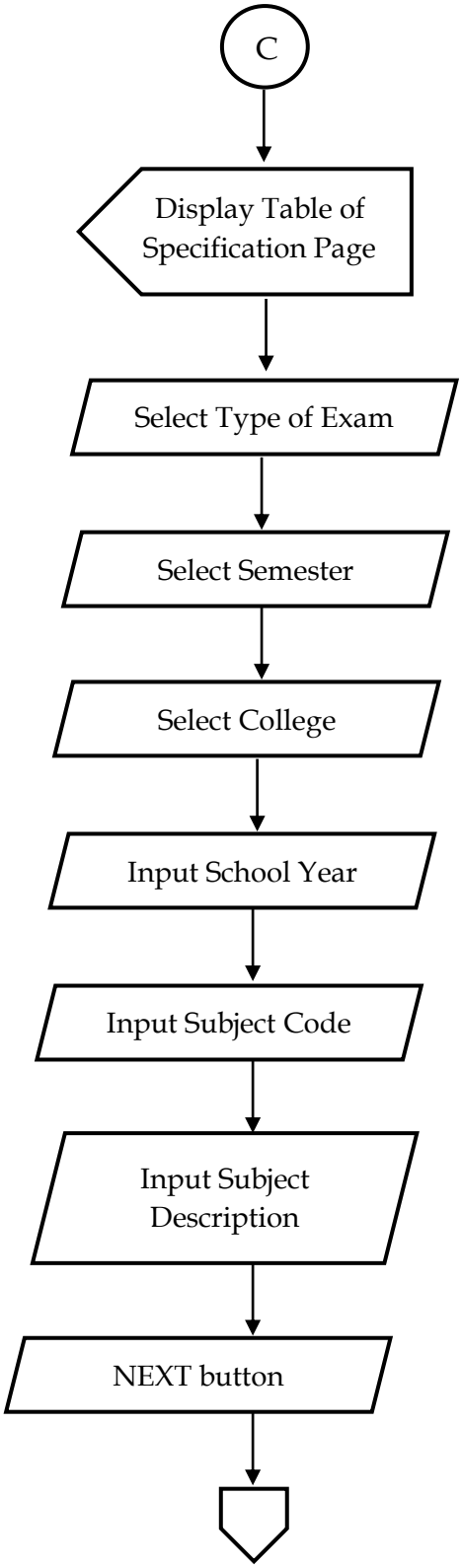


Figure 5a. Flowchart for TOS Task: First Step

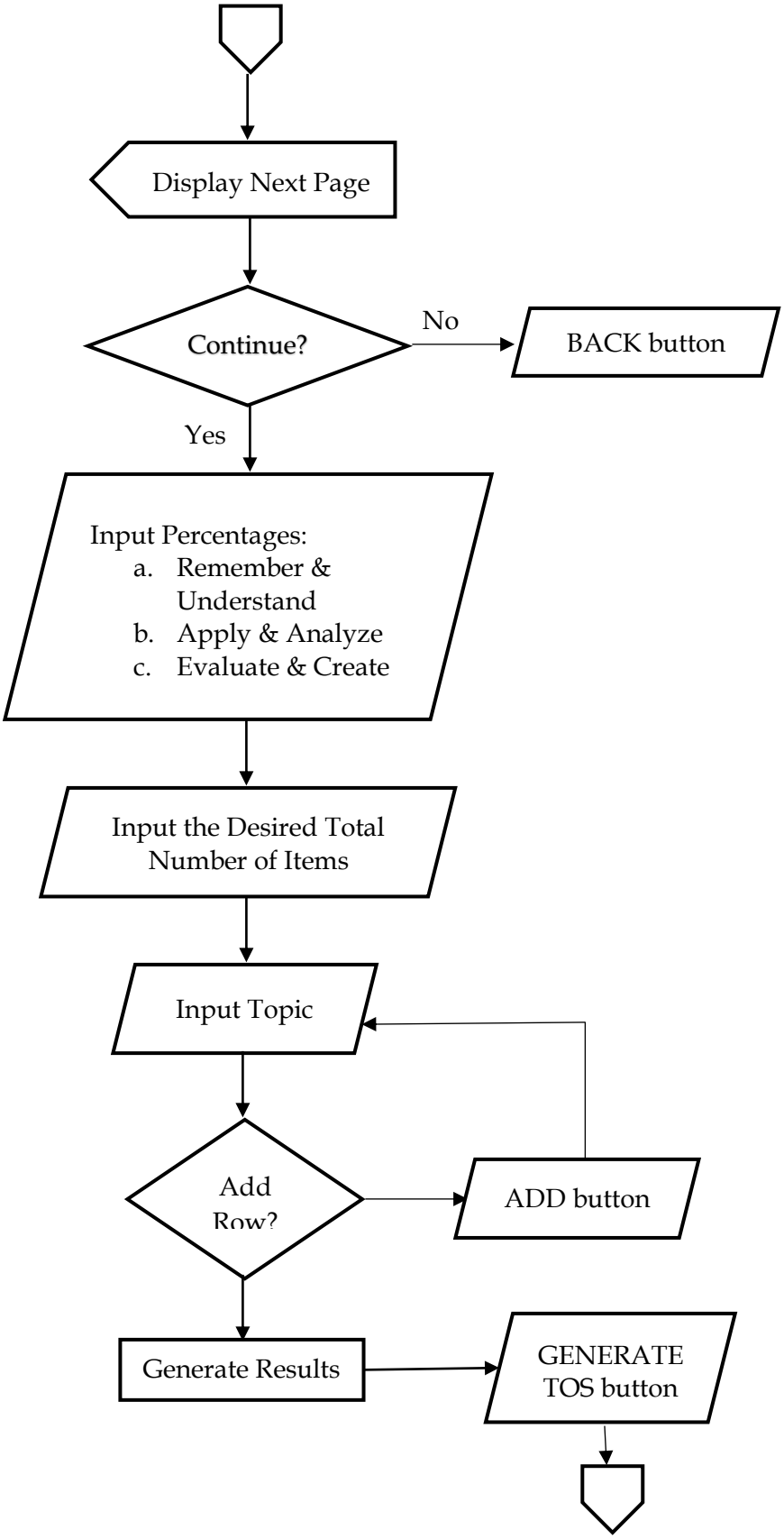


Figure 5b. Flowchart for TOS Task: Second Step

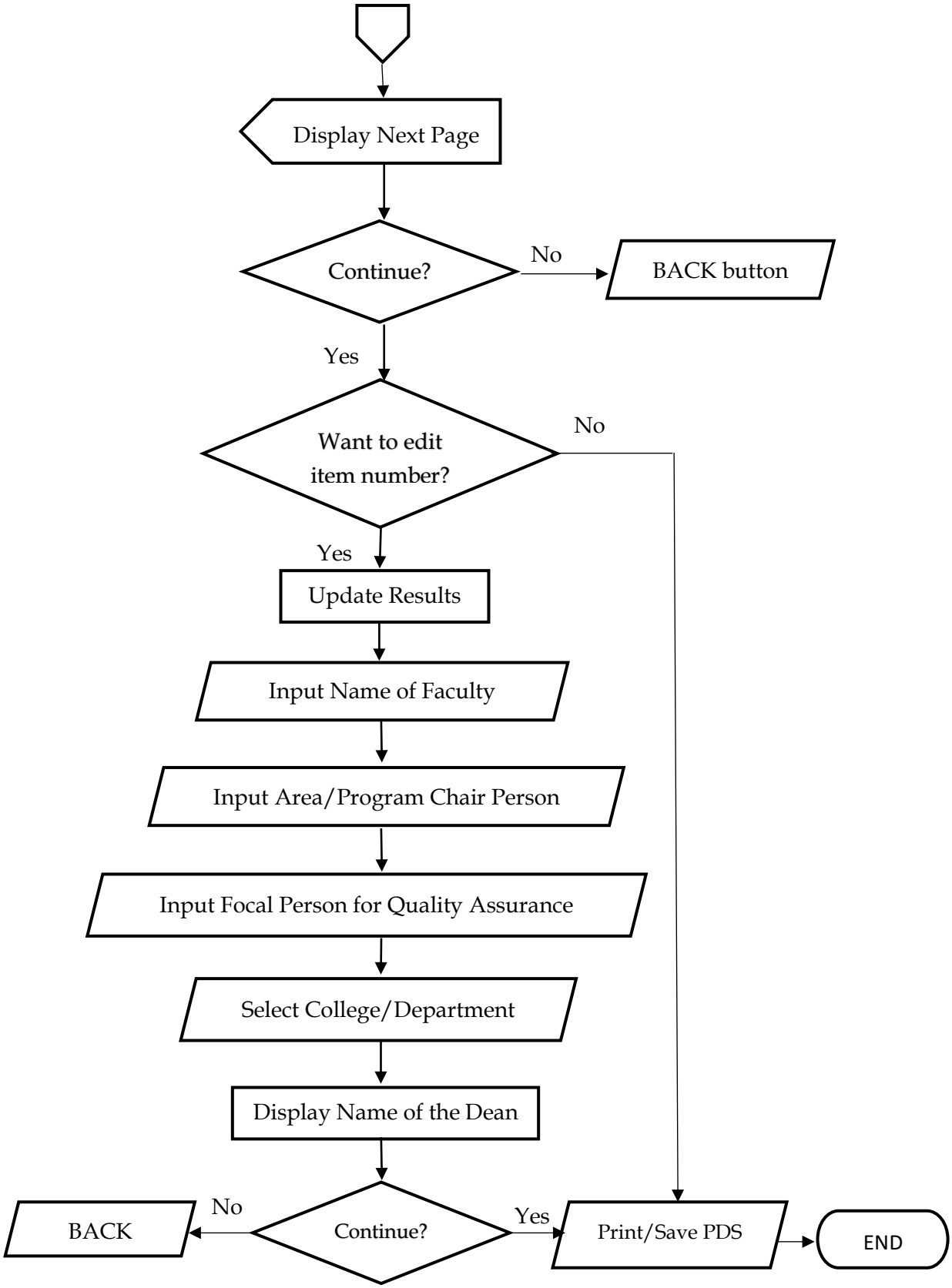


Figure 5c. Flowchart for TOS Task: Last Step

Multiple-choice Test Question Menu

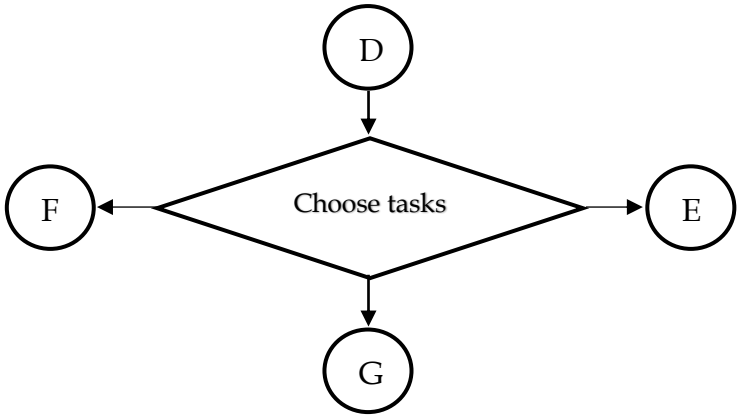


Figure 6. Flowchart for Multiple-choice Test Question Menu

Add Question Menu

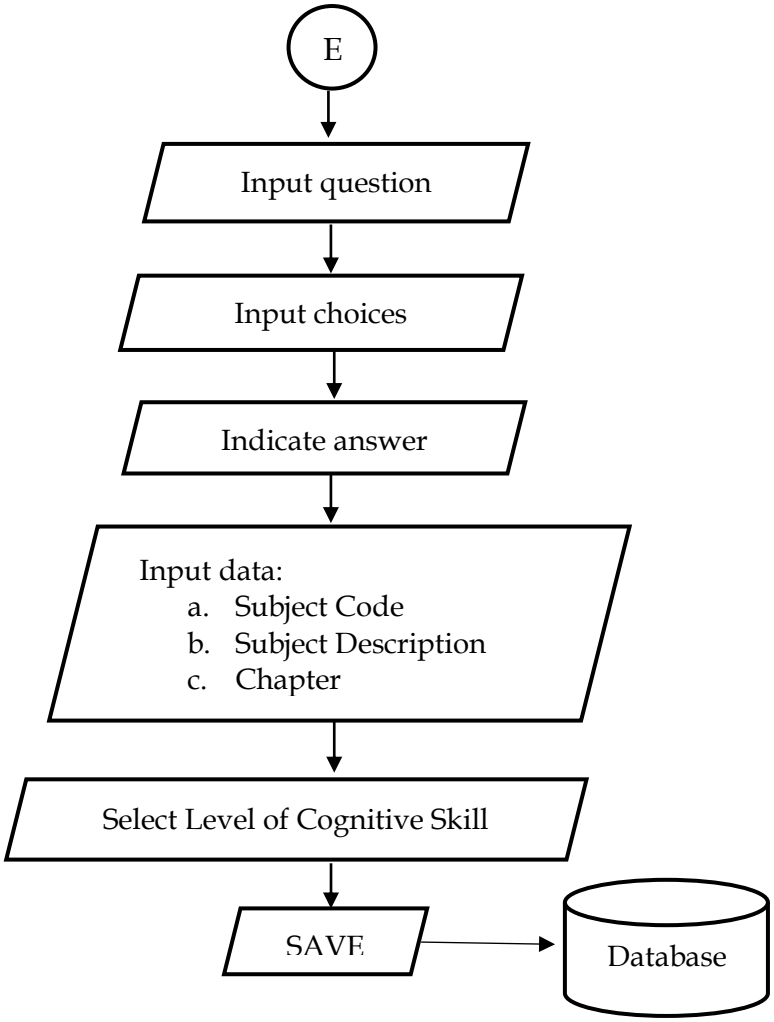


Figure 7. Flowchart for Adding Question

Show Questions Menu

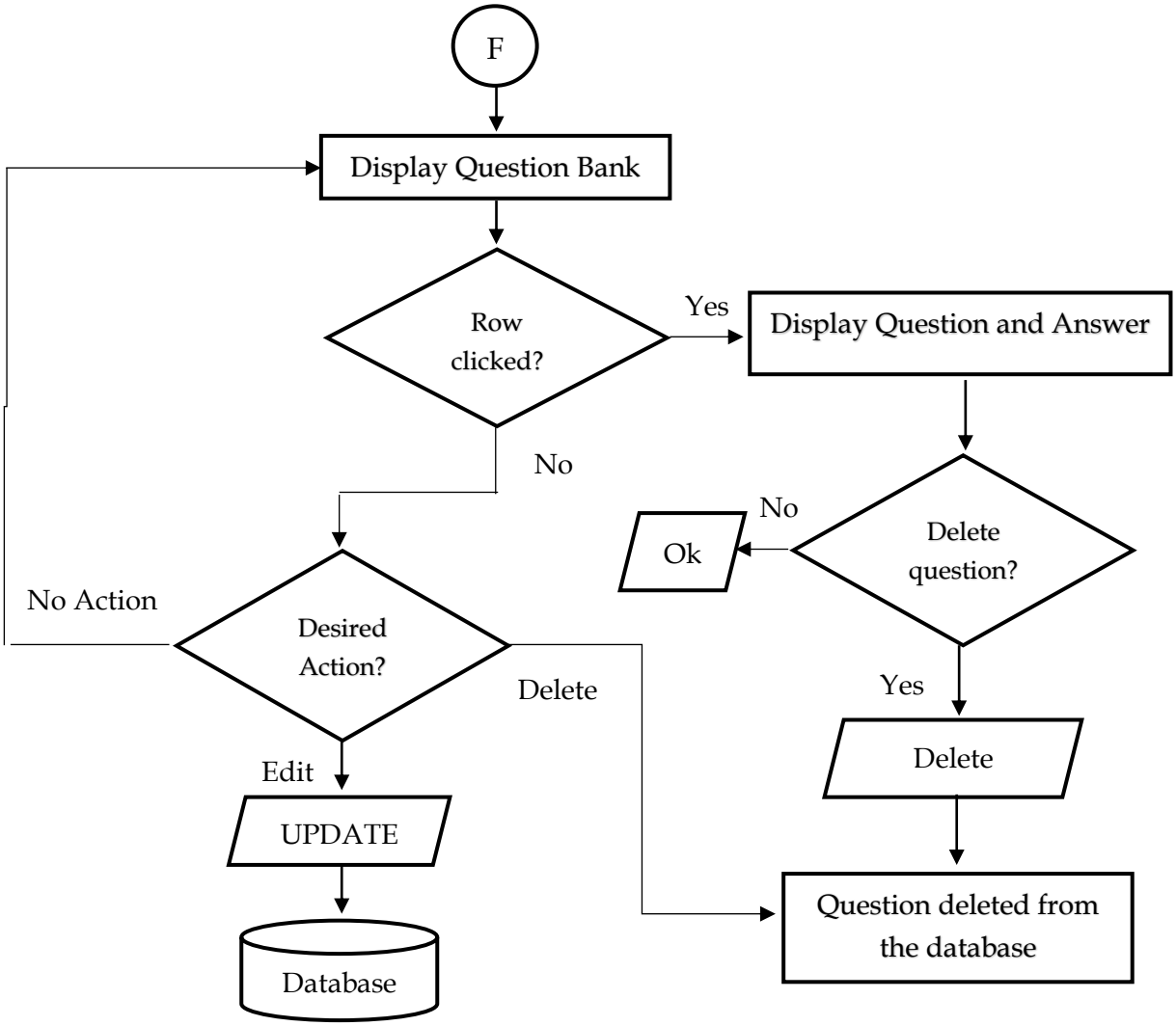
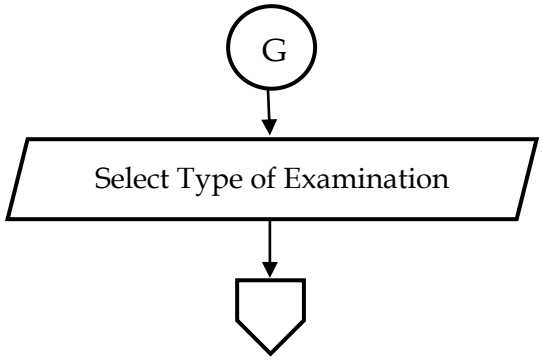
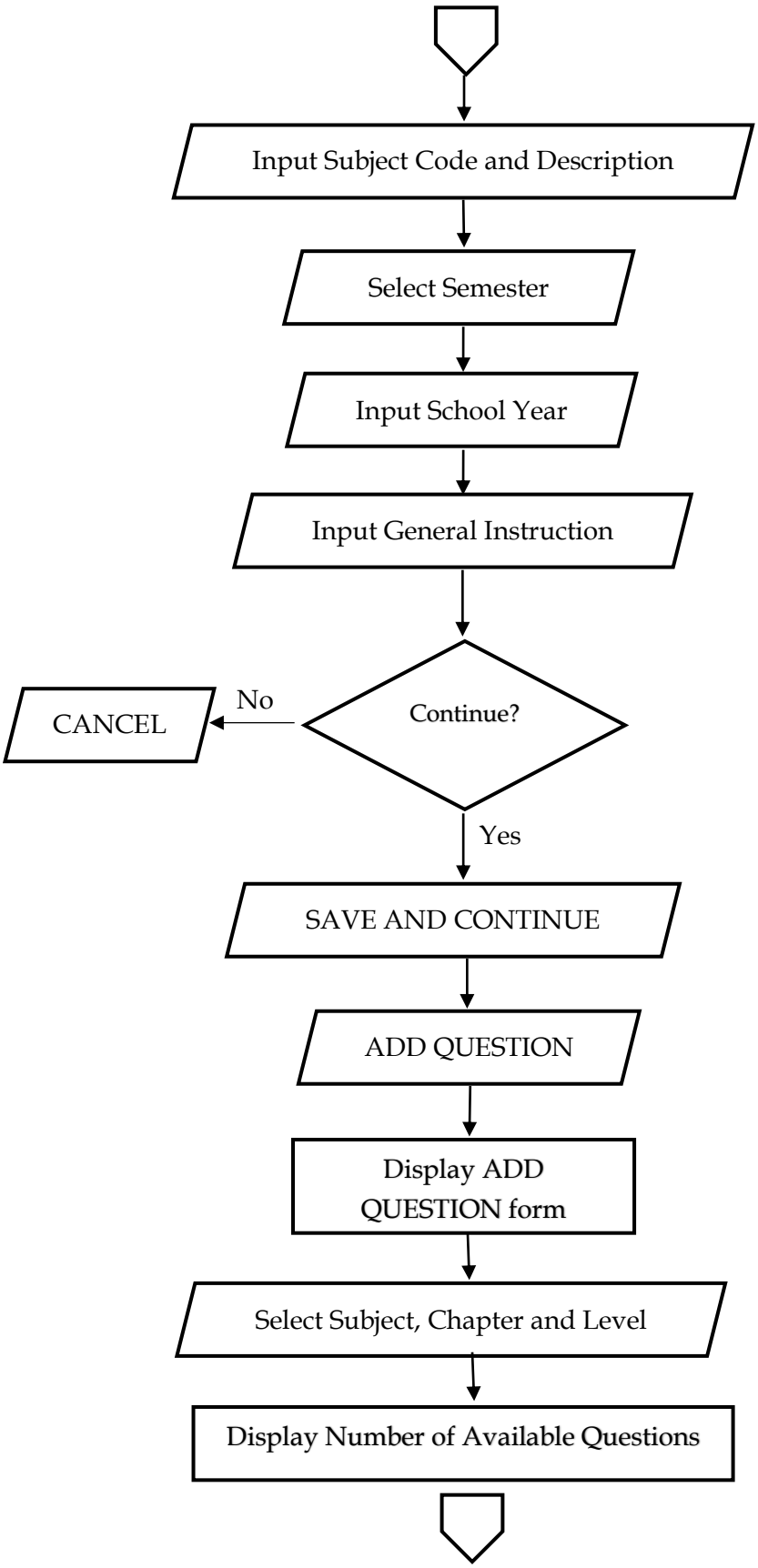


Figure 8. Flowchart for Search/View/Update Question

Create Question Paper Menu




Input Subject Code and Description
Select Semester
Input School Year
Input General Instruction
Continue?
No
CANCEL
Yes
SAVE AND CONTINUE
ADD QUESTION
Display ADD QUESTION form
Select Subject, Chapter and Level
Display Number of Available Questions

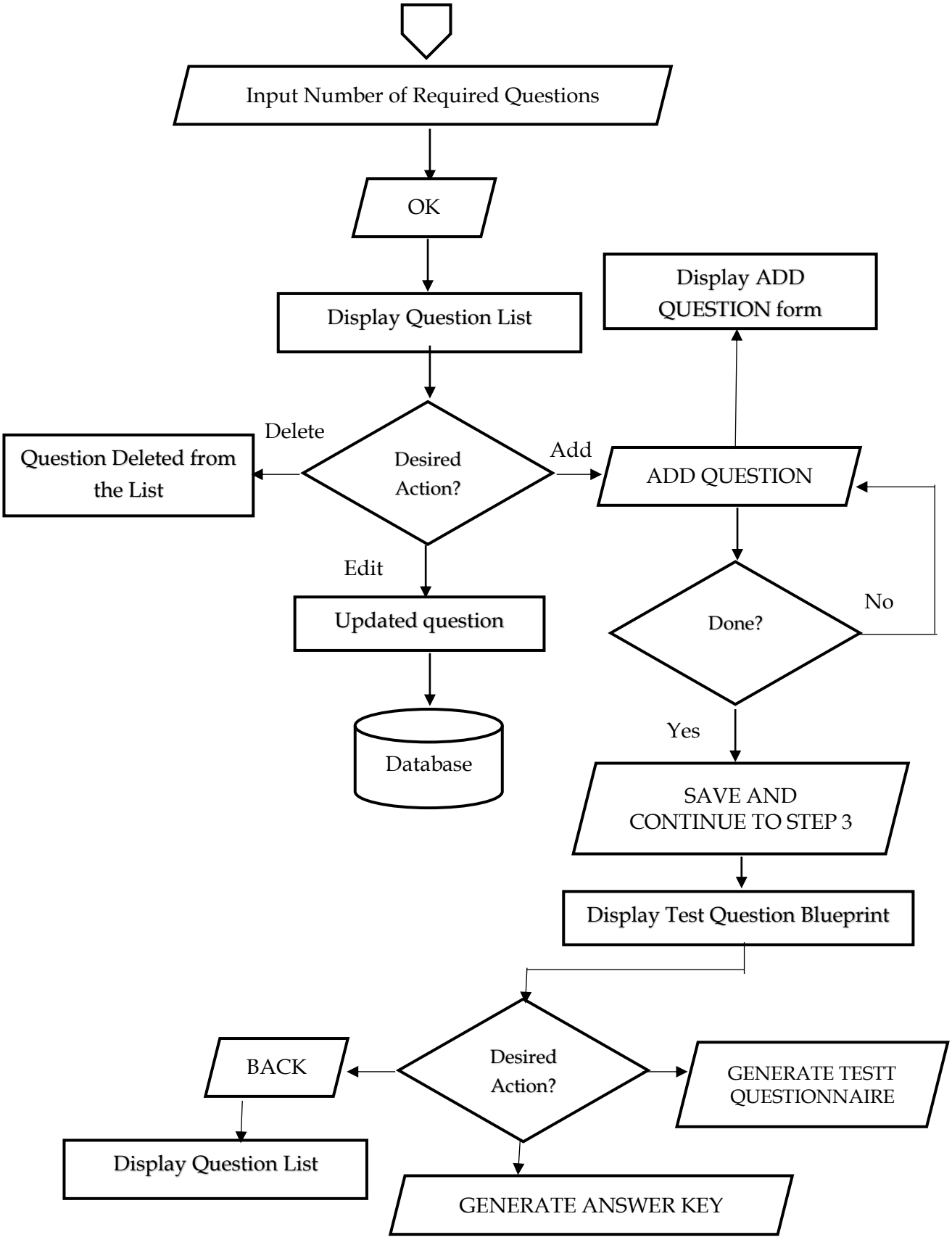


Figure 9. Flowchart for Creating Test Questions

The Graphical User Interface Development. The development of graphical user interface considers the following webpage modules as follows: (1) Home, (2) Tasks, (3) About, and Contact.

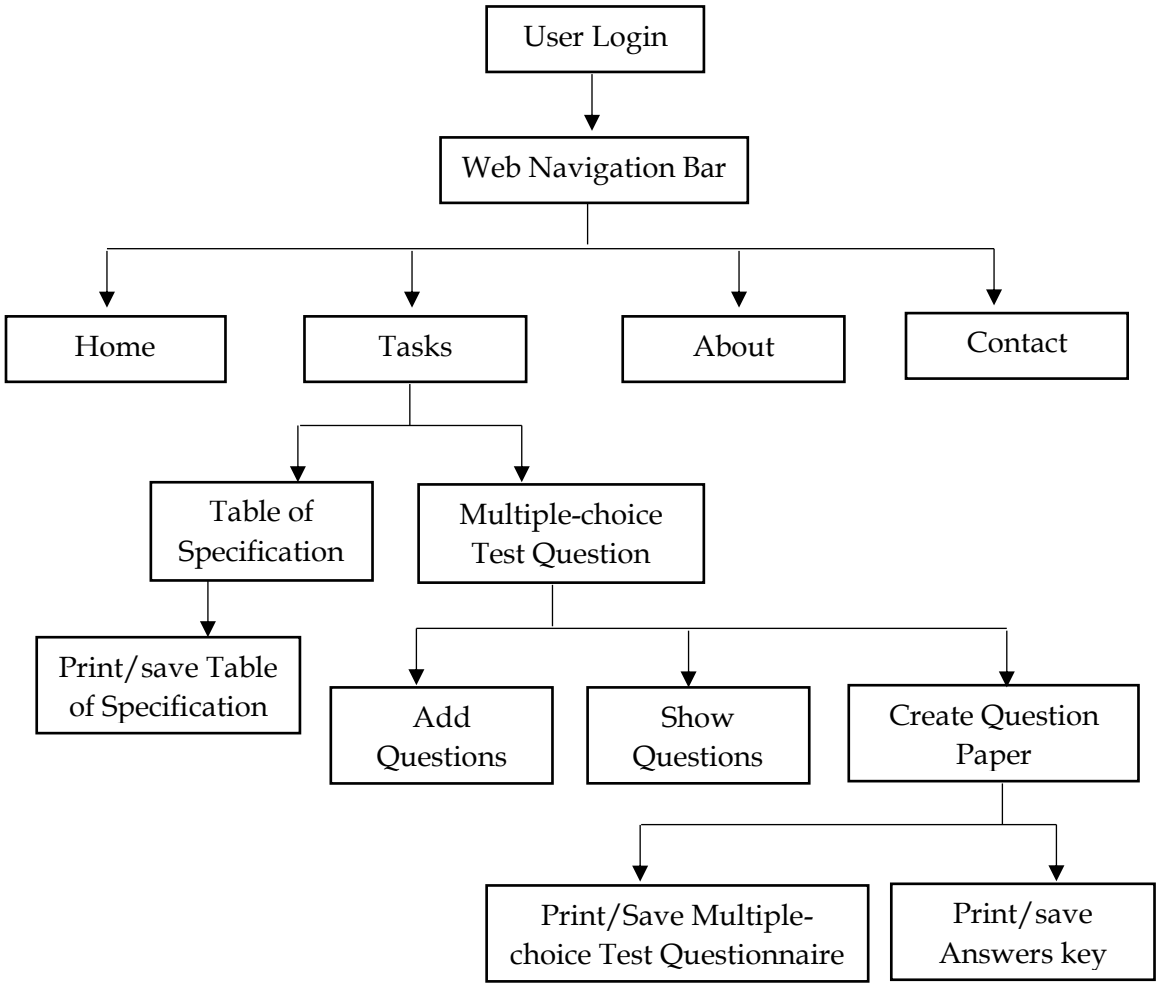


Figure 10. The Graphical User Interface Components of the System

Figure 10 presents the different user interface components of the system. The said figure was the basis in the actual webpage development of the entire system. As shown above, there are four (4) main menus namely; HOME, TASKS, ABOUT, and CONTACT. The system has two (2) TASKS sub menu, which is the TABLE OF SPECIFICATION, where user can create TOS and generate TOS paper,

and the MULTIPLE-CHOICE TEST QUESTION, where user can store questions in the database as well as generate test question paper.

Database Schema

The database schema of the system is shown in Figure 6 that represents the logical configuration of all or part of the relational database of the system.

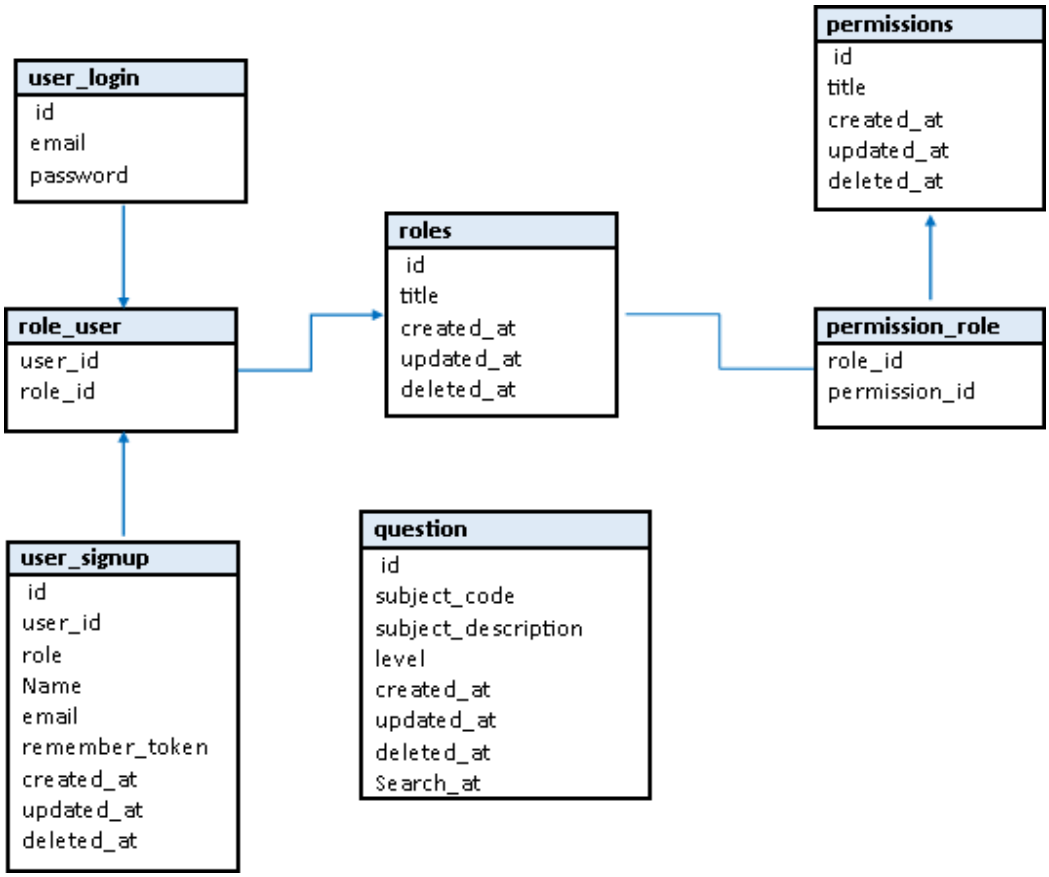


Figure 11. Database Schema of the System

All tables with titles and columns were plotted. The primary key in every table was determined and marked. It is a field in a table that uniquely identifies each record in a database table. The primary key in the system database is the field

"id". After marking the primary keys in every table, other columns in every table which used the value of the primary key of another table was now considered the foreign key. In other words, a foreign key is the link data between tables.

Statistical Treatment of Data

The result of the system evaluation was subjected for tabulation, analyzation and interpretation through the use of statistical tool. The researcher used the Likert Scale to interpret the results. The following statistical tools was used to interpret statistical analysis.

Frequency Count. Count of the number of times a particular score or value was found in the data set.

Weighted Mean. The average of the data that collected.

Grand Mean. The mean of means. It was achieved by dividing the total sets within the specific data.

CHAPTER IV

PRODUCT DESIGN DESCRIPTION, ANALYSIS AND INTERPRETATION OF DATA

This section discusses the final design and the evaluation tests results conducted of the developed web-based student evaluation instrument generator.

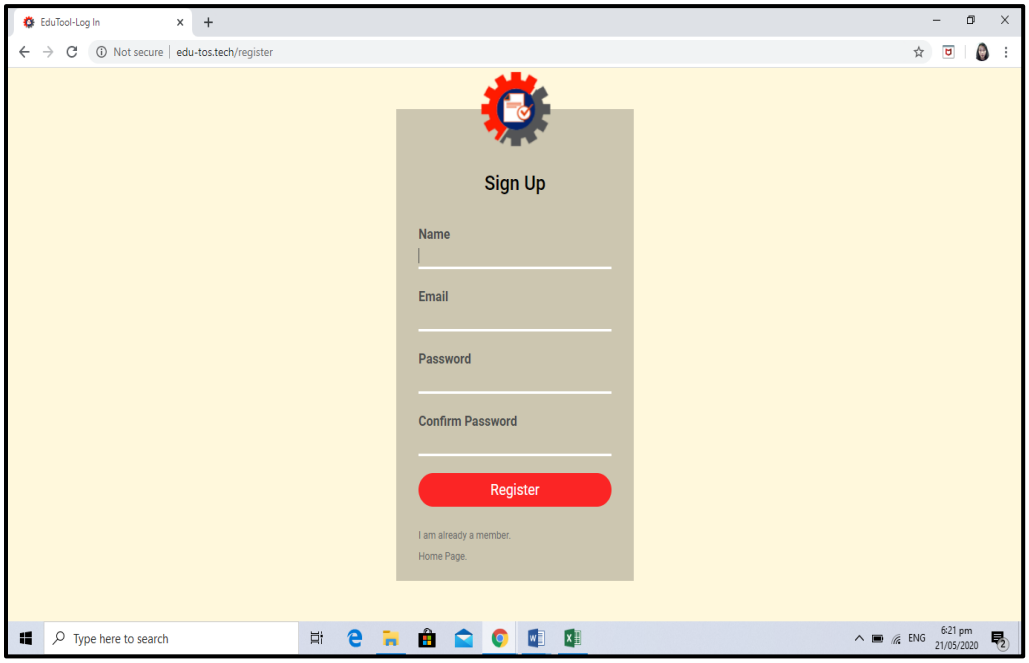
Software Description

This study primarily focuses on the generation of Table of Specification (TOS) and Multiple-choice Test Question. The idea of this study is to shift the repetitive and manual preparation of these tasks into an automated process. Through this web-based system, users can create and generate TOS and multiple-choice test question easily and without spending too much time. Also, it provides a database of questions (Question Bank) that would be helpful for users. The said question bank can be managed by the user, which they can add, edit, update, and delete the stored questions. Questions can also be searched and viewed by users. The user must sign up first before he/she can fully use the entire system. A non-registered member can only access the HOME, ABOUT, and CONTACT webpages. The system can be access online.

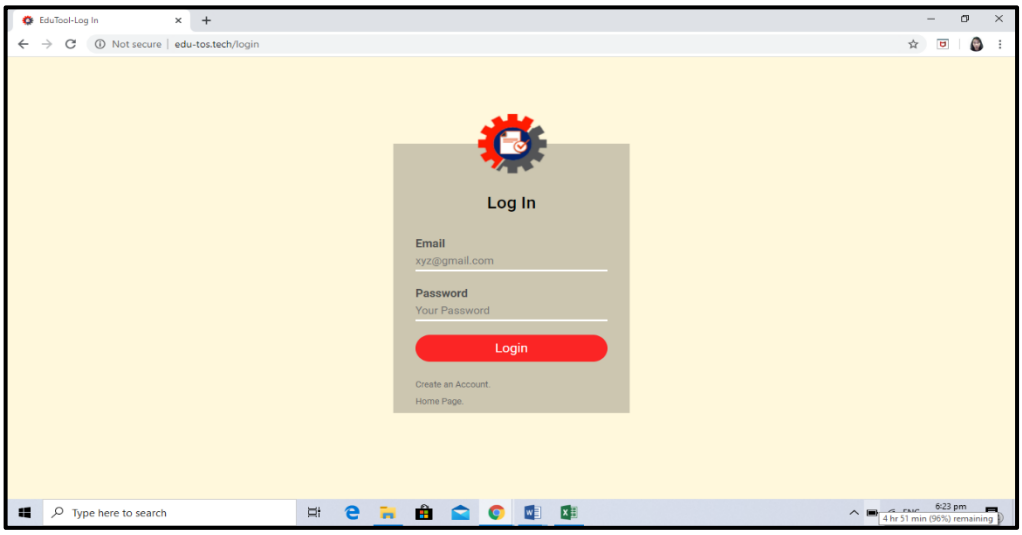
Product Development

Actual System Website Design. The system website has been deployed which has been made available at http://edu-tos.tech/. The researcher named the website as 'EduTool' short term for Educational Tool. In relation to this, the website user interface has been developed in accordance to the graphical user interface development process and system flowchart as presented in Chapter 3.

The website has four (4) main tabs namely: (1) HOME, (2) TASKS, (3) ABOUT, and (4) CONTACT. The user needs to login to fully navigate the website. The faculty member must sign up first in the website if he/she is not yet a member. Figure 7 presents the Sign Up and Login Form.



(a)



(b)

Figure 12. (a) Sign Up form and (b) Login form

CONTACT. The Contact menu was made for show, with the location map of Samar State University, the address, contact number, website address and social networking sites like Facebook and Twitter. In other words, it contains basic information of the university.

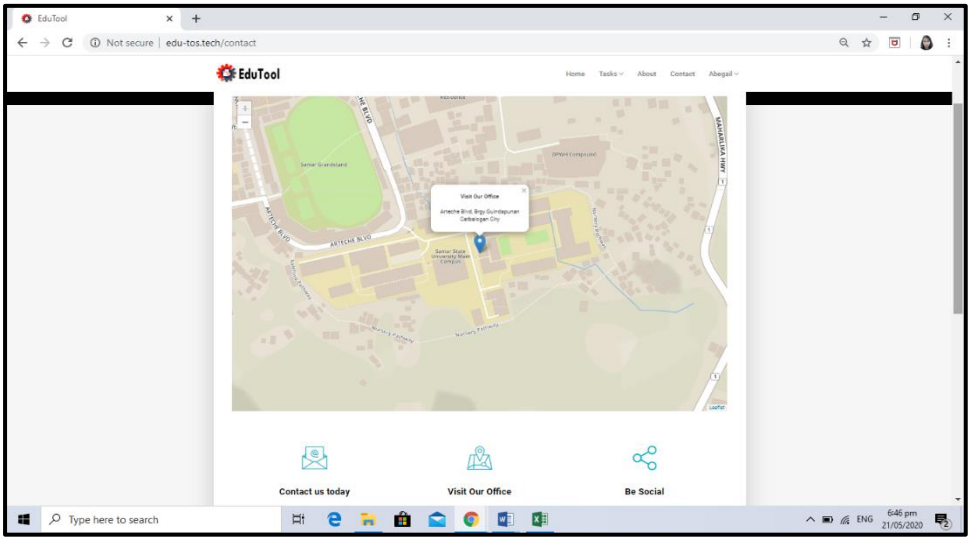


Figure 13. The Contact Menu

ABOUT. The About menu shows what does the system do and what it provides to users.

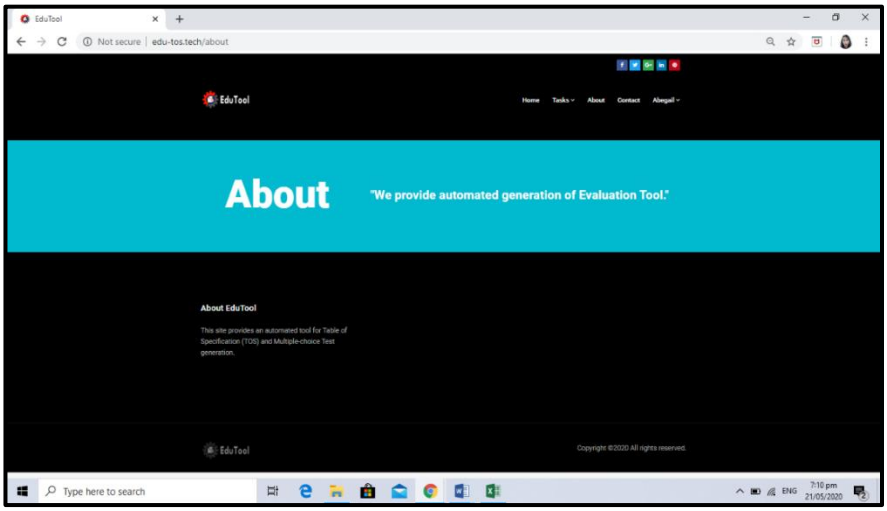


Figure 14. The About Page

TASKS. The Tasks menu is the main function of the system. When hovered, it shows the submenus; TABLE OF SPECIFICATIONS AND MULTIPLE-CHOICE TEST QUESTIONS. The MULTIPLE-CHOICE TEST QUESTION has also submenus, which are ADD QUESTIONS, SHOW QUESTIONS, and CREATE QUESTION PAPER.

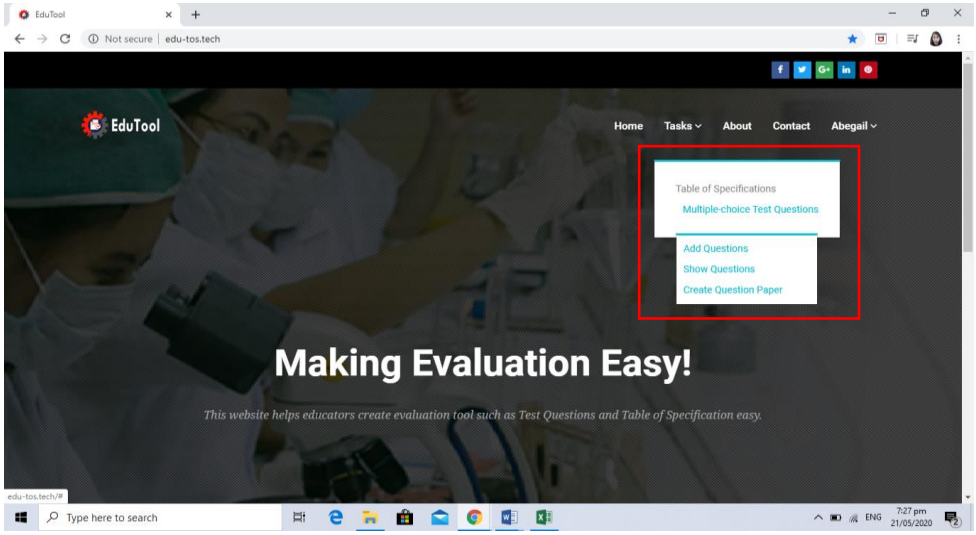
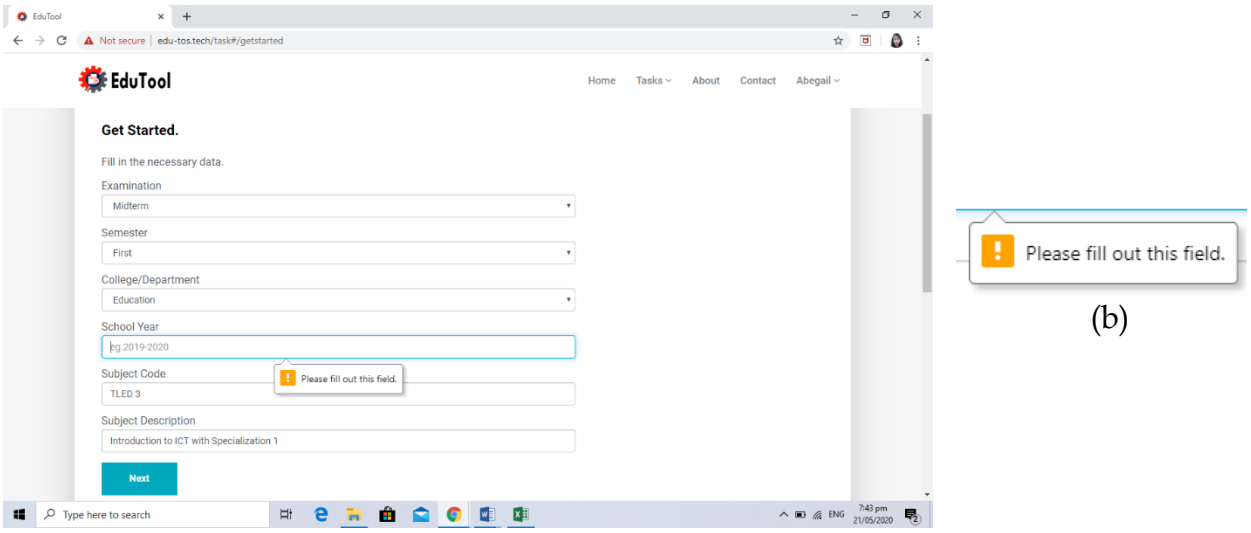


Figure 15. The Tasks Menu

TABLE OF SPECIFICATION. This menu allows the user to create and generate TOS automatically. The user must complete first the necessary data before getting into the TOS generation itself. The required information needed are the type of examination, semester, college/department, school year, subject code, and subject description. If there is any field missing, the user will not be able to proceed to the next page. The system will pop-up an error message. Note that this information will not be stored in the system database.



(a) (b)

Figure 16. (a) Page showing required fields to be filled in (b) Sample error message

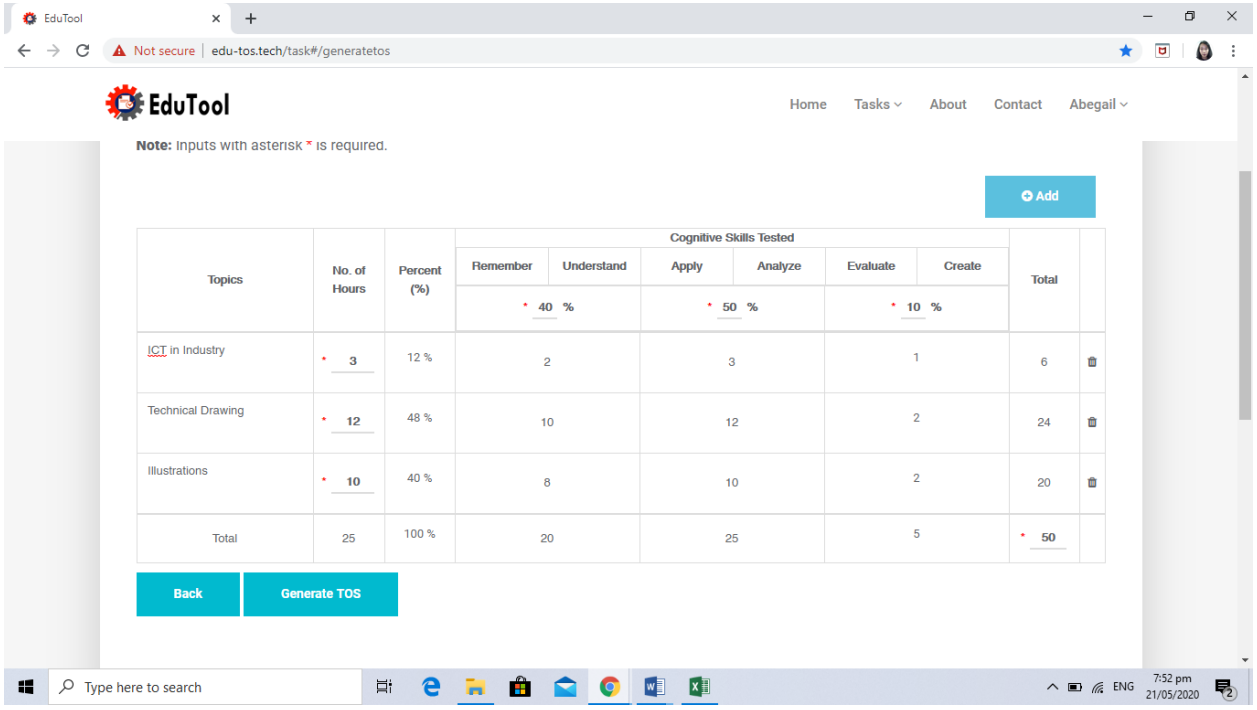


Figure 17. The TOS automatic computation

After completing the necessary data, the system will next displays the area where the user will input the Percentages required for Remember & Understand, Apply & Analyze, and Evaluate & Create. Conversely, the percentages per Cognitive Skills. Aside from that, the user will also be asked to input the total number of items required for a certain test, the topics and its number of hours covered. As the user enters data on the field/s, it will immediately do the computation and generate the results real-time. The computations of results was based on the formulas used by faculty of SSU. For instance, as shown in Figure 17. result implies that there should be ten (10) items in Technical Drawing for Remember & Understand skills. The ADD tab shown in the figure allows the user

to add another row in the table. While the trash bin icon allows the user to delete a row.

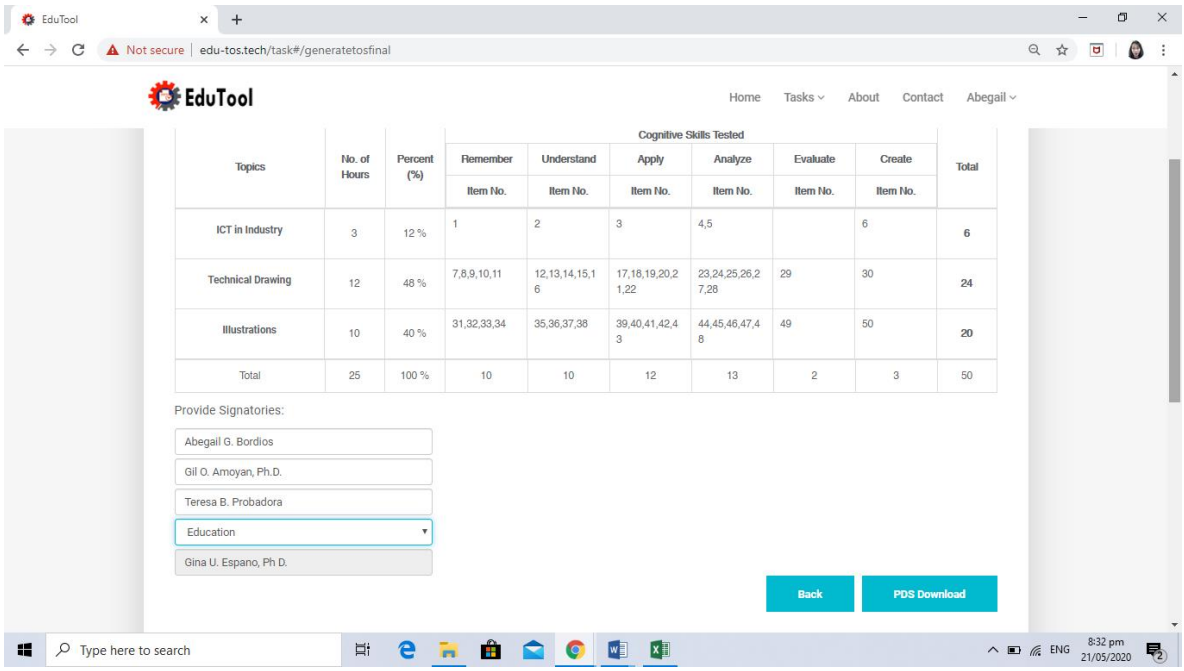


Figure 18. The TOS with suggested items per cognitive skills

When the GENERATE TOS tab is clicked, this page shown in Figure 18 will then be displayed on the user's screen. This page shows a complete data of TOS. The system gives the user a suggested number of items per cognitive skills, which is in sequential order. Since this order of items are only suggestion, the user can still edit the items by clicking the field or cell. If the user wants to have the items in a random manner, empty a certain cell, or move an item, he/she can do that. The user has the leeway to do these activities. As these changes happens, the summation (total) will also be updated automatically. Finally, if the user has already achieved the desired TOS he/she wanted, the next thing is to provide the

signatories. When the PDS DOWNLOAD tab is clicked, the final output will be displayed that can be printed or saved as .pdf file that the user can keep. Figure 19. presents the final output.

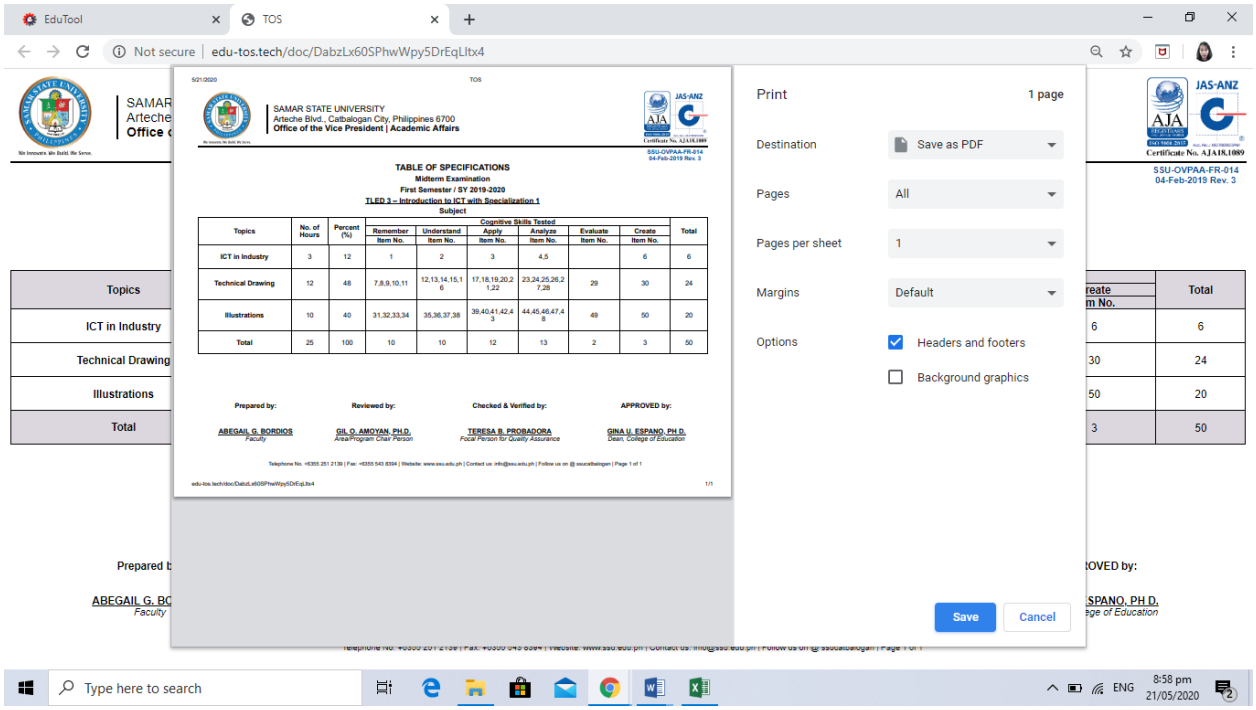


Figure 19. The Final Output

Multiple-choice Test Questions. This menu allows the user to create and generate multiple-choice test question paper and keep and maintain a repository of questions (Question Bank). In this task, the user can add, edit, and delete question from the database. The user can also search and view questions.

ADD QUESTIONS. This menu allows the user to type a question along with the choices and then save it in the database. Figure 20. depicts the user interface of ADD QUESTION page. Furthermore, the user also needs to indicate the correct answer by checking the checkbox provided. The user can also insert an

image in the question as well as in the choices if needed. After encoding of question, the user has to input the subject code, subject description, and chapter, and select the level of cognitive skill to complete the said task. This new question will then be added into the database.

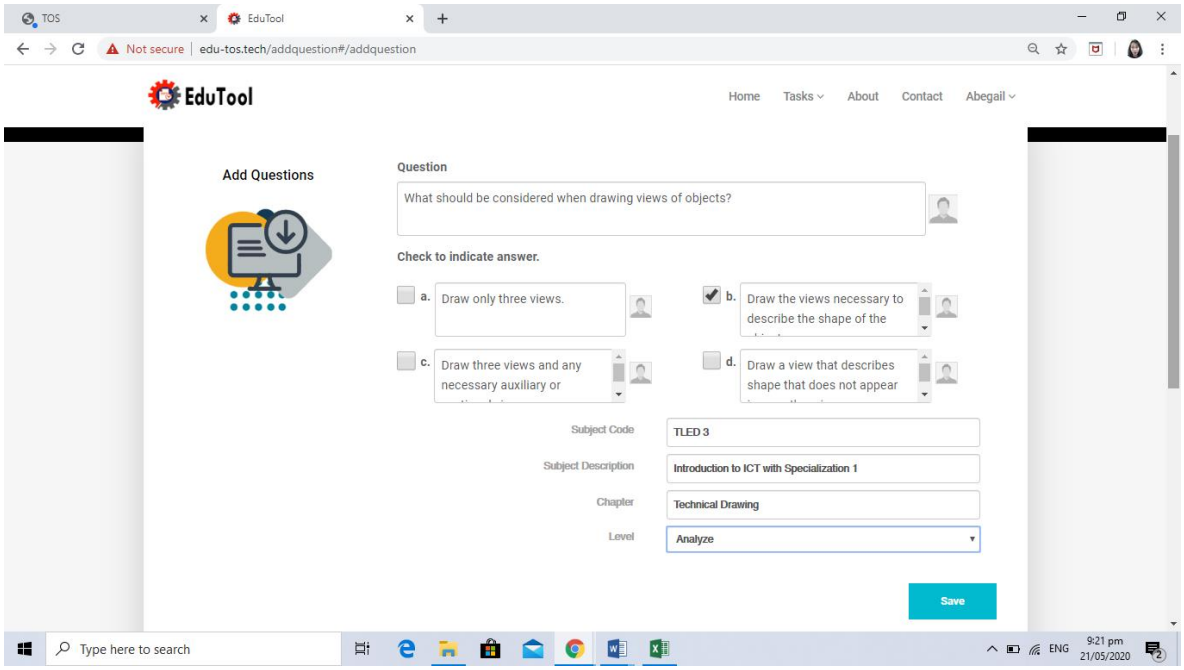


Figure 20. The Add Questions User Interface

SHOW QUESTIONS. This menu displays the questions stored in the question bank. It is presented in a categorical format (Question ID, Subject Code, Subject Description, Chapter, and Level). The user can search and view the question by any of these categories. Figure 21. shows how the question bank was presented.

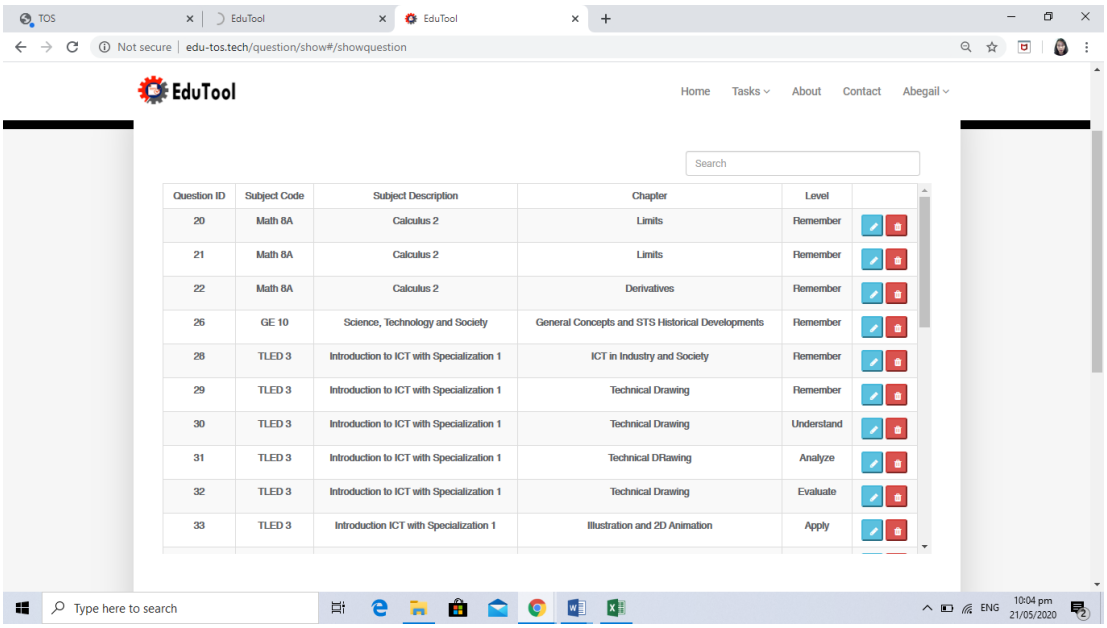
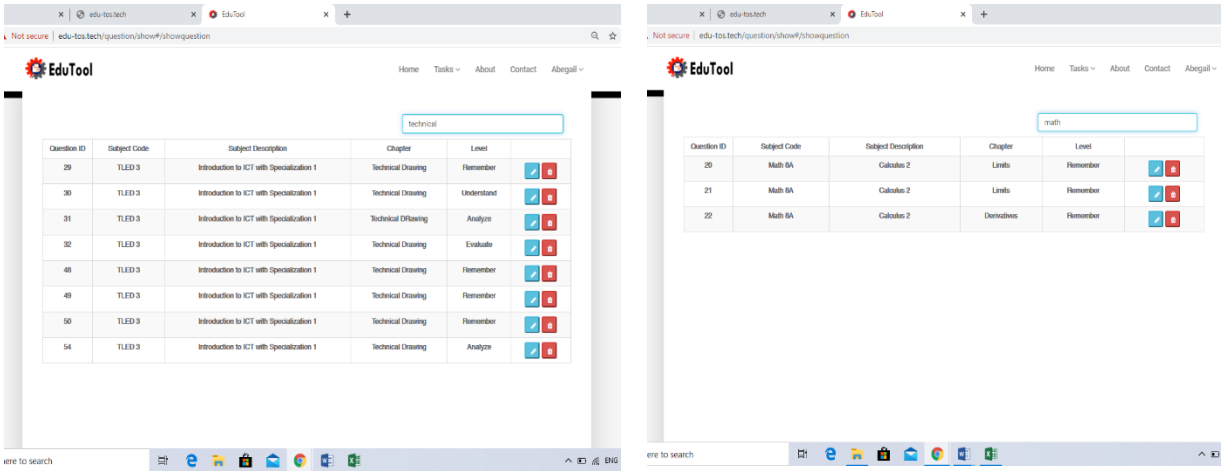


Figure 21. The Question Bank



(a) (b)

Figure 22. The Search Bar
(a) Questions searched by Subject Description (b) Questions searched by Subject

To see what question does a certain row consist, the user has to clicked a specific row and then a question form will pop-up together with its correct answer. In this form, the user cannot only view the question but, also he/she can delete it

from the database. Conversely, in the default view of this page the user can also edit and update as well as delete the question directly.

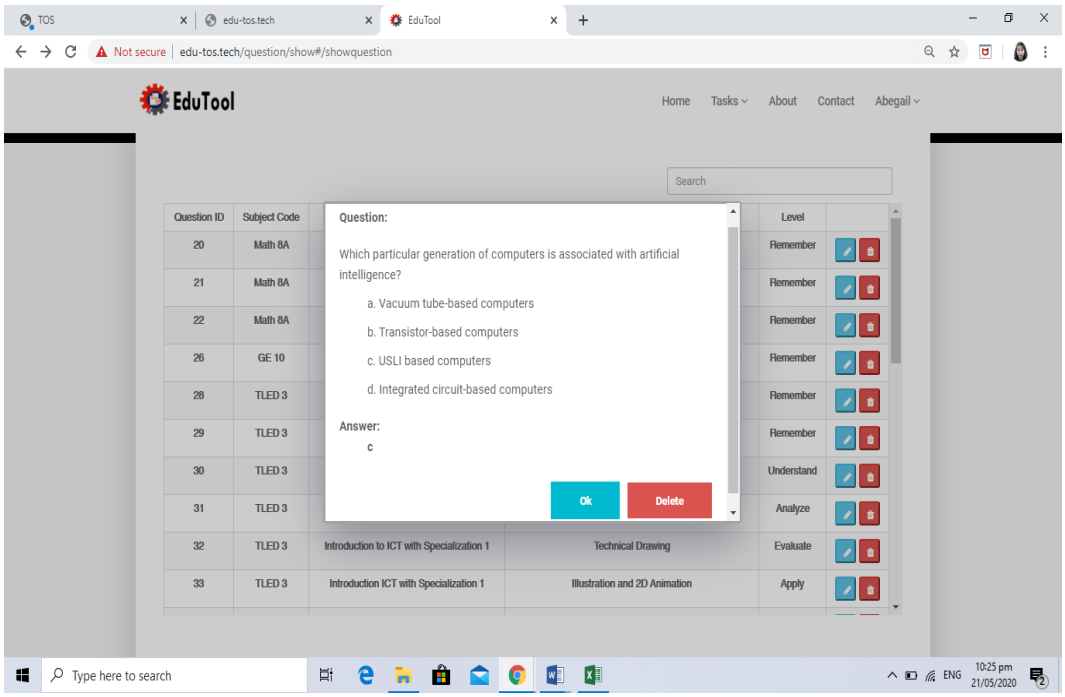


Figure 23. The Question Form

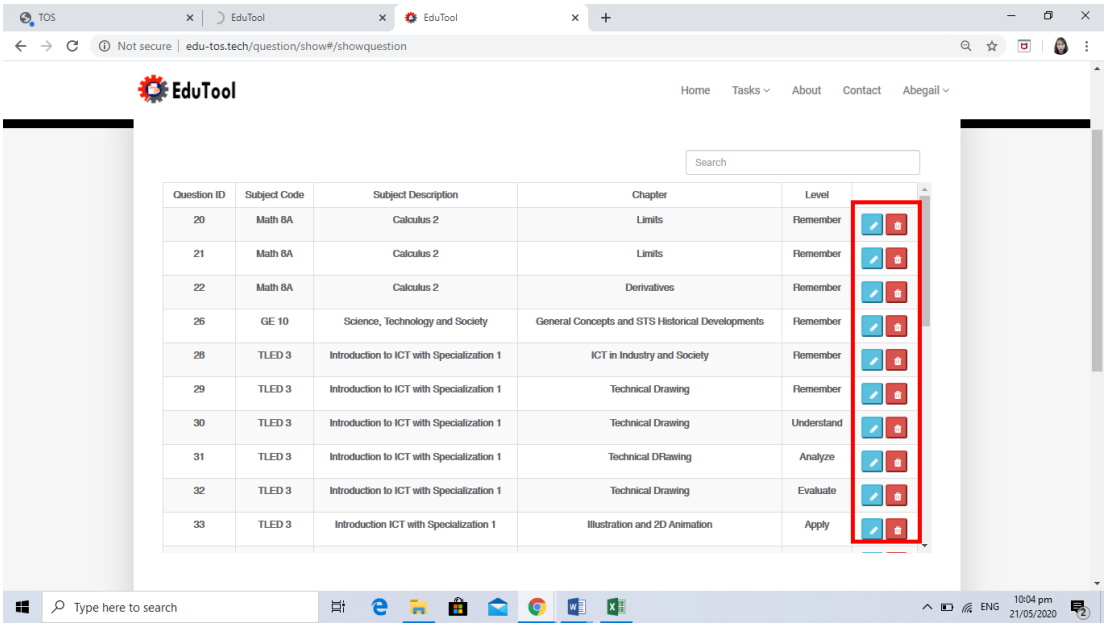


Figure 24. The Update and Delete icon

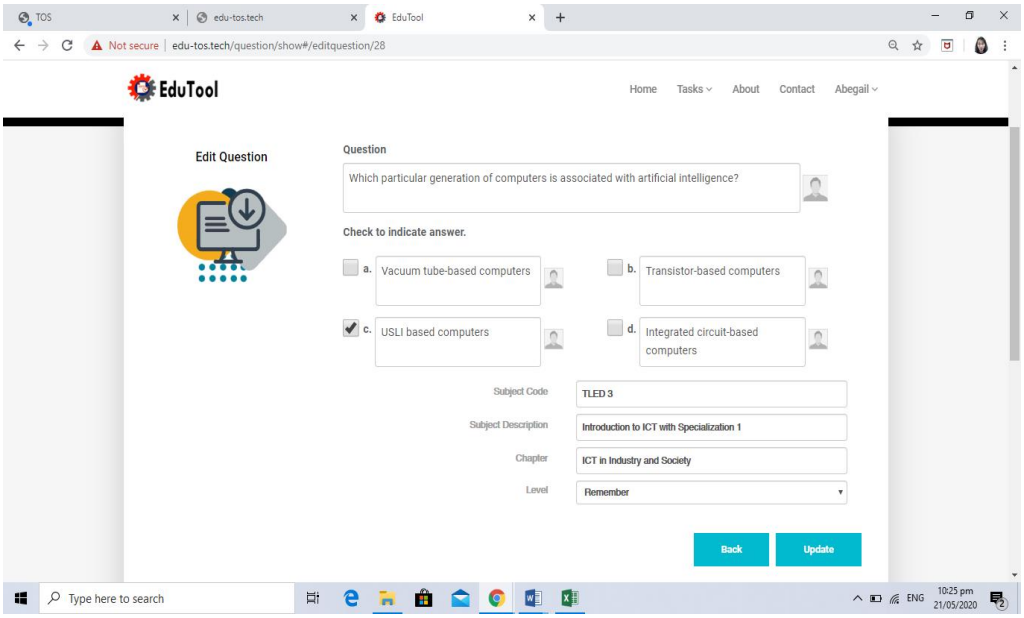


Figure 25. The Update Question User Interface

CREATE QUESTION PAPER. This menu allows the user to frame multiple-choice test questionnaire. In order to generate the test questionnaire, the user must follow three (3) steps namely: (1) Create New Test, (2) Add Question Blueprint, and (3) Preview and Generate PDF. First, the user should fill in the necessary data. These are the type of examination, subject code, subject description, semester, school year, and general instruction.

Secondly, the user has to create question blueprint by adding question. When the ADD QUESTION tab is clicked, a form will pop-up. In this form, the user should select the Subject, Chapter, and Level needed for the test question. When its done, the system will show the user the available questions in the question bank vis-à-vis to the selection. The user has to input the required number of questions he/she only needed. The system will randomly picked the

required questions from the database and will be added to the question blueprint. The user has to repeat this process until such time that he/she achieved the desired total number of items.

Lastly, step 3 will give the user a preview/question blueprint. The user can now generate the test questionnaire and answers key by printing or saving a .pdf file copy. The following figures below shows the step-by-step process of creating multiple-choice test questionnaire.

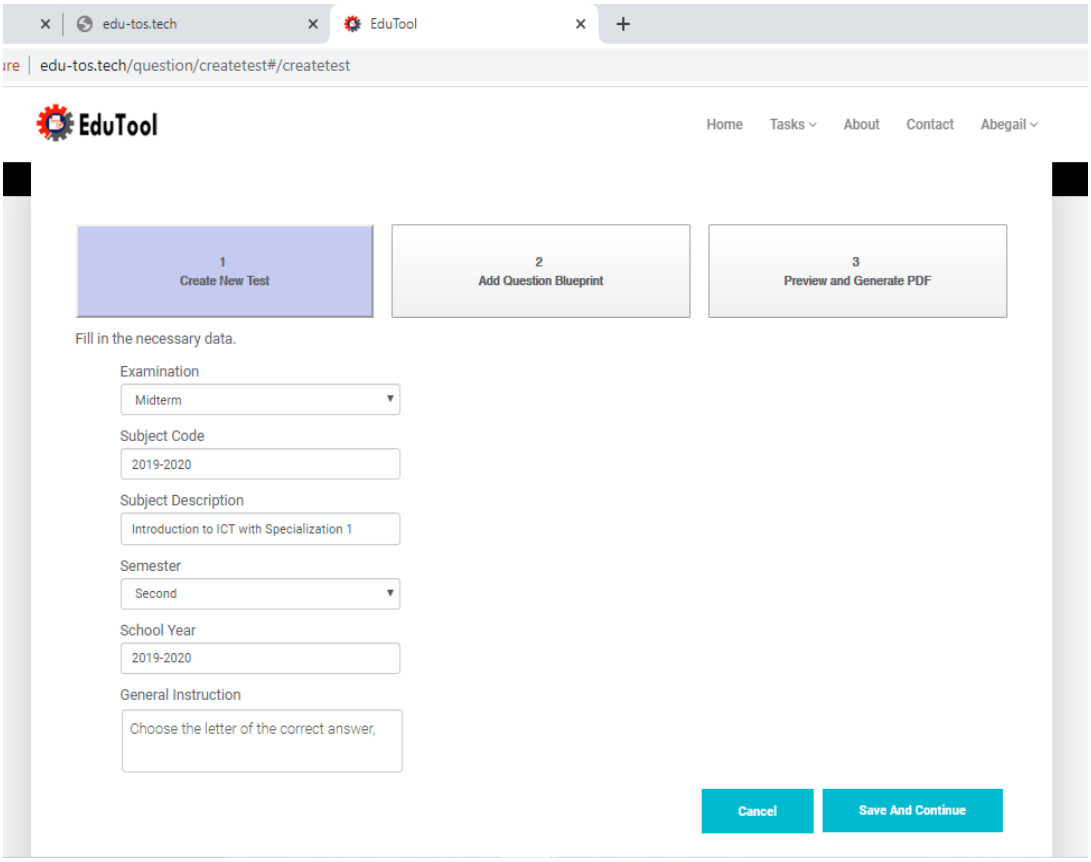


Figure 26. Step 1 (Create New Test)

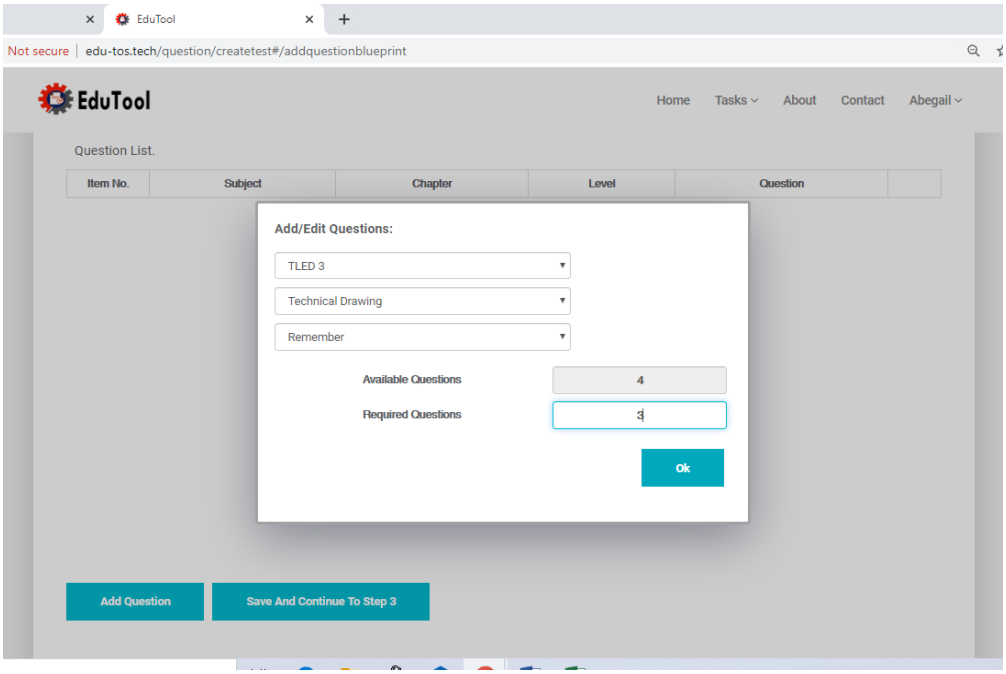


Figure 27. Step 2 (The Add Question Form)

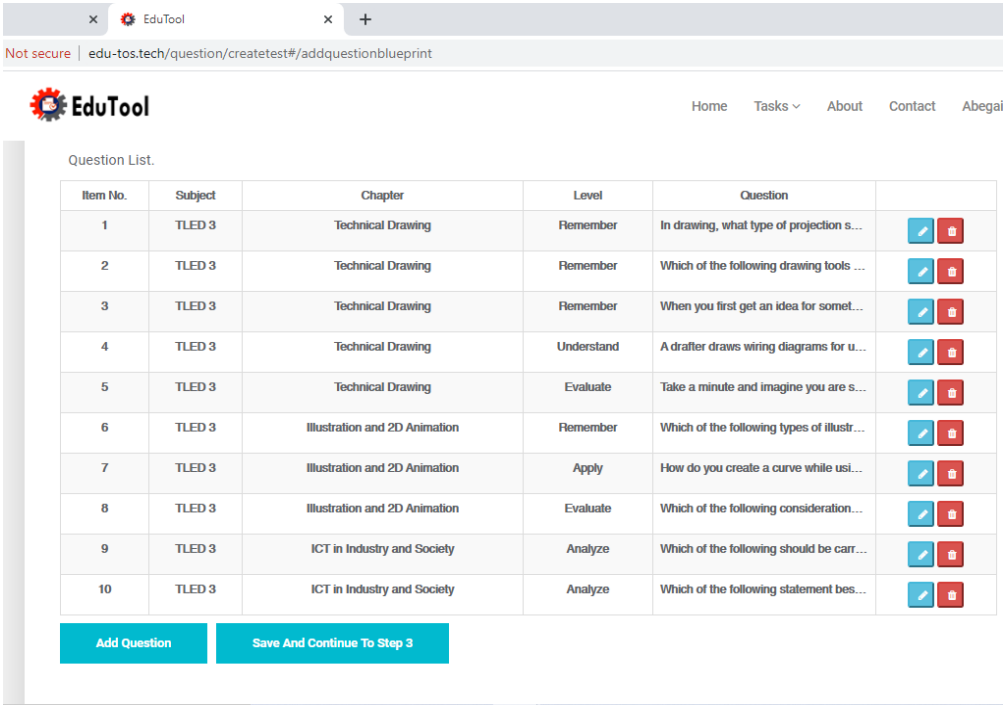


Figure 28. Step 2 (The Randomly Picked Questions)

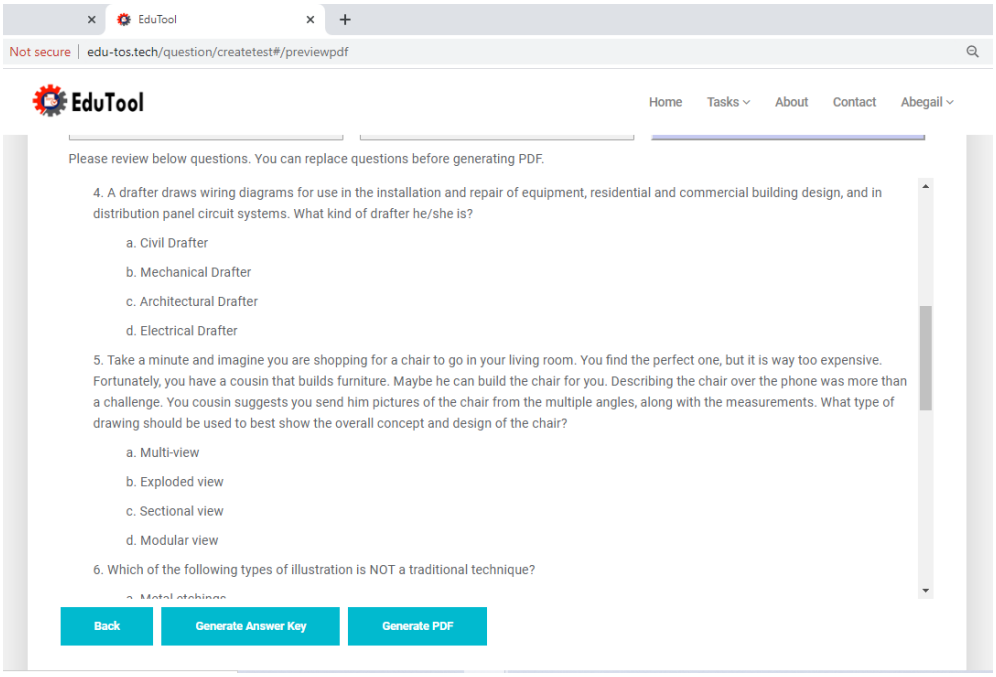


Figure 29. The Question Blueprint

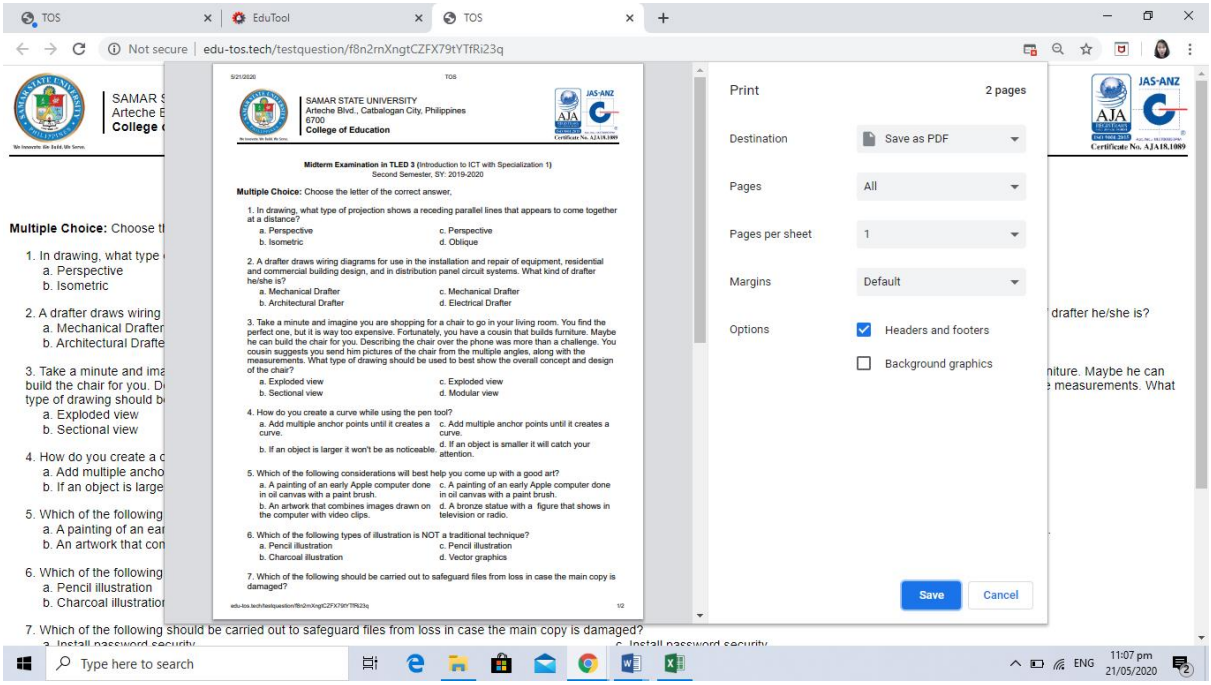


Figure 30. Final Output (Test Questionnaire)

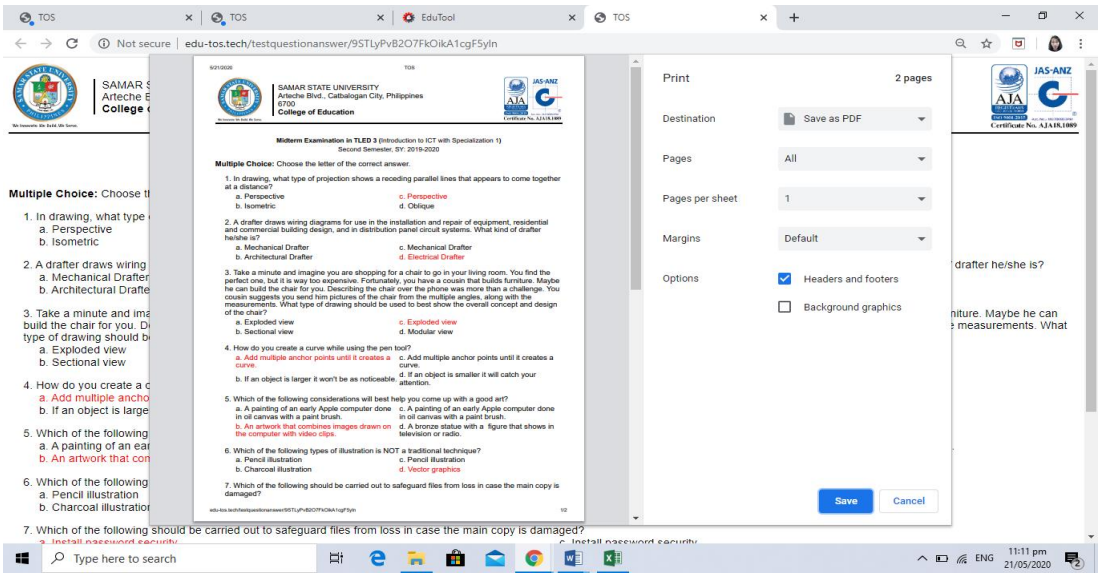


Figure 31. Final Output (Answers key)

System Security. Non – registered users do not have privileges to access the content and operations in the TASKS menu. Such users can just view the HOME, ABOUT, and CONTACT menus. If the member user leaves the website inactive for about 5 minutes, the session will expire. Thus, the system will require the user to login again in order to fully access the contents of the website. On the otherhand, the system enables the user to save a file copy of the generated TOS and Multiple-choice Test Question. By doing this, you can also have a backups of the said data in case, the system would not be available.

User Groups. The requirements for the Web-based Student Evaluation Instrument Generator rely upon two types of user groups. The two user groups, short descriptions of their requirements, and Use Case diagrams for each are described below.

Faculty Members

Faculty members have the ability to manage categories, references, questions, and TOS, within the system. The following is listing of some of their privileges in the system. Faculty members can: (a) log in and out of the system, (b) create/edit/delete data in TOS automation, (c) add/edit/update/delete questions stored in the database, (d) can add an image to a question and its choices, (e) view/search questions, (f) can frame test questionnaire, (g) generate the TOS sheet that user can print or save the file as PDF, and (h) generate the test questionnaire and answers key sheet that user can print or save the file as PDF.

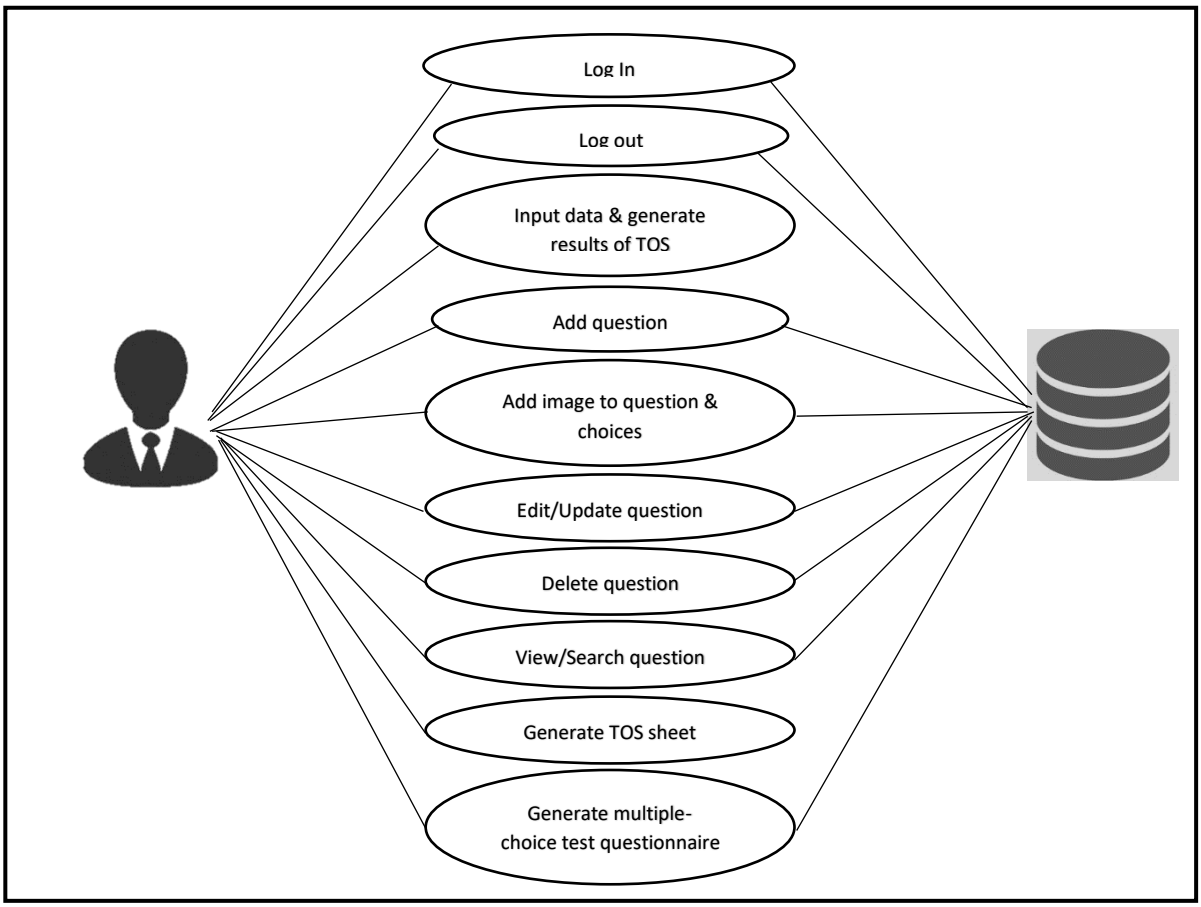


Figure 32. Faculty Use Case Diagram

Administrator

The administrator manage all user accounts. The following are the administrator's capabilities (a) Login in and out of the system; and (b) create/edit/delete/search system users.

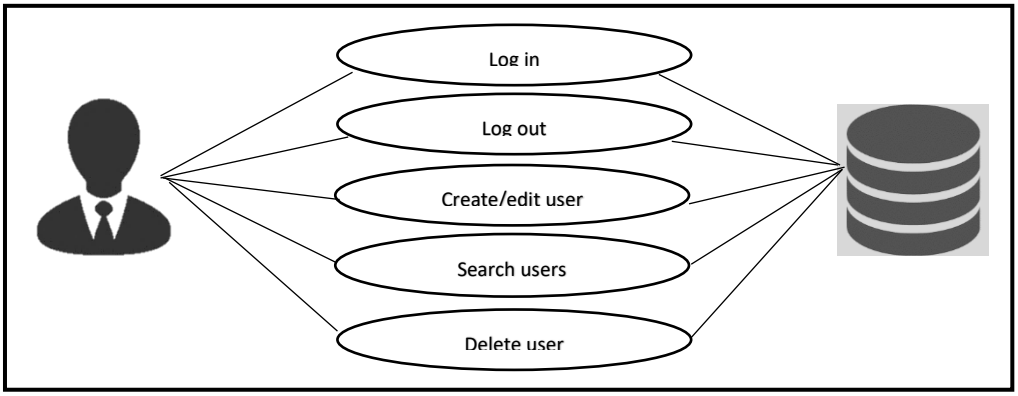


Figure 33. Administrator Use Case Diagram

Requirement Analysis and Specification

Research on tools and packages for building the website was performed before starting the design. Doing so allowed the researcher to focus on the web application itself and less on learning a new programming language. The software component directs the logical processes and operation of the entire system. This section discusses the software tools utilized in building the system. Below are the following web development components used: (a) HTML, (b) CSS, (c) JavaScript Vue.js, (d) PHP, (e) MySQL, and (f) Visual Studio Code.

The HTML, CSS, JavaScript Vue.js and PHP are the languages and scripts used in the web development. The HTML (HyperText Markup Language) was

used in the backend of the system. It gives skeleton of every single webpage on the Internet. HTML code tells the web browsers to display elements, like images, tables, headings, paragraphs, and the like. On the other hand, CSS (Cascading Style Sheets) was used in building the front-end of the system. This coding language gives the website its look and layout. Along with HTML, CSS is another fundamental tool in the web design of the developed system. The PHP and JavaScript Vue.js are the general-purpose scripting languages utilized in the study. A JavaScript is a client-side scripting language while PHP is a server-side scripting language. For the database, the MySQL database software was used in the design of the web based server application and the associated database of the system.

Presentation, Analysis and Interpretation of Data

The system undergone an evaluation to assess whether the objectives of the study was achieved. Particularly, if it responded to the problems and issues in creating the TOS and Multiple-choice Test Question. The system was evaluated through beta testing paired with a survey evaluation by experts and end-users. In beta-testing, the functionality, accuracy, reliability, and security of the system was evaluated by twenty-five (25) respondents. Five (5) experts assessed the technical design and details of the system while, twenty (20) end-users evaluated the system based on their perception on the web design and performance of the

system. The researcher utilized appropriate statistical analysis in order to extract data from the survey evaluation and obtain feedback and suggestions.

Technical Expert Profile. The technical experts involved in the beta testing is composed of two (2) computer engineers and three (3) IT experts. From which, four (4) of them are also a faculty member of Samar State University.

End-user Respondents' Profile. The end-user respondents are also a faculty member of the university. It is composed of five (5) instructors from College of Arts and Science (CAS), one (1) from College of Industrial Technology (CIT), ten (10) from the College of Education (COED), and four (4) part-time faculty.

System Functionality. The system functionality testing dealt with the evaluation of system if it satisfy the desired operation of each part and the whole system. The tasks/activities and graphical user-interface (menus/tabs/buttons, etc.) are observed if it is working fine during the operation process.

As shown in Table 1. the system has a grand mean of 4.76 which is interpreted as Strongly Agree. Therefore, this result implies that the system was working well during the functionality testing. The user interface such as menus, tabs, and buttons are easy to manage. Moreover, the system was able to achieved its main purpose to generate the TOS and multiple-choice test questionnaire with answers key; and was able to add, edit, update, delete, and retrieve questions from the database. Moreover, the users was able to search/view questions by category.

In other words, the respondents strongly agreed that the question bank is manageable as depicted in indicator 3, 4, and 5. On the contrary, an expert rated indicator 2 and 3 as Disaggree. The said expert believed that the system user design should have been improved for a better usabillity.

Table 1

Evaluation of the Respondents according to its Functionality

	Respondents					Total	WM	Interpretation
	5 (SA)	**4 (A)**	**3 (U)**	**2 (D)**	**1 (SD)**			
1. The user interface (menus/tabs/buttons) are easy to navigate.	(85) 17	(32) 8	-	-	-	(117) 25	4.68	SA
2. The system is manageable and user-friendly.	(75) 15	(36) 9 (5-end-user 4-expert)	-	(2) 1 (expert)	-	(113) 25	4.52	SA
3. The system can generate the desired TOS and multiple-choice test with answers key.	(120) 24	-	-	(2) 1 (expert)	-	(122) 25	4.88	SA
4. The system can keep, manage, and retrieve question stored in the system.	(115) 23	(8) 2	-	-	-	(123) 25	4.92	SA
5. The system can add and update questions when needed.	(100) 20	(20) 5	-	-	-	(120) 25	4.80	SA
Total	**95**	**24**	**-**	**2**	**-**	**125**	**23.8**	
Grand mean							**4.76**	**SA**

Legend:

4.51-5.00	**Strongly Agree**	**(SA)**
3.51-4.50	**Agree**	**(A)**
2.51-3.50	**Undecided**	**(U)**
1.51-2.50	**Disagree**	**(D)**
1.00-1.50	**Strongly Disagree**	**(SD)**

System Accuracy. The system accuracy evaluation was tested if the system was able to perform as per requirement of the respondents, without depecting any defects or issues. Otherwise, if the system runs accurately according to its functions and operations. Based on the results, indicator 1 has a weighted mean of 4.44 which is interpreted as Agree. Most of the respondents agreed that the system runs accordingly to its function. Meanwhile, three (3) end-user respondents were Undecided and 1 expert Disaggree.

Furthermore, the results also imply that the system is capable of accurate input-output mechanism as shown in indicator 2. This indicator means that the system displayed correctly whatever the data input is. The system also provided an accurate computation results in generating the TOS as shown in indicator 2. The formulas/computation used by the system was based on the University format. While indicator 3 shows that the framing of multiple-choice test questionnaire depicted an accurate results – questions ramdomly generated by the system (which are being previewed on the website) are the same with outputs (generated file). Overall, most of the respondents Strongly Agreed that the system gernerated the desired output as reflected in indicator 5 in the table with a weighted mean of 4.56.

Table 2

Evaluation of the Respondents according to its Accuracy

	Respondents					Total	WM	Interpretation
	5 (SA)	**4 (A)**	**3 (U)**	**2 (D)**	**1 (SD)**			
1. The system runs accurately according to its function.	(80) 16	(20) 5 (1-end-user 4-expert)	(9) 3	(2) 1 (expert)	-	(111) 25	4.44	A
2. The data input is correct while performing the task.	(105) 21	(16) 4	-	-	-	(121) 25	4.84	SA
3. The TOS provides accurate results.	(85) 17	(28) 7	(3) 1 (expert)	-	-	(116) 25	4.64	SA
4. All questions generated in multiple-choice test is what the user has chosen.	(100) 20	(20) 5	-	-	-	(120) 25	4.80	SA
5. Overall, the system generate the desired output.	(95) 19	(8) 2	(9) 3	(2) 1	-	(114) 25	4.56	SA
Total	**93**	**23**	**7**	**2**	**-**	**125**	**23.28**	
Grand mean							**4.66**	**SA**

Legend:

4.51-5.00	**Strongly Agree**	**(SA)**
3.51-4.50	**Agree**	**(A)**
2.51-3.50	**Undecided**	**(U)**
1.51-2.50	**Disagree**	**(D)**
1.00-1.50	**Strongly Disagree**	**(SD)**

System Reliability. The system reliability testing evaluated the system if it performs well at all times. This is to test the operation process on repeated trials in a given environment and is capable of rendering a fault-free operation. In other words, this is to test if there is a consistency on the performance.

Table 3 indicates a grand mean of 4.50, which interpreted as Agree. This implies that most of the respondents Agreed with the reliability of the system. However, some respondents are not sure if it is reliable. As presented in the table, there were respondents who have an Undecided rating in indicators 1, 2, 4, and 5.

Nonetheless, indicator 3 with a weighted mean of 4.68 suggests that the system would improve the efficiency of instructors in making TOS and multiple-choice test questions. Most of the respondents believed that the system would lessen the time and effort being spent on the conventional way of creating the Table of Specification and Multiple-choice Test Questions.

Table 3

Evaluation of the Respondents according to its Reliability

	Respondents					Total	WM	Interpretation
	5 (SA)	**4 (A)**	**3 (U)**	**2 (D)**	**1 (SD)**			
1. The system runs without failure/error.	(55) 11	(28) 7 (3-end-user 4-expert)	(18) 6	-	(1) 1 (expert)	(102) 25	4.08	A
2. There were no inconsistency in the system, thus making it easier to do task.	(60) 12	(32) 8 (4-end-user 4-expert)	(27) 9	-	(1) 1 (expert)	(120) 25	4.8	SA
3. Improve the efficiency of instructors in making TOS and multiple-choice test.	(105) 21 (20-end-user 1-expert)	(12) 3 (3-expert)	-	-	(1) 1 (expert)	(117) 25	4.68	SA

	Respondents					Total	WM	Interpretation
	5 (SA)	**4 (A)**	**3 (U)**	**2 (D)**	**1 (SD)**			
4. The function in the system are well integrated.	(85) 17 (16-end-user 1-expert)	(16) 4 (4-expert)	(12) 4	-	-	(113) 25	4.52	SA
5. If user makes a mistake while performing the task, an error messages pop-up to clarify the problem.	(75) 15	(28) 7 (4-expert)	(6) 2	-	(1) 1 (expert)	(110) 25	4.40	A
Total	**76**	**29**	**21**	**-**	**4**	**125**	**22.48**	
Grand mean							**4.50**	**A**

Legend:

4.51-5.00	**Strongly Agree**	**(SA)**
3.51-4.50	**Agree**	**(A)**
2.51-3.50	**Undecided**	**(U)**
1.51-2.50	**Disagree**	**(D)**
1.00-1.50	**Strongly Disagree**	**(SD)**

System Security. The system security was evaluated to uncover vulnerabilities of the system. As shown in table, indicator 1 has a weighted mean of 4.24 interpreted as Agree. Based on the results, 15 out of 25 respondent strongrly agreed that the system is secure and four (4) respondents were undecided. Though, there was one (1) technical expert who Disagree and one (1) who Strongly Disagree on the system security, three (3) experts believed that the system is secure from risks. With this result, it is concluded that system security must be improved in order to prevet data loss.

Table 4

Evaluation of the Respondents according to its Security

	Respondents					Total	WM	Interpretation
	5 (SA)	4 (A)	3 (U)	2 (D)	1 (SD)			
1. Ensure security of data from any unauthorized user.	(75) 15	(16) 4 (3-experts)	(12) 4	(2) 1 (expert)	(1) 1 (expert)	(110) 25	4.24	A
Grand Mean							**4.24**	**A**

Legend:

4.51-5.00	**Strongly Agree**	**(SA)**
3.51-4.50	**Agree**	**(A)**
2.51-3.50	**Undecided**	**(U)**
1.51-2.50	**Disagree**	**(D)**
1.00-1.50	**Strongly Disagree**	**(SD)**

Product Evaluation

As shown in table 5, the system has a rating of 4.57 interpreted as Strongly Agree, based on the survey evaluation assessment of both the technical experts and end-users. Moreover, as indicated in the table, the system is fully functional. Considering the designed functionality, processes, and execution, the user is very satisfied in accordance to what is expected.

On the side note, although there are some areas where the system was rated not that high, considering the overall rating is already enough so as the system can be used in actual setup or environment. In fact twenty-four (24) respondents would like to use the system frequently and recommend it to others. As shown in table 6.

Table 5

Respondents' Evaluation Result Based on Functionality, Accuracy, Reliability, and Security

Preference	Weighted Mean	Interpretation
Functionality	4.76	Strongly Agree
Accuracy	4.66	Strongly Agree
Reliability	4.50	Agree
Security	4.37	Agree
Grand Mean	**4.57**	Strongly Agree

Table 6

System Recommendation of the Respondents

Do you think you would like to use this system frequently and recommend it to others?	Yes	No	Undecided
	24	1	-

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

Summary of Findings

This study presents the development of a Web-Based Student Evaluation Instrument Generator that would assist faculty members in designing and generating Table of Specification (TOS). The said study was also realized to create a repository of questions (Question Bank) that would help the end-users in framing a Multiple-choice Test Questionnaire easily. In reference to the different results presented in previous chapter, the following summary of results was made:

1. Designed and develop a fully functional system specifically, a web-based student evaluation instrument generator. Particularly, the developed system comprises of different software tools and packages that executes and defines its functions, processes, and executions;
2. The system software are designed and build using PHP, HTML, CSS, JavaScript vue.js, and MySQL along with Visual Studio Code editor, which execute the logical processes and operations of the system;
3. The system has a capability to automate the process of creating table of specifications (TOS) and multiple-choice test questionnaire associated

with answers key. The system has also a capability to maintain and manage questions stored in the database;

4. The system randomly picked questions from the question bank with respect to the chosen categories (subject, chapter, & level of cognitive skills) by the user.
5. Based on the results of the survey evaluation, the system functionality and accuracy have a computed mean of 4.76 and 4.66 respectively, which is high. This indicates that the developed system if fully functional and accurate;
6. Meanwhile, the system reliability and security have a computed mean of 4.50 and 4.37 respectively that are good enough; and
7. Overall, the system evaluation has a computed grand mean of 4.57.

Conclusion

Based on the findings and results of the study, the researcher was able to draw the following conclusion:

1. Successfully designed and developed a web-based student evaluation instrument generator. It was able to automate the process of creating the Table of Specification (TOS) and Multiple-choice Test Questions with answer key.
2. The generated outputs can be printed and/or saved as PDF file which the faculty member can keep.

3. Multiple-choice Test Questions were randomly chosen by the system.
4. The system can store, update, and delete questions. It can also maintain and manage questions. In other words, the said system provides the means of creating easily searchable questions.
5. Based on the system evaluation, the developed Web-based Student Evaluation Instrument Generator promises an easy, fast, simple, and effective tool that can assist faculty member in creating TOS and multiple-choice test questionnaire.

Recommendation

The recommendations were drawn out from the results presented. In particular, recommendation focusses on the the different design and performance constraints as implied by both the experts and end-users based on their evaluation. Further recommendation was also drawn-out from the design issues that arises during beta-testing. Hence, with the ultimate aim of achieving of a higly effective, efficient and realiable system, the following recommendations are made:

1. Enhancement of software quality attributes that should promote easy maintainability and provide easy and user-friendly system.
2. Addition of validation to the forms/fields on some part of the system.
3. Web-interface design enhancement incorporating 'help' buttons and other functionalities to easy understand the use of the system.

4. Enhancement of security and safety features to prevent data loss and any type of attack by any unauthorized user.
5. Integration and use of tested, highly efficient, and better performance firmware for faster data processing;
6. Integration of database for the Table of Specification (TOS).

CHAPTER VI

PRODUCT TECHNICAL DESCRIPTION

The Web-based Student Evaluation Instrument Generator is a web-based tool for creating and generating Table of Specification (TOS) and Multiple-choice Test Questions with answers key. This was designed to address problems and issues underlying in such tasks thus, automating the process. The system offers an easy and fast solution to faculty in making their TOS and framing multiple test questions.

Features:

- A database of questions (Question Bank)
- Users can add/edit/update/delete/search questions
- Randomized questions generation for multiple-choice test questions
- Generated Table of Specification (TOS), multiple-choice test questions, and answers key can be downloaded as PDF file
- A login system which only members can fully access the system.
- Simple and easy-to-use

User Guide:

The user must login first to fully navigate the system. If the user is a non-member, he/she can only view the HOME, ABOUT and CONTACT page. Thus, the user needs to be a registered member before he/she can have an access on the TASKS menu.

Main Tasks of the System

1. Table of Specification
2. Multiple-choice Test Questions

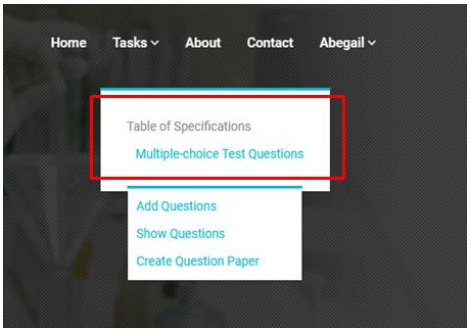
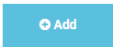


Figure 34. Main Tasks of the System

Table of Specification

This menu allows the user to create and generate TOS automatically. Listed below are the step-by-step guide of completing the task.

1. The user must complete first fill in the necessary data before getting into the TOS generation itself. This includes the type of examination, semester, college/department, school year, subject code, and subject description. Note that if there is any field missing, the user will not be able to proceed to the next page. The system will pop-up an error message as shown in Figure 11.
2. After providing the above information, the user must type in the title of chapter (e.g. ICT in Industry). To add another row, click 

button. And, to delete a row, click icon.
3. Provide the number of hours per chapters.

4. Then input Percentages required for Remember & Understand, Apply & Analyze, and Evaluate & Create. (eg. 40% for Remember & Understand, 50% for Apply & Analyze, and 10% for Evaluate & Create). As the user enters data on the field/s, it will immediately do the computation and generate the results real-time.
5. Click the 

tab to see the complete computation of TOS. The system gives the user a suggested number of items per cognitive skills, which is in sequential order. The user may edit this order of items by emptying a certain cell, or moving an item. Changes made will automatically be saved and updated.
6. To complete the TOS, the user must provide the names of signatories and the college/department.
7. Finally, click the 

tab to see the generated output. The user can print it or save it as a file copy.

Multiple-choice Test Questions

This menu allows the user to create and generate multiple-choice test question paper as well as keep and maintain a repository of questions (Question Bank). This has three (3) sub menus namely, (1) Add Questions, (2) Show Questions, and (3) Create Question Paper.

Add Question

This menu enables the user to add a multiple-choice question which will then be saved in the database.

1. To add a question, click the ADD QUESTION sub menu.
2. Type in the question and choices. Then, check the letter of the correct answer. The user can add an image to the question and choices if necessary.
3. Type in the subject code, subject description and chapter.
4. Select the level of cognitive skill to complete the task.
5. The new question will then be added by clicking the 

tab.

Show Questions

This menu displays the questions stored in the question bank. It is presented in a categorical format (Question ID, Subject Code, Subject Description, Chapter, and Level).

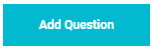
1. To do this task, click the SHOW QUESTIONS sub menu.
2. The user can search and view the question/s by any of above categories using the search bar.
3. Click a row on the list to view a question.
4. To edit a viewed question, click the  icon. Then click the 

tab to saved changes.
5. To delete a viewed question, click the  icon.

Create Question Paper

This menu allows the user to frame multiple-choice test questionnaire. In order to generate the test questionnaire, the user must follow three (3) steps namely: (1) Create New Test, (2) Add Question Blueprint, and (3) Preview and Generate PDF.

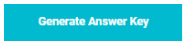
1. Click the CREATE QUESTION PAPER sub menu.
2. Provide the necessary information which includes the type of examination, subject code, subject description, semester, school year, and general instruction.
3. Click 

tab to save the information. An empty question list page (question blueprint) will be displayed.
4. Click 

tab to add questions on the list.
5. Select the Subject, Chapter, and Level desired for the test question.
6. The system shows the available number of questions stored in the database. Input the number of questions needed for the test questions. The system will then be randomly picked the questions from the database and display it on the question blueprint. Repeat the process until such time that the user achieved its desired total number of items for the test questions.
7. Click 

tab to preview the question blueprint made.

8. Click 

tab to generate the output. The user can print it or save it as a file copy.
9. Click 

tab to generate the answers key. The user can also print it or save it as a file copy.

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Appendices

Appendix A

LETTER OF APPROVAL

Republic of the Philippines
Samar State University
GRADUATE SCHOOL
Catbalogan, City

April 4, 2020

DR. MARILYN D. CARDOSO
University President
This University

Madam:

The undersigned, a Master of Science in Information Technology student, is currently conducting a research entitled, **"WEB-BASED STUDENT EVALUATION INSTRUMENT GENERATOR".**

In this regard, the undersigned would like to seek an approval from your good office to conduct a survey/data gathering to the following faculty member from the different colleges and offices in this institution since they are the identified participants of the said study.

Thank you very much and more power!

Sincerely yours,

(SGD.) ABEGAIL G. BORDIOS
Researcher

Noted:

(SGD.) ENGR. ESTEBAN A. MALINDOG, JR., Ph. D.
Dean, Graduate Schoo

COVER LETTER FOR THE RESEARCH INSTRUMENT

Republic of the Philippines
Samar State University
GRADUATE SCHOOL
Catbalogan, City

Dear Respondents,

Greetings!

The undersigned is currently conducting a study entitled **"WEB-BASED STUDENT EVALUATION INSTRUMENT GENERATOR"** as a requirement to complete her degree leading to Master of Science in Information Technology.

In relation to this, the undersigned humbly asks your assistance in answering the questionnaire and hoping that you will take time answering the questions honestly. Rest assured that all data gathered will be treated with utmost confidentiality and will be used for the purpose of this research endeavor.

Thank you very much for your patience, support and cooperation!

Very truly yours,

(SGD.) ABEGAIL G. BORDIOS
Researcher

Appendix B

SURVEY EVALUATION SHEET

SAMAR STATE UNIVERSITY
Arteche Blvd., Catbalogan City, Philippines 6700
Office of the Dean | College of Graduate Studies

We Innovate. We Build. We Serve.
Certificate No. AJA18.1089

Questionnaires for the Instructors of Samar State University

Research Title: Web-based Student Evaluation Instrument Generator

PART I. Personal Background

Direction: Kindly provide the necessary data asked by writing your answers on the space provided.

Name: (Optional) _____ College/Department _____Date: _____

PART II. Functionality, Reliability, Accuracy, and Security of the System.

Direction: Please check (✓) your response using the following scale:

Legends:

5 – Strongly Agree (SA)
4 – Agree (A)
3 – Undecided (U)
2 – Disagree (D)
1 – Strongly Disagree (SD)

	5 (SA)	4 (A)	3 (U)	2 (D)	1 (SD)
A. FUNCTIONALITY					
1. The user interface (menus/tabs/buttons) are easy to navigate.	Easy		average		Not easy
2. The system is manageable and user-friendly.	Very manageable & user-friendly		average		Not manageable & user-friendly.
3. The system can generate the desired TOS and multiple-choice test with answers key.	Can generate desired output		averagely can		Cannot generate desired output
4. The system can keep, manage, and retrieve question stored in the system.	Can do all the said functions		averagely can		Can do all the said functions
5. The system can add and update questions when needed.	Can do both functions		Can only do either of the two functions		Cannot do both of the functions
B. ACCURACY					
1. The system runs accurately according to its function.	Fully runs accurately		average		Does not run accurately
2. The data input is correct while performing the task.	Always correct		average		Not always correct
3. The TOS provides accurate results.	Fully provide accurate results		average		Does not provide accurate result

SAMAR STATE UNIVERSITY
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4. All questions generated in multiple-choice test is what the user has chosen.	Questions generated is in conformity with the user choice.		average		Questions generated is not in conformity with the user choice.
5. Overall, the system generate the desired output.	Fully generate the desired output		average		Cannnot generate the desired output
C. RELIABILITY					
1. The system runs without failure/error.	Full runs without failure/errors		average		Always run with failure/errors
2. There were no inconsistency in the system, thus making it easier to do task.	No inconsistency		average		Has inconsistency
3. Improve the efficiency of instructors in making TOS and multiple-choice test.	Fully improve efficiency		average		Cannot improve efficiency
4. The functions in the system are well integrated.	Fully well- integrated		average		Not well-integrated
5. If user makes a mistake while performing the task, an error messages pop up to clarify the problem.	Fully clarify problem		average		Does not clarify/Not helpful
D. SECURITY					
1. Ensure security of data from any unauthorized user.	Fully ensures security		average		Cannot ensure security

PART III. Recommendation and Suggestions

Direction: Please provide your answer by putting check (/) mark on the box that suits your assessment.

Do you think you would like to use this system frequently and recommend it to others?	Yes	No	Undecided

Suggestion/s:

_____
_____
_____

Thank you for your time in answering the evaluation form.

Abegail G. Bordios

Appendix C

SAMPLE OUTPUTS

Generated Table of Specification (TOS)

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SSU-OVPAA-FR-014
04-Feb-2019 Rev. 3

TABLE OF SPECIFICATIONS
Midterm Examination
First Semester / SY 2019-2020
TLED 3 – Introduction to ICT with Specialization 1
Subject

Topics	No. of Hours	Percent (%)	Cognitive Skills Tested						Total
			Remember	Understand	Apply	Analyze	Evaluate	Create	
			Item No.	Item No.	Item No.	Item No.	Item No.	Item No.	
ICT in the Industry and Society	3	12	1	2	3	4,5		6	6
Technical Drawing	12	48	7,8,9,10,11	12,13,14,15,16	17,18,19,20,21,22	23,24,25,26,27,28	29	30	24
Illustration	10	40	31,32,33,34	35,36,37,38	39,40,41,42,43	44,45,46,47,48	49	50	20
Total	25	100	10	10	12	13	2	3	50

Prepared by:	Reviewed by:	Checked & Verified by:	APPROVED by:
ABEGAIL G. BORDIOS	**JONAH GAY V. PEDRAZA**	**TERESA B. PROBADORA**	**GINA U. ESPANO, PH D.**
Faculty	*Area/Program Chair Person*	*Focal Person for Quality Assurance*	*Dean, College of Education*

Generated Multiple-choice Test Question

5/24/2020 TOS

SAMAR STATE UNIVERSITY
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6700
College of Education

Certificate No. AJA18.1089

Midterm Examination in TLED 3 (Introduction to ICT with Specialization 1**)**
First Semester, SY: 2019-2020

Multiple Choice: Choose the letter of the correct answer.

1. In drawing, what type of projection shows a receding parallel lines that appears to come together at a distance?
   a. Perspective
   b. Isometric
   c. Perspective
   d. Oblique

2. A drafter draws wiring diagrams for use in the installation and repair of equipment, residential and commercial building design, and in distribution panel circuit systems. What kind of drafter he/she is?
   a. Mechanical Drafter
   b. Architectural Drafter
   c. Mechanical Drafter
   d. Electrical Drafter

3. Take a minute and imagine you are shopping for a chair to go in your living room. You find the perfect one, but it is way too expensive. Fortunately, you have a cousin that builds furniture. Maybe he can build the chair for you. Describing the chair over the phone was more than a challenge. You cousin suggests you send him pictures of the chair from the multiple angles, along with the measurements. What type of drawing should be used to best show the overall concept and design of the chair?
   a. Exploded view
   b. Sectional view
   c. Exploded view
   d. Modular view

4. How do you create a curve while using the pen tool?
   a. Add multiple anchor points until it creates a curve.
   b. If an object is larger it won't be as noticeable.
   c. Add multiple anchor points until it creates a curve.
   d. If an object is smaller it will catch your attention.

5. Which of the following considerations will best help you come up with a good art?
   a. A painting of an early Apple computer done in oil canvas with a paint brush.
   b. An artwork that combines images drawn on the computer with video clips.
   c. A painting of an early Apple computer done in oil canvas with a paint brush.
   d. A bronze statue with a figure that shows in television or radio.

6. If you are a technical support engineer in a large corporation and your boss ask your opinion on how to save the large amount of information of the entire office into a centralized secure location, what type of computer do you suggest to meet the demands of the organization?
   a. Mainframe
   b. Workstation
   c. Mainframe
   d. Either a or b

7. Which of the following should be carried out to safeguard files from loss in case the main copy is damaged?

a. Install password security.
c. Install password security.
b. Install a firewall.
d. Backup the files regularly and store offsite.

8. Which of the following statement best describe ICT?

a. It is all the ways people use inventions and discoveries to satisfy their needs and desires.
c. It is all the ways people use inventions and discoveries to satisfy their needs and desires.
b. It is the study of technology used to handle information and aid communication.
d. It is planned and systematic method of working to achieve planned outcomes.

9. Which of the following drawing tools will you use in place of 30, 60, or 45 degrees triangle?

a. Dividers
c. Dividers
b. Protractor
d. Scale

10. When you first get an idea for something you want to build you may draw it roughly with using instruments or accurate scales. What type of drawing is this?

a. Graphic design
c. Graphic design
b. Conceptual Sketch
d. Illustration

Generated Answers Key

5/24/2020 TOS

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Certificate No. AJA18.1089

Midterm Examination in TLED 3 (Introduction to ICT with Specialization 1**)**
First Semester, SY: 2019-2020

Multiple Choice: Choose the letter of the correct answer.

1. In drawing, what type of projection shows a receding parallel lines that appears to come together at a distance?
   a. Perspective
   b. Isometric
   c. Perspective
   d. Oblique

2. A drafter draws wiring diagrams for use in the installation and repair of equipment, residential and commercial building design, and in distribution panel circuit systems. What kind of drafter he/she is?
   a. Mechanical Drafter
   b. Architectural Drafter
   c. Mechanical Drafter
   d. Electrical Drafter

3. Take a minute and imagine you are shopping for a chair to go in your living room. You find the perfect one, but it is way too expensive. Fortunately, you have a cousin that builds furniture. Maybe he can build the chair for you. Describing the chair over the phone was more than a challenge. You cousin suggests you send him pictures of the chair from the multiple angles, along with the measurements. What type of drawing should be used to best show the overall concept and design of the chair?
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   a. Mainframe
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8. Which of the following statement best describe ICT?

a. It is all the ways people use inventions and discoveries to satisfy their needs and desires.
b. It is the study of technology used to handle information and aid communication.
c. It is all the ways people use inventions and discoveries to satisfy their needs and desires.
d. It is planned and systematic method of working to achieve planned outcomes.

9. Which of the following drawing tools will you use in place of 30, 60, or 45 degrees triangle?

a. Dividers
b. Protractor
c. Dividers
d. Scale

10. When you first get an idea for something you want to build you may draw it roughly with using instruments or accurate scales. What type of drawing is this?

a. Graphic design
b. Conceptual Sketch
c. Graphic design
d. Illustration

Appendix D

Sample Codes

HTML code

```
<!doctype html>
<!--[if IE 9]> <html class="no-js ie9 fixed-layout" lang="en"> <![endif]-->
<!--[if gt IE 9]><!--> <html class="no-js " lang="en"> <!--<![endif]-->
<head>

   <!-- Basic -->
   <meta charset="utf-8">
   <meta http-equiv="X-UA-Compatible" content="IE=edge">

   <!-- Mobile Meta -->
   <meta name="viewport" content="width=device-width, minimum-scale=1.0, maximum-scale=1.0, user-scalable=no">

   <!-- Site Meta -->
   <title>EduTool</title>
   <meta name="keywords" content="">
   <meta name="description" content="">
   <meta name="author" content="">

   <!-- Site Icons -->
   <link rel="shortcut icon" href="images/top-icon.ico" type="image/x-icon" />
   <link rel="top-icon" href="top-icon.png">

         <!-- Google Fonts -->
   <link href="https://fonts.googleapis.com/css?family=Roboto:300,400,400i,500,700,900" rel="stylesheet">
   <link href="https://fonts.googleapis.com/css?family=Droid+Serif:400,400i,700,700i" rel="stylesheet">

   <!-- Custom & Default Styles -->
         <link rel="stylesheet" href="css/bootstrap.min.css">
   <link rel="stylesheet" href="css/font-awesome.min.css">
   <link rel="stylesheet" href="css/carousel.css">
   <link rel="stylesheet" href="css/animate.css">
   <link rel="stylesheet" href="style.css">
</head>
<body>

   <!-- LOADER -->
   <div id="preloader">
      <img class="preloader" src="images/loader.gif" alt="">
   </div><!-- end loader -->
   <!-- END LOADER -->

   <div id="wrapper">
```

```
    <!-- BEGIN # MODAL LOGIN -->
    <div class="modal fade" id="login-modal" tabindex="-1" role="dialog" aria-hidden="true" style="display: none;">
      <div class="modal-dialog">
        <div class="modal-content">
          <!-- Begin # DIV Form -->
          <div id="div-forms">
            <form id="login-form">
              <button type="button" class="close" data-dismiss="modal" aria-label="Close">
              <span class="flaticon-add" aria-hidden="true"></span>
              </button>
              <div class="modal-body">
                <input class="form-control" type="text" placeholder="What you are looking for?" required>
              </div>
            </form><!-- End # Login Form -->
          </div><!-- End # DIV Form -->
        </div>
      </div>
    </div>
    <!-- END # MODAL LOGIN -->

    <header class="header">
      <div class="topbar clearfix">
        <div class="container">
          <div class="row-fluid">
            <div class="col-md-6 col-sm-6 text-left">
</div><!-- end left -->
            <div class="col-md-6 col-sm-6 hidden-xs text-right">
              <div class="social">
                <a class="facebook" href="#" data-tooltip="tooltip" data-placement="bottom" title="Facebook"><i class="fa fa-facebook"></i></a>
                <a class="twitter" href="#" data-tooltip="tooltip" data-placement="bottom" title="Twitter"><i class="fa fa-twitter"></i></a>
                <a class="google" href="#" data-tooltip="tooltip" data-placement="bottom" title="Google Plus"><i class="fa fa-google-plus"></i></a>
                <a class="linkedin" href="#" data-tooltip="tooltip" data-placement="bottom" title="Linkedin"><i class="fa fa-linkedin"></i></a>
                <a class="pinterest" href="#" data-tooltip="tooltip" data-placement="bottom" title="Pinterest"><i class="fa fa-pinterest"></i></a>
              </div><!-- end social -->
            </div><!-- end left -->
          </div><!-- end row -->
        </div><!-- end container -->
      </div><!-- end topbar -->

      <div class="container">
        <nav class="navbar navbar-default yamm">
          <div class="navbar-header">
            <button type="button" class="navbar-toggle collapsed" data-toggle="collapse" data-target="#navbar" aria-expanded="false" aria-controls="navbar">
              <span class="sr-only">Toggle navigation</span>
```

```
                    <span class="icon-bar"></span>
                    <span class="icon-bar"></span>
                    <span class="icon-bar"></span>
                  </button>
                  <div class="logo-normal">
                    <a class="navbar-brand" href="index.html"><img src="images/logo.png"
alt=""></a>
                  </div>
                </div>

                <div id="navbar" class="navbar-collapse collapse">
                  <ul class="nav navbar-nav navbar-right">
                    <li><a href="index.html">Home</a></li>
 <li class="dropdown hassubmenu">
                      <a href="#" class="dropdown-toggle" data-toggle="dropdown" role="button"
aria-expanded="false">Tasks <span class="fa fa-angle-down"></span></a>
                      <ul class="dropdown-menu" role="menu">
                        <li><a href="blog.html">Table of Specifications</a></li>
                        <li><a href="blog-1.html">Multiple-choice Test Questions</a></li>
</ul>

                       <li><a href="events.html">About</a></li>

                    <li><a href="page-contact.html">Contact</a></li>
                    <li class="iconitem"><a href="#" data-toggle="modal" data-target="#login-
modal"><i class="fa fa-search"></i></a></li>
</ul>
                </div>
              </nav><!-- end navbar -->
            </div><!-- end container -->
          </header>

          <section id="home" class="video-section js-height-full">
            <div class="overlay"></div>
            <div class="home-text-wrapper relative container">
              <div class="home-message">
                <p>Making Evaluation Easy!</p>
                <small>This website helps educators create evaluation tool such as Test Questions and
Table of Specification easy.</small>
                <div class="btn-wrapper">
                  <div class="text-center">
                    <a href="signup.html" class="btn btn-primary wow slideInLeft">Sign Up</a>
   <a href="login.html" class="btn btn-default wow slideInRight">Log In</a>
                  </div>
                </div><!-- end row -->
              </div>
            </div>
            <div class="slider-bottom">
              <span>Explore <i class="fa fa-angle-down"></i></span>
            </div>
          </section>
        <div class="container">
```

```
            <div class="row">
              <div class="col-lg-4 col-md-4">
                <div class="widget clearfix">
                  <h3 class="widget-title">About EduTool</h3>
                  <div class="newsletter-widget">
                    <p>This site provides an automated tool for Table of Specification (TOS) and
Multiple-choice Test generation.</p>
</div><!-- end newsletter -->
                </div><!-- end widget -->
              </div><!-- end col -->
<div class="col-lg-3 col-md-3">
                <div class="widget clearfix">
                  <h3 class="widget-title">Popular Tags</h3>
                  <div class="tags-widget">
                    <ul class="list-inline">
                      <li><a href="#">course</a></li>
                      <li><a href="#">web design</a></li>
                      <li><a href="#">development</a></li>
                      <li><a href="#">language</a></li>
                      <li><a href="#">teacher</a></li>
                      <li><a href="#">speaking</a></li>
                      <li><a href="#">material</a></li>
                      <li><a href="#">css3</a></li>
                      <li><a href="#">html</a></li>
                      <li><a href="#">learning</a></li>
                    </ul>
                  </div><!-- end list-widget -->
                </div><!-- end widget -->
              </div><!-- end col -->
</div><!-- end row -->
          </div><!-- end container -->
        </footer><!-- end footer -->

        <div class="copyrights">
          <div class="container">
            <div class="clearfix">
              <div class="pull-left">
                <div class="cop-logo">
                  <a href="#"><img src="images/logo.png" alt=""></a>
                </div>
              </div>
              <div class="pull-right">
                <div class="footer-links">
                  <ul class="list-inline">
                    <p>Copyright ©2020 All rights reserved.</p>
                  </ul>
                </div>
              </div>
            </div>
          </div><!-- end container -->
        </div><!-- end copy -->
      </div><!-- end wrapper -->
```

```
    <!-- jQuery Files -->
    <script src="js/jquery.min.js"></script>
    <script src="js/bootstrap.min.js"></script>
    <script src="js/carousel.js"></script>
    <script src="js/animate.js"></script>
    <script src="js/custom.js"></script>
    <!-- VIDEO BG PLUGINS -->
    <script src="js/videobg.js"></script>

</body>
</html>
```

CSS Code

```
html{
    background-color: cornsilk;
}

.login{
    width:320px;
    height: 400px;
    background: rgb(0,0,0,0.2);
    color: #4b4d4d;
    top: 50%;
    left: 50%;
    position: absolute;
    transform: translate(-50%,-50%);
    box-sizing: border-box;
    padding: 50px 30px;

}

.avatar{
    width: 100px;
    height: 100px;
    border-radius: 50%;
    overflow: hidden;
    position: absolute;
    top: calc(-100px/2);
    left: calc(50% - 50px);
}

h3{
    margin: 0;
    padding: 0 0 20px;
    text-align: center;
    color: aqua;
    font-size: 10px;
}

.login p{
    margin: 0;
    padding: 0;
    font-weight: bold;
}

.login input{
    width: 100%;
    margin-bottom: 20px;
}

.login input[type="text"],input[type="password"]{
    border: none;
```

```
    border-bottom: 3px solid #fff;
    background: transparent;
    outline: none;
    height:40px
    color:aliceblue;
    font-size: 15px;
}

.login input[type="submit"]{
    border: none;
    outline: none;
    height: 40px;
    background: #fb2525;
    color: #fff;
    font-size: 18px;
    border-radius: 20px;
}

input[type="submit"]:hover{
    cursor: pointer;
    background: #ffc107;
    color: #000;
}

.login a{
    text-decoration: none;
    font-size: 12px;
    line-height: 20px;
    color:dimgray;
}

login a:hover{
    color: #ffc107;
}

table {
    width: 600px;
}

th{
    text-align: left;
}

table, th, td {
    border: 1px solid #000;
}
```

CURRICULUM VITAE

I. Personal Information

Name *(Last Name, First Name, Middle Name)*	BORDIOS, ABEGAIL GRUTA
Mailing Address	P6 BRGY. MAULONG, CATBALOGAN CITY, WESTERN SAMAR, 6700
Telephone Number	NONE
Mobile Number	(+63) 9556612963
Date of Birth *(MM/DD/YYYY)*	11/01/1990

II. Educational Attainment

Bachelor's Degree Attained	BACHELOR OF SCIENCE IN COMPUTER ENGINEERING
Course	BSCpE
Field of Specialization	DIGITAL SYSTEMS, COMPUTER DIAGNOSTICS & TROUBLESHOOTING, EMBEDDED SYSTEM, COMPUTER NETWORKS, ICT
Date Graduated *(MM/YYYY)*	03/2012
Honors/Awards Received	NONE
School/Institution	SAMAR STATE UNIVERSITY

Degree Attained *(Master's Degree / Doctoral Degree)*	MASTER IN INFORMATION TECHNOLOGY
Course	MSIT
Field of Specialization	INFORMATION TECHNOLOGY
Date Graduated *(MM/YYYY)*	CAR
Honors/Awards Received	NONE
School/Institution	SAMAR STATE UNIVERSITY

III. Work Experience *(Start with the most recent one; add tables as needed)*

Position	INSTRUCTOR I
Company	COLLEGE OF EDUCATION – SAMAR STATE UNIVERSITY
Period Covered	2014 – PRESENT
General Job Description	TASKS INCLUDES INSTRUCTION, EXTENSION ACTIVITIES, AND RESEARCH WORKS

IV. Research/ Creative Project Produced *(Start with the most recent one; add tables as needed)*

Research/ Project Title	DEVELOPMENT OF GEO-REFERENCED AGRICULTURAL MAPPING AND MANAGEMENT SYSTEM FOR SAMAR ISLAND
Period Covered	2018 – PRESENT
Brief Description	THE STUDY AIMS TO MAXIMIZE THE FULL POTENTIAL OF SAMAR, THERBY ATTAINING AGRICULTURAL SUSTAINABILITY WHICH AT THE END REVITALIZE ECONOMIC PRODUCTIVITY, REDUCED POVERTY, IN THE LOCALITY, THE REGION AND THAT OF THE NATION IN GENERAL.
Research/ Project Output	PAPER, PAPER PRESENTATION
Role/ Tasks	TEAM MEMBER

Research/ Project Title	LIVES OF PEOPLE IN POVERTY AND THEIR COPING STRATEGIES: EVIDENCE FROM URBAN AND RURAL COMMUNTIES
Period Covered	JANUARY 2017 – PRESENT
Brief Description	THIS STUDY EXAMINES THE EXTENT OF DEPRIVATION THAT POOR PEOPLE EXPERIENCE AND WILL FURTHER DETERMINE THEIR STRATEGIES OF COPING POVERTY TO MEET THEIR DAILY LIVING FARTHER THEIR LIVES.
Research/ Project Output	PAPER, PAPER PRESENTATION
Role/ Tasks	TEAM MEMBER

Research/ Project Title	ONLINE PLANT PEST AND DISEASES MANAGEMENT SYSTEM USING ANDROID & GIS PLATFORM FOR THE DEPARTMENT OF AGRICULTURE, PROVINCE OF SAMAR
Period Covered	FEBRUARY 2016 – NOVEMBER 2016
Brief Description	AN ANDROID BASED PLANT PEST AND DISEASES MONITORING SYSTEM THAT AUTOMATE THE DECISION MAKING AND MONITORING PLANT PESTS & DISEASES OF THE PROVINCIAL AGRICULTURE OFFICE OF SAMAR USING ANDROID AND GIS SYSTEM TECHNOLOGY.
Research/ Project Output	ANDROID BASED PLANT PEST AND DISEASES MONITORING SYSTEM
Role/ Tasks	PROJECT TEAM MEMBER

Research/ Project Title	HELPING AT-RISK COLLEGE STUDENTS SOLVE PHYSICS WORD PROBLEMS THROUGH THE USE OF DIAGRAMMATIC REPRESENTATION
Period Covered	JUNE 2015 – NOVEMBER 2015
Brief Description	THIS STUDY INVESTIGATES THE EFFECTIVENESS OF DIAGRAMMATIC REPRESENTATION IN ENHANCING THE PROBLEM SOLVING CAPABILITIES IN PHYSICS WORD PROBLEMS BY COLLEGE STUDENTS ENROLLED IN PHYSICS COURSES ALONG THE TOPICS IN MOTION OF FALLING IN MOTION OF FALLING OBJECTS AND PROJECTILE MOTIONS PACKAGE AS A MODULE.
Research/ Project Output	PAPER, PAPER PRESENTATION
Role/ Tasks	TEAM MEMBER

V. Publications *(Start with the most recent one; add tables as needed)*

Publication Type *(Book, Journal, Commissioned Report)*	UTILITY MODEL PUBLICATION
Name of Publication	INTELLECTUAL PROPERTY PHILIPPINES
Title	PROCESS OF MAKING TARO (COLOCASIA ESCULENTA) JAM
Brief Description of Work	A PROCESS OF MAKING TARO (COLOCASIA ESCULENTA) JAM
Date Published	NOVEMBER 2017

Publication Type *(Book, Journal, Commissioned Report)*	JOURNAL
Name of Publication	JOURNAL OF SAMAR STATE UNIVERSITY ENGINEERING PEEBLE
Title	SELF-SERVICE FUEL-DISPENSING MACHINE
Brief Description of Work	A SELF-SERVICE FUEL-DISPENSING MACHINE USED FOR DISPENSING FUEL AT UNATTENDED SITES WHICH INCLUDES A FUEL PUMPS CAPABLE OF DISPENSING A FUEL.
Date Published	JUNE 2016

VI. Academic Paper Presentations *(Start with the most recent one; add tables as needed)*

Title	TOWARDS PRODUCTIVE, EFFECTIVE AND SUSTAINABLE SAMAR
Brief Description of Paper	THIS EXTENSION PROJECT DEALS ON THE CONDUCT OF RAPID SOIL CHARACTERIZATION AND PROFILING OF SAMARS' AGRICULTURAL LAND AREAS. AN AUTOMATED GEO-REFERENCED SAMAR AGRICULTURAL LAND PRODUCTION, MONITORING AND MANAGEMENT SYSTEM IS DEVELOPED.
Name of Conference	PHILIPPINE ASSOCIATION OF EXTENSION PROGRAM IMPLEMENTORS. INC. (PAEPI) NATIONAL CONFERENCE
Date of Presentation	NOVEMBER 25-26, 2019

Title	DEVELOPMENT OF GEO-REFERENCED AGRICULTURAL MAPPING AND MANAGEMENT SYSTEM FOR SAMAR ISLAND
Brief Description of Paper	THE STUDY AIMS TO MAXIMIZE THE FULL POTENTIAL OF SAMAR, THERBY ATTAINING AGRICULTURAL SUSTAINABILITY WHICH AT THE END REVITALIZE ECONOMIC PRODUCTIVITY, REDUCED POVERTY, IN THE LOCALITY, THE REGION AND THAT OF THE NATION IN GENERAL.
Name of Conference	POVERTY CONFERENCE (POVCON) 2019
Date of Presentation	SEPTEMBER 25-27, 2019

Title	DEVELOPMENT OF GEO-REFERENCED AGRICULTURAL MAPPING AND MANAGEMENT SYSTEM FOR SAMAR ISLAND
Brief Description of Paper	THE STUDY AIMS TO MAXIMIZE THE FULL POTENTIAL OF SAMAR, THERBY ATTAINING AGRICULTURAL SUSTAINABILITY WHICH AT THE END REVITALIZE ECONOMIC PRODUCTIVITY, REDUCED POVERTY, IN THE LOCALITY, THE REGION AND THAT OF THE NATION IN GENERAL.
Name of Conference	VICARRP (2019 CLUSTER 2 INTER-AGENCY R&D REVIEW/SYMPOSIUM
Date of Presentation	SEPTEMBER 12-13, 2019

Title	ONLINE PLANT PEST AND DISEASES MANAGEMENT SYSTEM USING ANDROID & GIS PLATFORM FOR THE DEPARTMENT OF AGRICULTURE, PROVINCE OF SAMAR
Brief Description of Paper	AN ANDROID BASED PLANT PEST AND DISEASES MONITORING SYSTEM THAT AUTOMATE THE DECISION MAKING AND MONITORING PLANT PESTS & DISEASES OF THE PROVINCIAL AGRICULTURE OFFICE OF SAMAR USING ANDROID AND GIS SYSTEM TECHNOLOGY.
Name of Conference	2ND ISTEAM RESEARCH CONGRESS
Date of Presentation	AUGUST 28-30, 2018

Title	GAS LEAK DETECTOR AND WIRELESS ALARM SYSTEM VIA SMS NOTIFICATION
Brief Description of Paper	AN ANDROID BASED PLANT PEST AND DISEASES MONITORING SYSTEM THAT AUTOMATE THE DECISION MAKING AND MONITORING PLANT PESTS & DISEASES OF THE PROVINCIAL AGRICULTURE OFFICE OF SAMAR USING ANDROID AND GIS SYSTEM TECHNOLOGY.
Name of Conference	2ND ISTEAM RESEARCH CONGRESS
Date of Presentation	AUGUST 28-30, 2018

VII. Professional Licenses and Certification

License Type *(e.g. Professional Teacher, Registered Nurse)*	CIVIL SERVICE ELIGIBLE
Date of Issuance *(MM/YYYY)*	DECEMBER 9, 2014
Date of Expiration *(MM/YYYY)*	NONE

VIII. Other Information

Non-Academic Distinctions	NONE
Membership in Association	INSTITUTE OF COMPUTER ENGINEERING OF THE PHILIPPINES (ICpEP) PERSONNEL ASSOCIATION, SSU

IX. Character References

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