Sudan University of Science and Technology

College of Graduate Studies

College of Computer Science and Technology

Title, An Enhanced Model For Set E – Exam for Sudanese Universities

The Thesis is in Partial Fulfillment for Master Degree in Computer Sciences

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November 2018

Declaration

I hereby declare that the work reported in this M.Sc. thesis titled as “Enhanced Model For E – Exam Generating for Sudanese Universities” submitted at the Sudan University of Science and Technology, is an authentic record of my work carried out under the supervision Dr Adil Ali Abdul-aziz. I have not submitted this work elsewhere for any other degree.

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Almonzer Salah NoorAldaim	Dr Adil Ali Abdul-aziz
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Dedication

To my lovely mother, who gave me endless love, trust, constant encouragement over the years, and for her prayers.

To my Family, for their patience, support, love, and for enduring the ups and downs during the completion of this thesis.

ACKNOWLEDGEMENT

I would like to express my special thanks of gratitude to my teacher (Dr Adil Ali Abdul-aziz) who gave me the golden opportunity to do this wonderful project on the topic (Enhanced Model For E – Exam Generating for Sudanese Universities), which also helped me in doing a lot of Research and I came to know about so many new things I am really thankful to them.

Secondly I would also like to thank my parents and friends who helped me a lot in finalizing this project within the limited time frame.

ABSTRACT

Today with the development of technology and the trend of the Sudan government, Sudanese Universities convert the manual exam to e exam starting by four Universities(Alnealine University, Open Sudan University ,Alnhda faculty ,International University of Africa) , Despite the increasing numbers of educational institutions that carry out the e - exam, the current practices lack the standard and thus become the need to build a unified model in preparing the number of questions and the method of setting up the e - exam. A random sample was collected from four Sudanese universities for 160 students (undergraduate and postgraduate) 11 teachers and 10 courses, the data were analyzed and therefore deficiencies were identified in the current practices of the e -exam. A standard model for creating the e -exam was proposed and then an automated tool was developed based on the proposed model.The test of the tool after its application proved its ability to estimate the time of the exam in addition to the efficiency and flexibility in the prepare of the exam questions in an organized manner. The researcher recommends developing this tool and using it in the Sudanese universities to increase the efficiency of the e -exam.

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مستخلص البحث

بدأت بعض الجامعات السودانية(جامعة النيلين, جامعة السودان المفتوحة, كلية النهضة , جامعة إفريقيا العالمية) في تحويل الاختبارات من الصورة التقليدية(الاختبار الورقي) الى الصورة الالكترونية تماشيا مع التطور التكنلوجي وإتجاة حكومة السودان نحو التعليم الالكتروني ، وعلي الرغم من ازدياد المؤسسات التعليمية التى تنفذ الاختبارات الالكترونية الا أن هذه الممارسات تفتقد الى المعيارية وبالتالي تصبح الحاجة ماسة لبناء نموذج موحد ومحوسب ليستوعب الجوانب العلمية في تحديد عدد اسئلة الاختبار واسلوب انشاء الاختبار الالكتروني . تم أخذ عينة عشوائية من الاربع جامعات السودانية المذكوره اعلاه لعدد 160 طالبا وطالبة (بكالريوس ودراسات عليا) بالاضافة الى 11 معلما و 10 مقرارات دراسية .تم تحليل البيانات وبالتالي تم تعريف اوجة القصور فى الممارسات الحالية للاختبارات الالكترونية عليه تم وضع نموذج معياري للاختبارات الالكترونية ومن ثم تم تطوير أداة الكترونية للاختبار الالكتروني بناءاًعلى النموذج المقترح.أثبت إختبار الاداة بعد تطبيقها قدرتها على تقدير زمن الاختبار الالكتروني بالاضافة الى الفاعلية والمرونة في وضع اسئلة الاختبار بطريقة منظمة ،عوتعتبر هذة الدراسة مقترح جيد واداة يمكن استخدامها في الجامعات السودانية لزيادة كفاءة الاختبارات الالكترونية.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

TITLE **PAGE**

LIST OF ABBREVIATIONS

E -exam	**Electronic exam**
Moodle	modular oriented object dynamic learning environment
IUA	International university of Africa
Web	World wide web
Sus	System Under Study

INTRODUCTION

This chapter introduces the research work, the beginning of the chapter prevents background of the study, describes the problem of statement and views what are the objective and hypothecs to solve this problem and finally points to the expected result.

1.1 Background of the study

To detect the performance of student there are two types of examination which are the conventional examination (using paper and pencil) and the electronic examination(e – exam) (using a computer), In Sudanese Universities all the methods in previous years used a conventional method to test the ability of student but in last second year with the development of technology and the direction of the government of the country towards e-learning , some Universities have increased the ability to convert the conventional method to electronic method (noticeable time and money savings due to automatic delivery, storage and the (semi-)automated correction of (semi-)standardized question types, improved readability, structure and clarity of typed open-text answers, the research is focus on e - examination).

E - Examinations is the best method for evaluating the ability of knowledge of student rather than conventional exam, e - examination is a system that involves the conduct of examinations through the web or the intranet (Costa et al., 2012).

Moodle (Modular Oriented Object Dynamic Learning Environment) is one of the most widely used open-source e-learning platforms that enables the creation of a course website, ensuring and examinations their access only to enroll students (Adebayo and Abdulhamid, 2014), in Moodle there are different types of questions to measure the ability of student in a High speed and efficiency.

In this study ,we hope to deploy a model of e - examination , this model is an abstract of previous study and what are challenges when implement e - exams in different area and specifically in Sudanese Universities , this model is helping a teacher to deploy a perfect e -exam because the teacher is the base of implementing e - exams in any educational organization , by model that can be used as standard of all Sudanese Universities to design a standard exam and constant time with international standard and must guarantee that the exam is the measure the abilities of student. The ability of teachers is very important to extract excellent exam about the way that tests student ability and we hope this to be available by a model.

1.2 The Problem of Statement

Despite the increasing number of educational institutions that carry out the electronic exam, the current practices lack the standard and thus there is the need to build a unified model in preparing the number of questions, determining the exam time and computerized to accommodate the educational aspects in the construction of examinations and facilitate the development of examinations in future more easy.

To solve of the main problem of research there are sub questions found as follows:

1.3 Research questions

(i) How Sudanese Universities practice e - examinations?

(ii) What are the standard adopted to prepare and determine time and number of questions of e - exam?

(iii) What is the appropriate model for developing electronic exam questions?

(iv) How to computerize the e - exam model so that the process of developing the exam is of the highest quality and standard?

1.4 Aim

The aim of the research is to investigate the current challenges of e examinations practicing in Sudanese Universities, in order to propose new standard model for exam preparation supported by a tool for assisting universities and their teachers to create their exams efficiently and effectively.

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1.5 Objective

(i) To determine the application of e - examinations in Sudanese Universities that are applied for e- Exams.

(ii) To propose standard model for Sudanese universities that are generating e - exams.

(iii)To develop a new tool based on proposed model for facilitating the generation of e - exams

1.6 Assumption and Hypothecs

(i) The teacher use the proposed model.

(ii) All teachers of all Sudanese Universities design a perfect exam and known Apure learning outcome by model.

The hypothecs of this study is a framework that is used by teachers efficiently in international University of Africa firstly and all the Sudanese Universities. Now there is no mechanism or step or to deploy the e - exams in Sudanese Universities, the proposal model is to an automation system to help teachers specifically to design an excellent exams and questions bank. By the proposed model the abilities of the teacher will be reduced because by a system that can design a matrix of knowledge cognitive level and writing what is learning outcome of this program that student to be learnt and what is outcome of this program, after that with this matrix teacher can design a perfect exam with the international standard of designing exams.

1.7 Research descriptive method

(i) Deductive Approach

(ii) (Testing theory through observation and data)

(iii) Exploratory Study

(iv) (Purposive, self-selection sample)

(v) Distribution of the questionnaire.

(vi) Longitudinal

(vii) (Projects must be around 3-5 months in length of time)

(viii) In-depth interviews at beginning and end with teachers, student, administration, dean of faculty and top decisions maker.

(ix) Selection of members of the specializations of the educational curriculum, psychologically, and strategically plans.

(x) Four Universities (International University of Africa, Open Sudan University, Alnahda University, faculty of medicine in Alnealine University,) that are engaged in electronic examination will be surveyed in this study, where (160) students (undergraduate and post graduate) will be selected from each University for the interview and questionnaire purposes. Also (11) teachers (10) Lecturers and (7) teachers were selected from each University for the interview about the problems and impacts of electronic examination on their students' performance as well as the processes of e-examination.

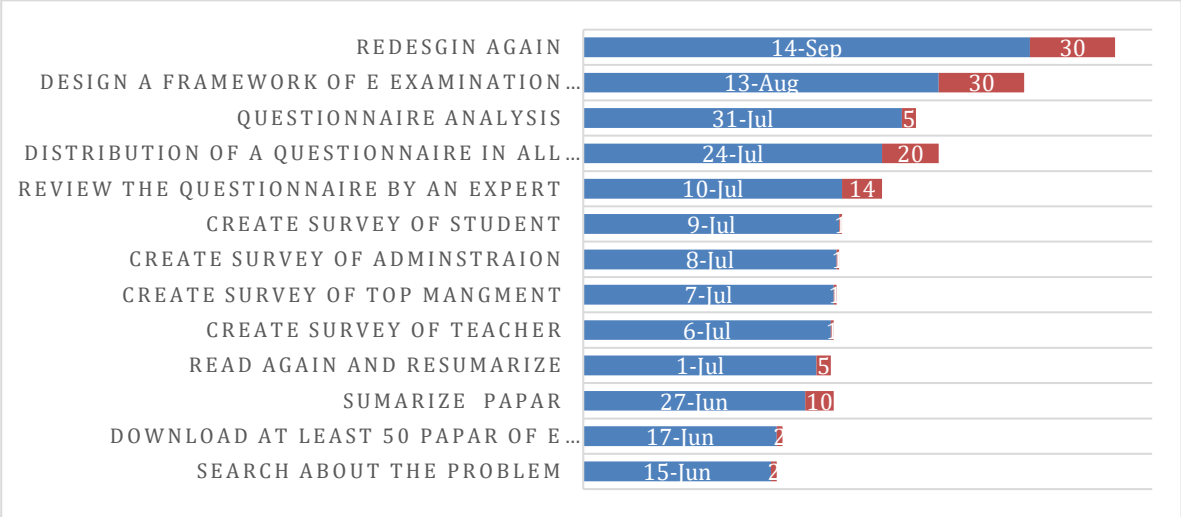

Figure 1.1 period time of research

1.8 Proposed solution

Design a model for helping teacher to design a matrix of cognitive level (blueprint) and to design a perfect exam that will help to test the ability of student more efficiently.

1.9 Scope of research

The scope of this research is all Sudanese Universities and specifically in the Universities that need to implement e- examination, the scope is just to design model for Universities to prepare a exams in standard way.The study and survey covered the five universities, which are (international university of Africa , Alnealine University, Open Sudan University ,Alnhda faculty.The study established during june2018 until November 2018

1.10 Expected result

The expected result of this research is to design model of e - examination and apply this model in international University of Africa as case study, and then provide it to be applied in all Sudanese Universities.

1.11 Thesis Outlines

- Chapter one (introduction of thesis)
- Chapter two(literature review of e - examination)
- Chapter three(presents the research methodology)
- Chapter four (Analysis and Results)
- Chapter five (conclusion and future work)

LITERATE REVIEW

This chapter provides an over view of a previous research study and introduces the concept of e - examination, model and to describe the thesis, in this chapter our discussion is very important context: Explanation the terminology of the study, Explanation the previous study of e - examination. Explanation scope of e - examination.

2.1 Background

Literature review is very important context because it is a review of the previous studies on E - examination globally as general and in Sundanese Universities in particular, In literature review we will scope out the data collection requirement for the primary research to be conducted and the main purpose of the previous work is providing direction in the construction of data collection, what is the risk when data collection have been analyze and to view the challenges of the research ,E - examination in Sudanese Universities used different methods and different steps to deploy e - examinations and this is very dangerous to test the knowledge of student by e - exams , in these more over Universities there is no standard to determine the time of exam ,there is no standard to determine difficulty of exam and this can be seen in chapter 3 and chapter4.

This chapter is divided into two categories. In the first category there is discussion and definition in our terminology:

- Model
- E - Examination
- Moodle
- Bloom taxonomy.
- Solo taxonomy.
- Fink taxonomy
- Blueprint
- What is the question bank and how to deploy an effective question bank?

The second category of this chapter is the previous studies of e - examination and this category is divided into two parts: global previous study and local previous study (Sundanese Universities).

2.2 Model

A model is a set of statements about some systems under study(SUS). Statement means some expression about the SUS that can be considered true or false (although no truth value has to be assigned at any particular point in time). We can use a model to describe an SUS. In this case, we consider the model correct if all its statements are true for the SUS. Models are usually descriptive in traditional scientific disciplines. A common kind of model in Newtonian physics might describe a set of physical objects—say the planets in the solar system, which would be the SUS in this case. Such a model makes statements on the positions, velocities, and masses of the planets at some point in time as they orbit the sun. The model is correct if those statements correspond to observations of the actual planets (Seidewitz, 2003).

2.3 E - Examination

E - Examinations are the best method for evaluating the ability of knowledge of student rather than conventional exam, E - examination is a system that involves the conduct of examinations through the web or the intranet (Costa et al., 2012). Electronic examination (e-exam) system is a software to carry out the examination at the computer. Usually the exam is in a form of one or multiple choice test (closed tasks, the term is explained below). The application may be a standalone (desktop) program optionally enriched with multimedia content and other features like time measurement or a choice of questions in a random manner(Bieniecki et al., 2010).

Electronic exams (in short, e-exams) are computer-based systems employed to assess the skills, the capabilities or the knowledge of students and professionals. Their importance has raised considerably since several educational and testing institutions began to offer e-exams as a service open to a worldwide-spread audience(Dreier et al., 2014).

2.4 Moodle

Moodle is a Course Management System (CMS) - a software package designed to help educators to create quality online courses and manage learner outcomes. Such e-learning systems are sometimes also called Learning Management Systems (LMS), Virtual Learning Environments (VLE) and Learning Content Management Systems (LCMS). Students need only a browser (e.g., IE, Firefox, Safari) to participate in a Moodle course. Moodle is Open Source software, which means you are free to download it, to use it or to modify

it and even to distribute it (under the terms of the GNU General Public License). Moodle runs without modification on UNIX, Linux, Windows, Mac OS X, Netware and any other system that supports PHP, including most web host providers. Data is stored in a single database: MySQL and PostgreSQL are best supported, but it can also be used with Oracle, Access, Interbase, ODBC and others (Romain, 2015).

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Moodle is one an online Learning Management System course (LMS) enabling educators to create dynamic courses that extend learning, at any time and at anywhere. The heart of Moodle courses is that which contains activities and resources. The main power of this activity-based on model comes in combining the activities into sequences and groups, which can help you to guide participants through learning paths. Thus, each activity can be built on the outcomes of previous ones (moodle, 2005).

2.5 Bloom taxonomy

In 1956 Benjamin bloom developed a framework for classifying educational goal and objective into hierarchical structure representing different forums and levels (Diab and Sartawi, 2017), Bloom is used to classify the objectives of learning outcome by dividing the learning into three different domain (Wilson, 2016):

- Cognitive means (knowing or head)
- Effective means (emotions, feeling, heat)
- Psychomotor (doing, haptic)

Each of these a multi tired hierarchical structure for classifying learning.

Taxonomy is really just a word for a form of classification. This taxonomy had permeated teaching and instructional planning for almost 50 years before it was revised in 2001 and in this research we will use this revise, the name of six major categories change from noun to verb forums (Krathwohl, 2002) See figure2.1

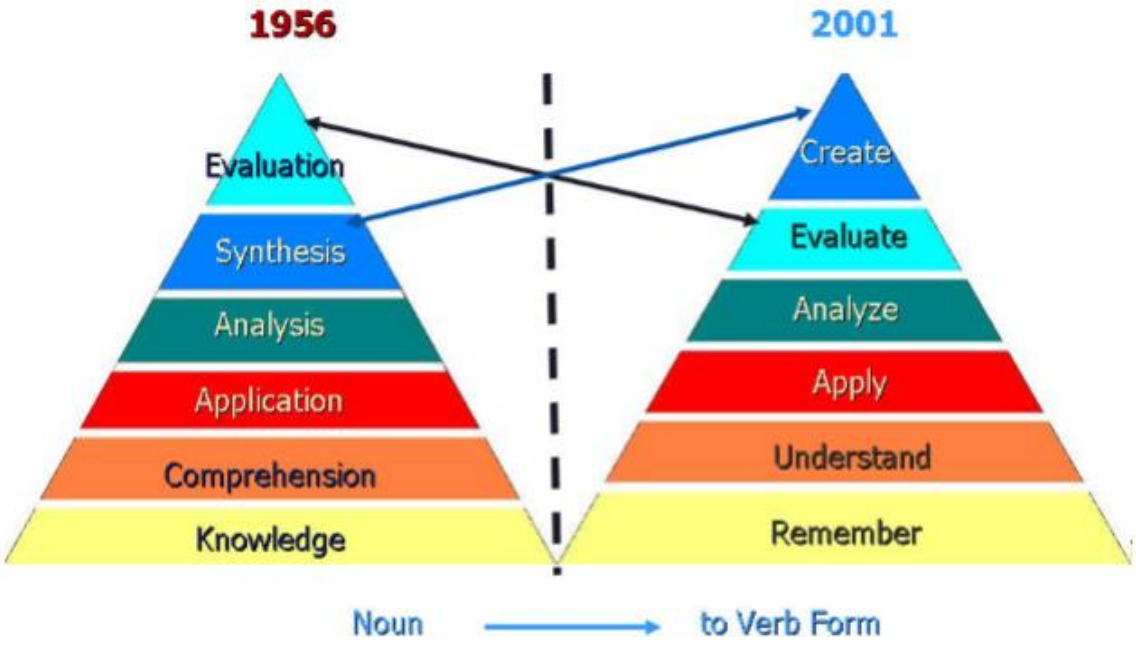

Figure2.1 Bloom taxonomy

Remember: Means recalling information recognizing, listing, describing, retrieving, naming, finding and the questions can be asked like (What happened after…? , How many…? , What is…?).

Understand: Explaining ideas or concepts Interpreting, summarizing, paraphrasing, classifying, explaining and the questions can be asked like (How would you explain…?, What could happen next? , Who do you think…? ,What was the main idea…?)

Apply: Using information in another familiar situation Implementing, carrying out, using, executing and the questions like (Do you know of another instance where…?, Can you group…? , which factors would you change…? ,What questions would you ask of…? -From the information given, can you develop a set of instructions about…?).

Analyze: Breaking information into parts to explore understanding and relationships, Comparing, organizing, deconstructing, interrogating and finding and the questions like (Which events could not have happened? , How is …similar to …?, What are some other outcomes? , Why did …occur? , What was the problem with…?)

Evaluate: Justifying a decision or course of actions checking, hypothesizing, critiquing, experimenting, and judging and the questions like (Is there a better solution to…? ,What do you think about…? ,Do you think…is a good or bad thing? ,How would you feel if…? ,How effective are…? ,What are the pros and cons of …?)

Create: Generating new ideas, products, or ways of viewing things Designing, constructing, planning, producing, inventing and the questions like (Can you design a…to…? , Can you see a possible solution to…? , How would you devise your own way to…? , What would happen if…? ,How many ways can you…? , Can you create new and unusual uses for…?)

2.6 Solo taxonomy

Solo was devised by Collis and Biggs and looked at the structure of the observed learning outcome produced by students in terms of their complexity, Solo is commonly in higher educational is used not only in assist in writing learning outcome but has also been used to categories answer and is often used in assessment criteria(Geraldine O'Neill, 2010).

2.7 Fink taxonomy

Unlike the previous two taxonomies, present a taxonomy that is not hierarchical, covers a border cross section of domain with the exception of psychomotor domain (Geraldine O'Neill, 2010) see figure2.2.

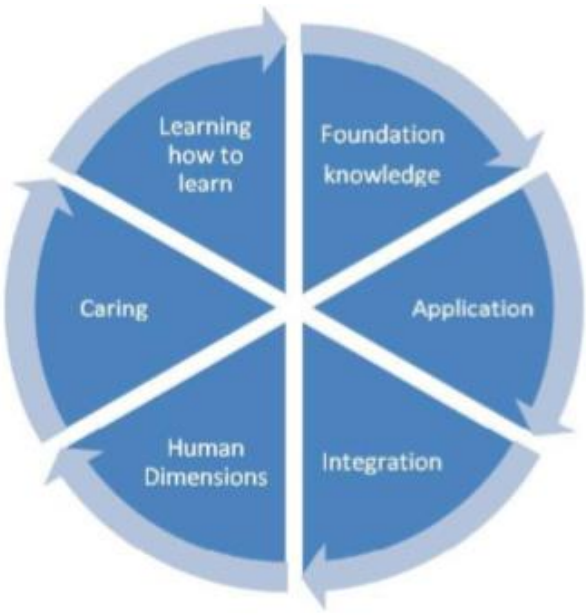

Figure 2.2 Solo taxonomy

2.8 Blueprint

Before defining blueprint there are two concepts which are well defined firstly:

- Learning outcome is a program level statement describing the knowledge, skills, and attitudes and values that student gain from the program.
- Learning objective is a course level statements describing the knowledge, skills, and attitudes and values that students gain from a course (Bieniecki et al., 2010).

Blueprint or table of specification can help to determine if the content and objectives are in the same proportion on the test as they are addressed during instruction, by blueprint we help an instructor to address all levels of learning and mistake in the test (Singun Jr, 2016).

Blueprint is the matrix or chart reporting the number and type of test questions, blueprint can also identify the weighting of cognitive dimension as the level of competence tested in each knowledge domain (Roberts, 2008) see figure 2.3.

The purpose of blueprint is to conceptual map of examination format and the content area and provide:

- Type of measurement tools and proportion of each question format
- Topic and the level of training of each topic and relevant learning objective.
- Weighting to each topic.

Topic to be tested	% of period being tested devoted to topic	Level of Understanding (from Bloom's Taxonomy)			# of quest-ions	% of test devoted to topic
		Questions measuring recall/ comprehension	Questions measuring application/ analysis	Questions measuring synthesis/ evaluation		
Number of Questions						
% of test devoted to each level of understanding						

Figure2.3 Blueprint matrix

2.9 Question Bank

Question banks are large database of suitable questions that are coded by subject area, instructional level, instructional objectives measured and various other pertinent question characteristics (e.g. difficulty level and discriminating powers). Question bank are very useful test development and the classified of item according to relative difficulty, questions bank can also provide a platform for discussing curriculum goals and objectives(Naidu et al., 2017),Question bank contains an item to have a study carefully in item of model in different item function (DIF) (Roberts et al., 2009).

2.9.1 Technical organizational of question bank in Jagiellonian University

Question bank could be done as a pen and paper where submit all the questions on paper and teacher selects them and incorporates into a test paper , but the teacher need almost of tie using IT tools (most teacher disproportionally more to prevent creating randomized test with different question for each students).
During assignments each teacher had to create 10 questions and up to 20 extra questions for bonus point(just 4 weeks to create their own questions set , In order to make the question creation process smooth, there was a short (circa one-hour) training showing students how to create questions. This was done to help students with less advanced computer skills. For each question teacher provides reference for every question and photo of each particular page were inserted in the general feedback filed.

In this workshop there are five types of questions (MCQ, T&F, Drag and Drop into text, Drag and Drop into Image and Matching) and 108 teachers, 1283 questions of all questions are created into the work shop, the exam consists 140 questions randomly form question bank each question is 0.5 marks out of 70 marks, the highest mark is 63.17 and lowest mark is 26.18 and the time limit of exam is 60 minutes (Drąg and Filip, 2015).

2.10 Previous study

To compare between e - examination and conventionally examination to detect the performance of student who were e- examination is better than conventionally examination using paper and pencil, the type of questions in e - examination using four questions: true and false, multiple choice, short answer calculations and problem or exercise questions that requires multiple steps for their solutions depending on short answer calculations. Teacher can create a set of questions comprised of a previous type of questions supported by applications but all of these questions depend on the nature of examination topic and then before creating questions is split questions into group of different difficulty of questions if a teacher cannot understand e - examination just training practical example of how to use this technology. The methodology of this paper is a multiple path (first variation) and it consists of the four types of questions. In every correct answer we add a certain point to the final result and all wrong answers with unanswered questions of different difficulty level. Finally the result is a performance of e - exam is better than conventionally exam and also an e - exam contains more questions of all levels of difficulty and a complex problem can be broken down into simple one. This method was applied again on the same group and the performance has increased (Stergiopoulos et al., 2006).

Electronics test in examining student in Nigerian dissection for security of labs and challenge of e - examinations. The aim of this paper is to ameliorate and develop a new acceptable system A questionnaire was distributed to 20 students (15 are males and 5 are females) and 5 of staff for selected from six Universities of Nigerians (University of Ilorin, University of Lagos, University of Nigeria Nsuka, Covenant Universities Ota, Nigeria Open University of Nigeria and Federal University of Technology Minna) A questionnaire contains 4 easy questions and 20 scale concerning the exam of secure electronic examinations (see) ,there are three steps to preparing questions : Firstly prepare e - exam questions to ask lecture in charge up of the course to submit questions to administrations .Secondly admin private operator to enter the pool questions into the database and finally timing of exams .

There are four challenges mentioned in this paper security (biometric and non-biometric means send exam questions to e - exam center in department), human interference, training of staff and student and complicity software (Adebayo and Abdulhamid, 2014).

Mep (Moodle electronic platform)is used for transforming a traditional lectures and clinical teaching into more active learning experience , this Moodle is used in faculty of nursing in Sultan Qabous University the targeted students is undergraduate nursing course for three departments: Health assessment, health promotion and nursing administration.in health assessment the targeted students is a second year student and they are using a course online in Moodle electronic platform, the students of Nursing Administration Department are using Moodle electronic platform in forth year students and they are using in (theoretical, clinical,wiki ,videos and quizzes),the health promotion (this course is theoretical course) ,In this faculty the most challenge is culture of students, the result is that a mep is more interactively and share ideas between students during a course , help the teachers to deal with the topic to return a strong culture , in the manual exam the male are divided into a group and female are divided into another group to exam of Quran or Muslims exam but in e - exam all students exams at the same time, the e - exam to give a real time support of student(Amandu et al., 2013).

To analysis a function and tools of Moodle platform and they are used by students in University of Aveiro, A questionnaire was distributed and applied to 278 students to analysis all Students' impression with this questionnaire, the methodology of this paper was examined through content analysis complemented with non-structure interview carried out with the responsible for the platform of UA to analysis data they are used IBM SPSS ,a first section of questionnaire was applied by 150 female and 128 male the average age of respondents was 18-21 years old (minimum 18 years and maximum 21 years) ,93% used privet network ,7%donot access to

internet, the authors of this papers are some recommendations in a future work it is considered important to prefer a careful analysis at the underlying reason to use and to investigate on how these tools can help on promoting the success of teachers (Costa et al., 2012).

Study of a group of final year girls approaching the high states terminal leveeing certified examinations in market direct education system in irelend,the school context mount private is anon free paying academic girls Catholics state school on the outskirts of the large city rivers town in Ireland, the number of students is 600 students per class now the questions is how well a school performer in lc(leavenings certified) examinations selected by top 10% of the high performing schools and also interested in examining how schools compete for top-performing students in a very competitive marketplace., a data collection methods included extended observation, group interviews and in-depth one-to-one interview large group 72 final years self-selected from year of group and to determine using the matrix division of property ,authority and experience , this framework was applied to both parents occupations .This article demonstrated of the LC examination system to be used by a school to culturally reproduce the elite middle classes This study highlights numerous strategies employed by the school, parents and girls to achieve personal, familial and institutional success(Canny and Hamilton, 2017).

A challenges of e - exam and a challenges of creating questions bank and what are Challenges which face when creation of questions of exam, this study in University of turkia. Firstly e assessment is divided into three types diagnostic assessment (at the beginning of the course to gang acknowledge level of student) formative assessment (during implementation of the course to clarify the learning and to identify the need for additional teaching), summative assessment (at the end of course defines grade of student), sometimes adds integrative assessment (feedback of student).

Exam aquariums means an student complete an exam without a teacher, on the other hand staff training is the most critical order who to guarantee quality of assessment and order to increase a reliability of solutions used ict to usability effects acceptance of e - examinations for teachers and the other solutions are that a positive experience of e - examinations had a positive influence on the adaption of e - exams.

Quality of questions is a big influence of exams and difficult challenge in designing questions for e - exam (difficult to create nonobjective questions to measure student understanding, the questions are how to test quality of questions? Point of view is a complete exam from students and once this question bank is used in several Universities there is a need to define standardized questions to better objective for the evaluations, to increase reliability of a system that a teacher needed for additional time for e - exam to create an optimal question bank (Kuikka et al., 2014).

The efficacy of modern technology in improving education using neurovascular examinations (nve)to determine a facility with online video service .The methodology of this study is a number of students (260) and junior doctor(238)upper and lower limb nve with distributing posters that advertised the course and contacting medical school cord inters in leading Manchester hull and York and postgraduate education department in 7 hospitals in the York shire and North West deanery of the uk,the number of trainees in this study is 498 and this comprised of 260(52.2%) medical student80(16.1) foundation year doctors50(10%)foundation year 2 doctor66(13.3%)specialist trainees 20(4%)registrars orthopedic surgery . The result of each group was analyzed the score of the nve test done prior to the course and the compression of upper and lower limp test scores between different grade was done by using the kuskal walis test for non-paramedic data as our data the result of all means upper and lower limb a higher for more senior trainees, to measure of performance of upper and lower limb using puns procedure for multiple comparison across different grades.

A computer instruction is designed to provide a review of pulmonary medicine in the form of a self-assessment , This study consists of 30 questions (multiple choice ,true and false and matching A with B) standard of text book of medicine, In this study we use apple II with a floppy disc drive unite ,the subject using the pulmonary computer assisted in teaching program including third year medical students and the program can take 20-30 minutes to complete ,a result including a score of 40 third year medical students and 12 medical residents. The range of score is between 46.7% to 93.3 with a mean 68 %(Aslam-Pervez et al., 2017).

To present the view of attitude and perspective tertiary students using Moodle along with traditional face to face .A questioners was distributed among all of participants in the English for specific purpose class .This questioner consists open ended and liker scale questions and solicited information's regarding computer ability and attitude towards the computer experience with using technology , This questioner was distributed among 248 students ,19students is a full time means an age is 21 and 50 students is a part time means an age is 36.2 , 88% female 12%male , after analyzed a questioners all of 248 had experience with computers 96.88% are used email,86.12 are used word processing ,16.18% are used for gaming ,75.41 are used for personal communications.

Teachers and students required the technologies to undergo an effective teaching learning process. Powerful examinations system is developed using zend (is a software that is used to improve the speed of execution of the php applications). Examination system was decomposed into three different modules (manager, faculty, students). The system is consisting of web server with a database and student connect using web browser (Zoran and Rozman, 2010).

Zend application is run faster than other exam. The examination system was better than traditional examination, a confidence is that a large number of students are being assed equally, reducing opportunity for cheating (Bingli and Babu, 2012).

The main concern for institution that organize exam is to detect when student cheat .More fronds are possible and ever authorities can be dishonest, in the short exams should be verifiable (verifiability mean for exams is unclear and no tool to analyze an exam.

The formalizes several individual and universal verifiability properties for traditional and electronic exam .The methodology of this paper is to propose asset of verifiability properties and implement out farmworker prove if to analyze two existing exams of electronic exam and a paper and pencil exam, any exam (paper or electronic exam) involves at least two roles the candidate and the exam authority and multiple sub role like register candidate.The questions comminute prepares the questions and the examinations correct the answer, the goal of verifiability to test the absence of anomalies (Dreier et al., 2015).

The lms learning management system industry represents an $860 million market which is made more than 60 different providers, virtual learning environment or learning management system used by University and colleges allow to mentors to manage their courses and exchange content with student for a course (Kumar and Suneja, 2011).

Electronic medical record (EMR) is an enabling technology that allows physician's practices to pursuer more power full quality rather than paper, based on a qualitative study of physician practices that improvement an EMR found of quality depends heavily on physician's use of the EMR and not paper for most of their daily tasks.The questioner was distributed and shows a slow but steady progress in adopting this new technology, for ninety interview between mid 2000with EMR manager and physician organization that has implement an EMR and there are more benefits of EMR such as viewing, documentation, analysis, and reporting(Miller and Sim, 2004).

To analyze the final mark of the student in a department of a telecommunication in the University of Politécnica de Madrid. Students within a course are assessed two different methods .The first one consists only final exam and formative assessment. The number of student is 210 students divided into 7 groups with different levels, More than 70% of the students are classified in the same group.15% failed in continuous assessment method but succeed in the final exam and 15 % passed in continuous assessment but failed in final exam (de Sande et al., 2008).

Many institutions are starting to reconsider their traditional method of student assessment and are the viability of conducting web based testing and assessment. The test of questions can be shuffled to have the same pattern and level but different contents and the e - examination can also reduce the effort and time required from conducting an examination.This study was conducting on college of commerce and business administration , Dhofar University, Oman for 50 male and 50 female selected from a college ,the final result of this paper is to enable students to have access their results promptly and improve quality and standard of examination result(Uddin et al., 2017).

To show and to develop online examinations and testing And the possibility of testing it and applying it to the ground so that it can replace the traditional method And to make sure that it is possible for the system has been applied in International University of Africa and Alneelane University for 249 students in different courses, the method of this paper is applied of system and A questionnaire was distributed among students. The impression of student is very interactive with a system and increase communication between student and ICT and that can be among shown in the result of showing a result and Saving money and effort.

2.11 Summary

This chapter is a based of research because it is theoretical background about the problem and the area of problem. This chapter is divided two categories: In the first category we are taking in some terminology and also the chapter discussed about questions bank and how to prepare perfect exam.

The terminology of this chapter that discussion is the concept of model, E - Examination, Moodle is an open source software, the bloom taxonomy and the revised bloom taxonomy and also the chapter discussed different taxonomies that are used to help teacher to prepare exam like solo, fink taxonomy and in this study the researcher use the bloom taxonomy because this taxonomy is core of all taxonomies.

The concept of blueprint are also discussed in this chapter and seen in the matrix of blueprint. Blueprint is a very important technique to help teachers to test the exam with standard.

After that the chapter discussed about the concept of question bank and how to prepare the question bank and the researcher will show the experience of Jagiellonian University and what step is to design question bank ,how to train the teacher with Moodle to enter the questions directly after end with bloom taxonomy courses .

In the second category the chapter discussed some previous studies in e - examination form in different Universities in countries like (Oman, turkey, Poland, Portugal, Nigeria) to show the steps to implement e - examinations and what are the challenges.

METHODOLOGY

This chapter introduces the research design, at the beginning of the chapter prevent Delimitation of the study, describe the population of study and views the Operational Framework and finally views the general framework and describe phases.

3.1 Research design

The researcher choose a survey and interview research design because it is best served to answer the questions and the purpose of the study, the survey is one of the research design to collect and to analyze data.

3.2 Delimitation of the study

In this study we choose the four Universities to deploy this method the survey was distributed by choosing sample of students from different faculties to detect the perception, attitudes and ability of student to enter the exam, and also the researcher distributed a survey to the teacher to detect are the teachers able to design exams.

3.3 Population of the study

In this study the target of population is the teacher, the administrator and the student in four Universities table 3.1 define the details of the target:

Table 3.1: Population of the study

No	Name of University	No of students (under graduate)	No of students (post graduate)	No of teachers	No of administrators
1	International University of Africa	26	14	3	1
2	alneelane University	40	-	3	1
3	Open Sudan University	40	-	2	1
4	Alnahda Faculty	40	-	3	1

In this study we choose 9 grades of courses from different Sudanese Universities from in the area of the research and the name of courses are:

Table 3.2 name of courses in Sudanese Universities

Name of subject	Time of exam	Number of questions
clinical chemistry	2 hours	80
database concept	2 hours	60
histo pathology	2 hours	80
Economic Sociology	2 hours	31
Mathematics	2 hours	50
Islamic studies	2 hours	26
Principles of doctrines of jurisprudence	2 hours	21
Art Scenario	2 hours	49
Analytical Engineering	2 hours	1
Software engineering	2 hours	35

3.4 Time of exam

To determine the time of exam we use the standard of calculating the time of exam depending on the types of question see table3.3:

Table 3.3 average time needed for test item types

Item Type	Average Time
True-false	30 seconds
Multiple-choice	1 minute
Multiple-choice of higher level learning objectives	1.5 minutes
Short Answer	2 minutes
Completion	1 minute
Matching	30 seconds per response
Short Essay	10-15 minutes
Extended Essay	30 minutes
Visual Image	30 seconds

In this study we use two types of questions (Multiple choice, True and False)

3.5 Operational Framework

The operational framework is based on the research design mentioned previously see table3.4.The operational framework design by writing (research question, objective) and what activates can be helpful to extract the result.

Table 3.4 operational framework

No	Research Question	Objective	Activity(s)	results
1	• How Sudanese Universities practice e - examinations? • What are the standard adopted to prepare, determine time and number of questions of e- exam?	• To survey the application of e - examinations in Sudanese Universities that apply e - exams.	Study the area, Interviews and survey.	List of all procedure and applications in each University.
2	• How Sudanese Universities practice e - examinations? • What are standard adopted to prepare, determine time and number of questions of e - exam? • What is the appropriate model for developing electronic exam questions؟	• To propose standard model for generating e - exams.	- Study the previous work. - By interview with teachers.	Steps to design a model.

3	• How to computerize the e - exam model so that the process of developing the exam is of the highest quality and standard?	• To develop a new tool based on proposed model for generating e - exams	By studying of the area and interview with teacher in each University	Design a tool to help teachers to prepare blueprint and exam

3.6 General framework

The research work described in this thesis can be divided into four main phases which are sketched in Figure3.1 as follows

Phase 1

To search about the problem and research area to increase knowledge about problem and, to understand the requirement's and concepts of problem clearly.

Phase 2

In this phase mobility to Sudanese Universities to aggregate data collection from teacher, admin and student.

Phase 3

After understanding the problem clearly and aggregating the data collection from all the Sudanese's Universities then design proposed solution and after that to verify this solution is to solve any error during verification to build the final solution.

Phase 4

The last phases is to publicate the result which extracts in phase 3.

3.7 Summary

This chapter introduced the operation and general research framework for the work in this thesis. According to the research questions formulated in Chapter 1, the research was designed and based on four main phases in addition to the results disseminations phase. Adding to this the chapter introduces the standard of determine time of exam and the population of study and how data is collected.

ANALYSIS AND RESULTS

The aim of this chapter is to introduce how to analyze data and also to show the proposal solution, and at the end of this chapter we take about discussion of result.

4.1 Background

In previous chapters we discussed about the gap between the exams and the knowledge of students that can be tested by e - exams in Sudanese Universities. In Sudanese Universities we don’t find any standard to design the exams and determine the time of exams. Some of teachers don’t know how to test the ability of student clearly.

Today as technology progresses there are more solutions to help teachers to design a perfect exams and to test the student in more advanced and the solution can be seen in these chapters.

In this chapter also we will discuss about analysis data in section one, steps to design model and feature of model in section two and in section three we will take about Inventory of all results.

4.2 Analysis data

Before starting to analysis data see figure 4.1 to show the use case diagram to describe the sets of actions.

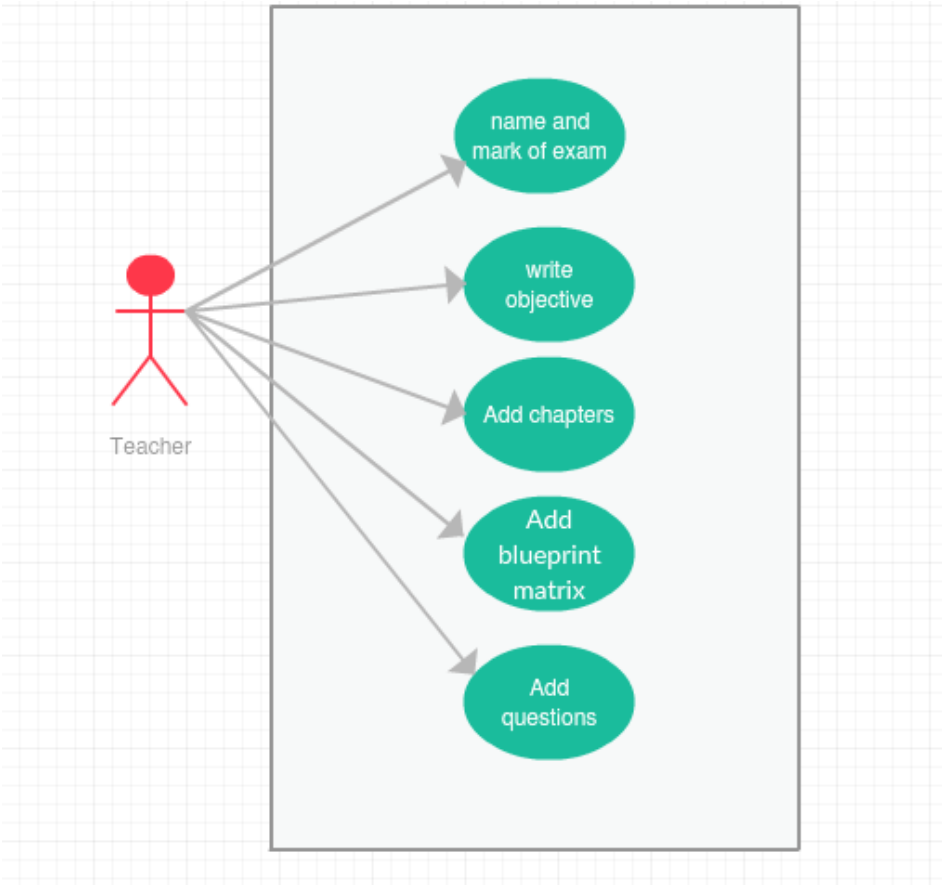

Figure 4.1 Use case diagram

In figure 4.2 we can see the model that can be defining the steps to prepare the questions by the teachers starting by determining the courses chapters to export the questions as Aiken format.

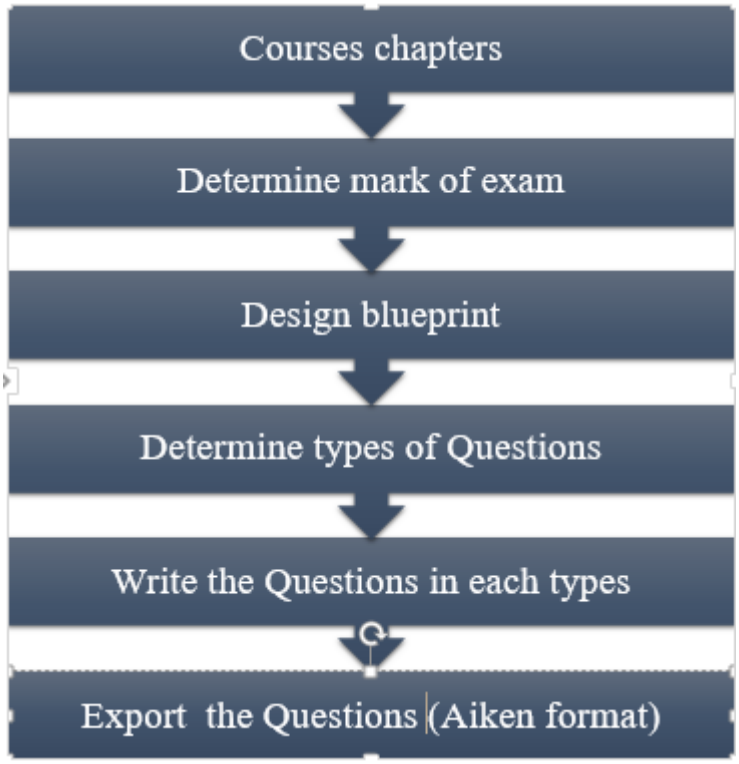

Figure 4.2 step to prepare Questions (model)

4.2.1 Primary data analysis

The main objective of study is to analysis and measure the ability of students to preform exam and that teacher can use the e - exam effectively by designing the perfect exam with the standard pedagogical, we developed a questioner distributed in

four Sudanese Universities (Alnealine, Open Sudan, Alnhda, International University of Africa), after collecting the data they enter to excel sheet and analysis by spss software, in next paragraph describe the analysis of student.

4.2.2 Student analysis

In this paragraph we have our discussion about the questioner of students. Firstly in figure 4.3 we can see the diagram of the gender of four Sudanese Universities.

Gender: had only two categories, it was taken as dummy variable (boy = 1 and girl = 2). Out of the 160 Students respondents, 88 were male (51.3%) and 78 were female (48.2%).

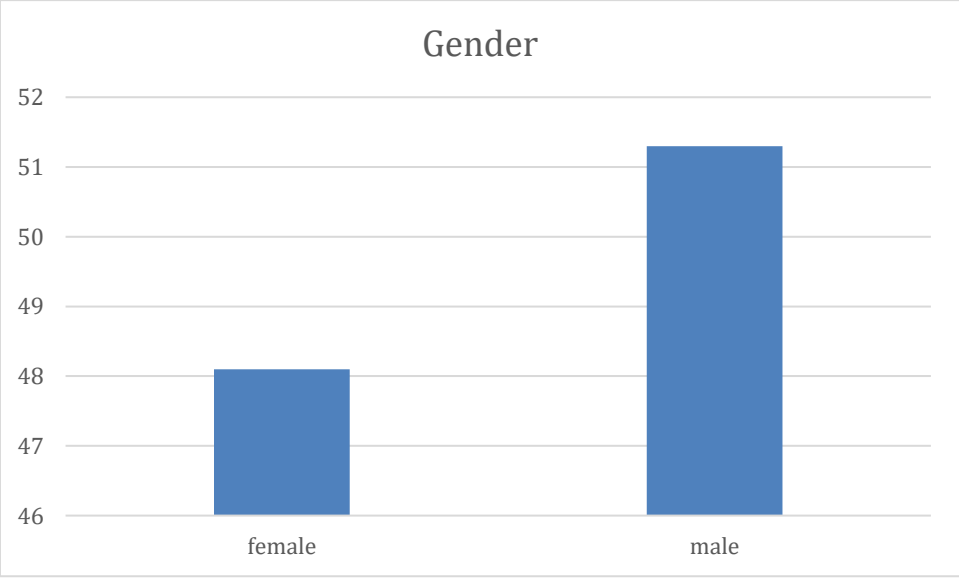

Figure 4.3 gender of the student

Have a computer: To show the percentage of student that they have computers, 119(74.4%) of the students who have computers and 41(25.6%) of the students who don't have a computers see figure 4.4.

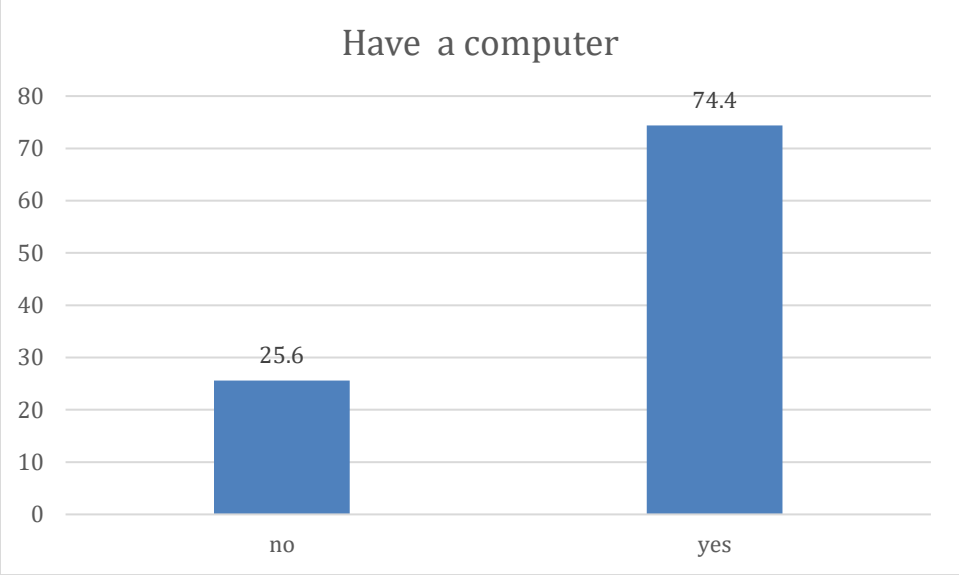

Figure 4.4 Student have computer

Difficult To Deal With It: In figure 4.5 we can see the 121(75.3%) of the students There is no difficulty in dealing with computers and 36 (22.2% of the) student there is a difficulty in dealing with computers.

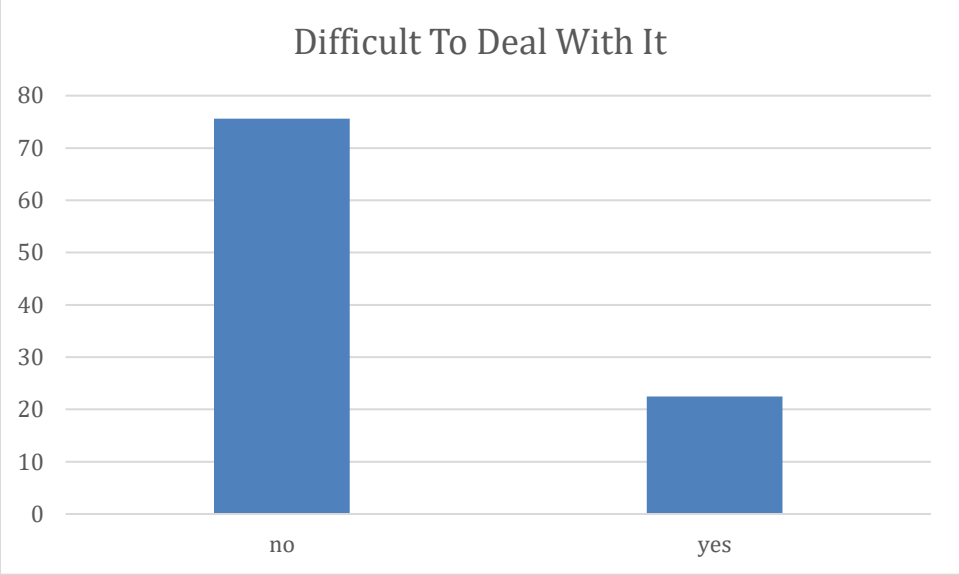

Figure 4.5 student have difficult with computer

Exam Using a Computer: 131(81.9%) of the students they can take the exam by computer, 7 (4.4%) of the students cannot take the exam by computer and 21 (13.1%) of the students sometimes can take the exam see figure 4.6.

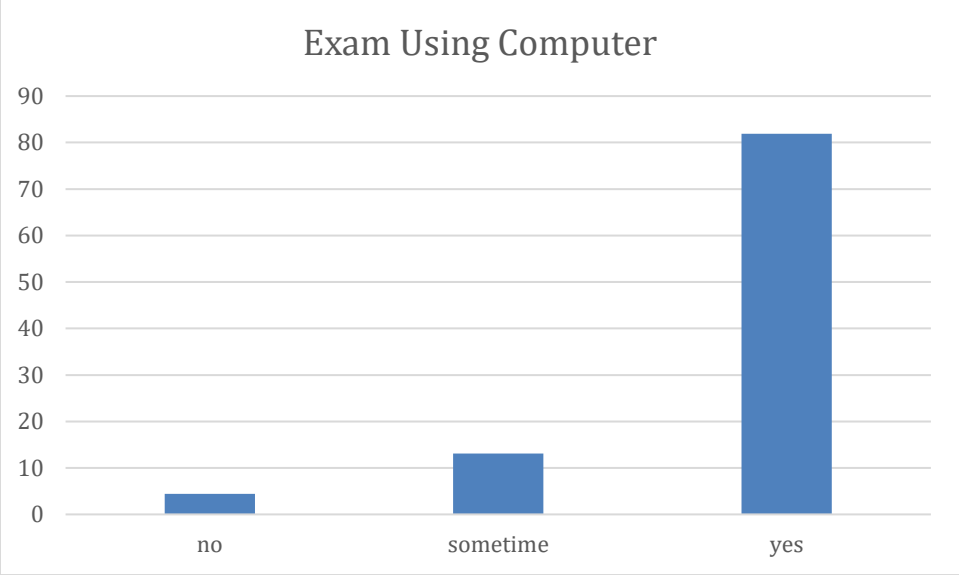

Figure 4.6 Student perform exam using computer

Trained To Set Up Online Exam Questions: 107(66.9%) of the student have 1 to 3 training courses to perform the exams, 17(10.6%) of the student have 4 to 6 training courses to perform the exams see figure 4.7, 19(11.9%) of the students are more than 6 training courses and 9(5.6%) of the students don't need training to perform the exams.

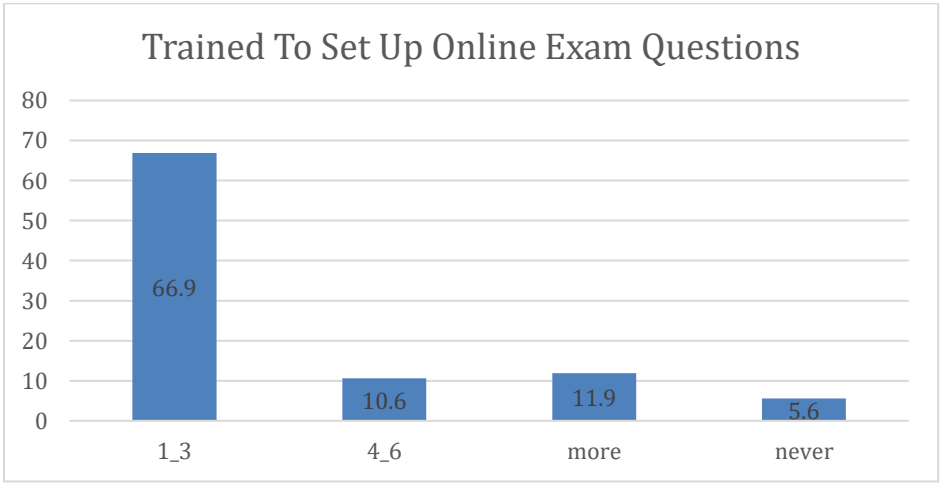

Figure 4.7 Student trained to set up online exam

Easiest Exams to Answer: 105(65.6%) of the students they online exam is easier to answer see figure 4.8, 24 (15%) of the students they paper exam is easier to answer and 29(19.4%) of the students there is no difference between paper and online exam.

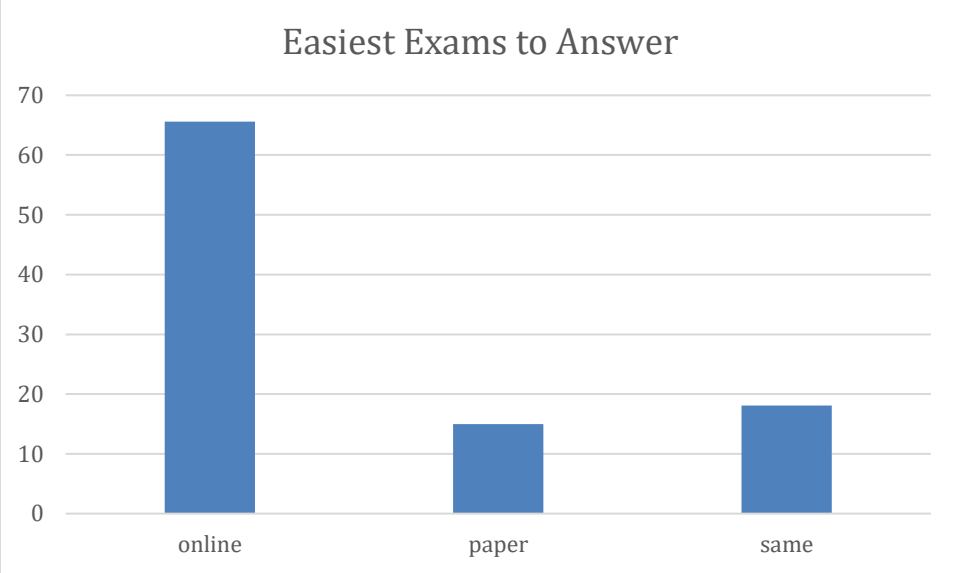

Figure 4.8 Easiest exams to answer

4.2.3 Teacher analysis

In this paragraph we discuss about the teacher questioner and to make sure the teacher is the one who can design the perfect exam and to make sure that the teacher Knows that the knowledge level or the knows rule that can be used when designing exam, the questioner was distributed into four Sudanese's Universities and the data was collected from different faculties (see figure 4.9)

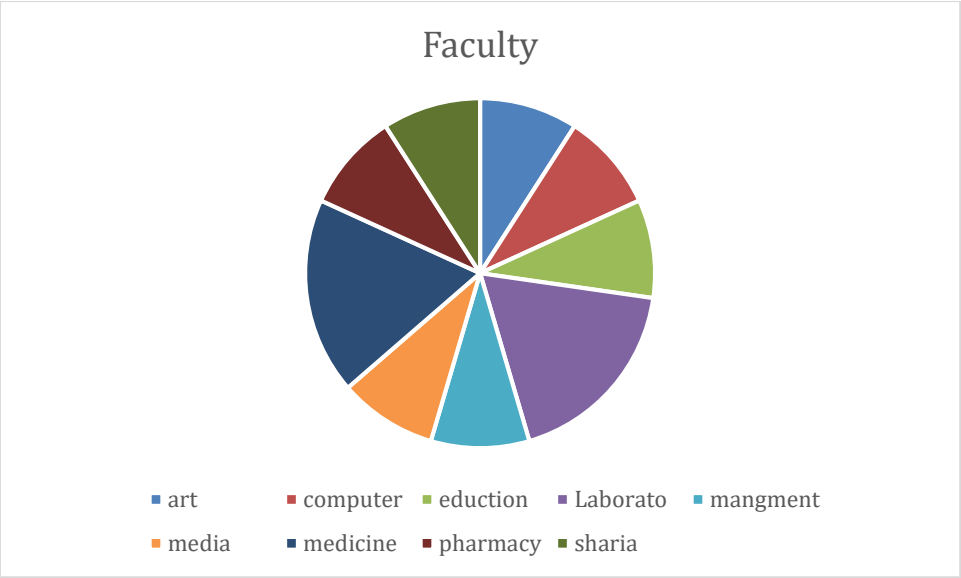

Figure 4.9 faculties of teachers in Sudanese University

Gender : In figure 4.10 we can see had only two categories. It was taken as dummy variable (boy = 1 and girl = 2). Out of the 11 teachers respondents, 9 were male (81.8%) and 78 were female (18.2%).

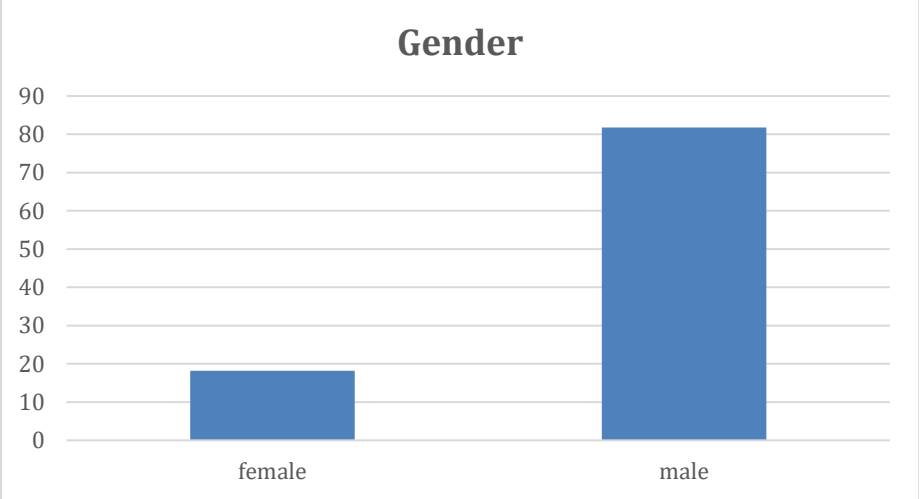

Figure 4.10 gender of teachers

Have a computer: To show the percentage of teachers that they have computers, 11(100%) of the teachers they have computer and 0(0%) of the teachers(see figure 4.11) don't have a computers.

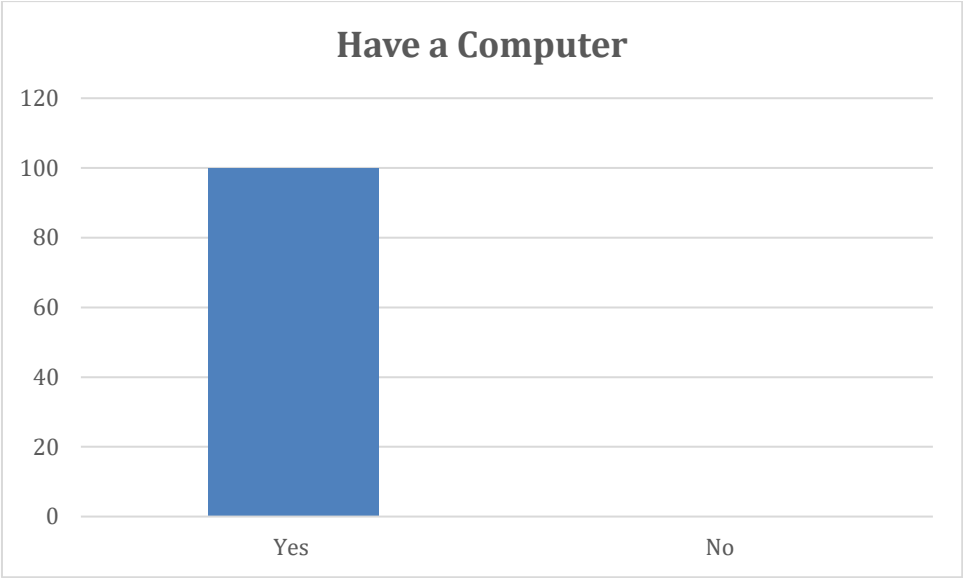

Figure 4.11 teacher have computer

Number of Questions in Manual Exam: in figure 4.12 there are 5(45.5%) of the teachers designed the number of questions between 20-30 questions in manual exam, 2(18.2%) of teachers are designed between 31- 40, 1(9.1%) of teachers are designed between 41-50 and 3(27.3%) of the teachers are designed than 50 questions.

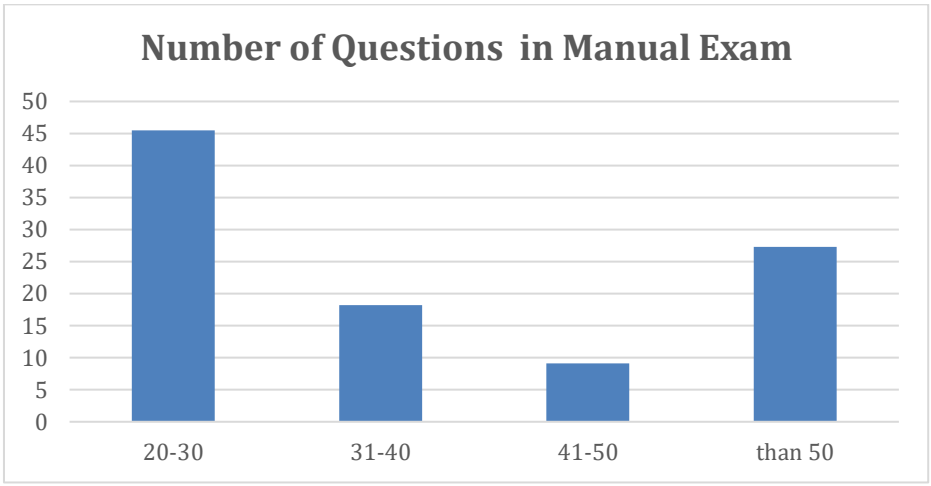

Figure 4.12 number of questions in manual exam

Difference between Manual Exams and Electronic Exams during Preparing Questions:

With 10(90.9%) of the teachers there is difference and with 1(9.1) of the teachers there is no difference see figure 4.13.

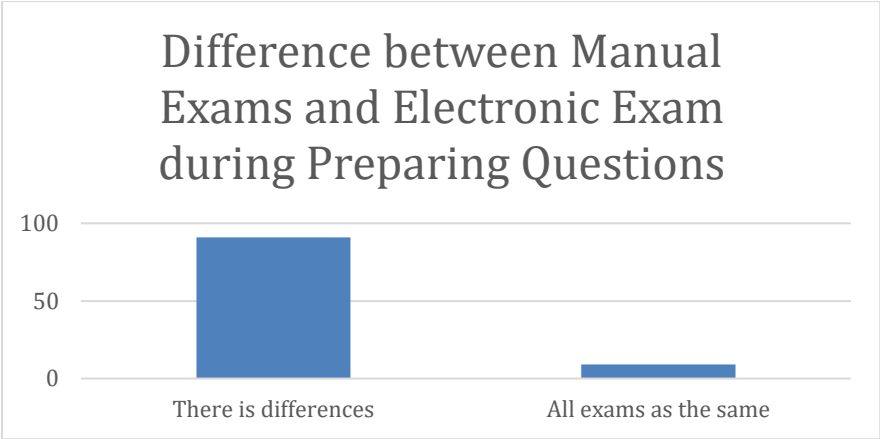

Figure 4.13 Difference between Manual Exams and Electronic Exam during Preparing Questions

Measure the Ability of Students: In figure 4.14 there are 3(27.3%) of teachers take that measure to all types of questions, 7(63.6%) of teachers don't take that to measure all types of questions, 1(9.1%) of teachers take that measure some types of questions.

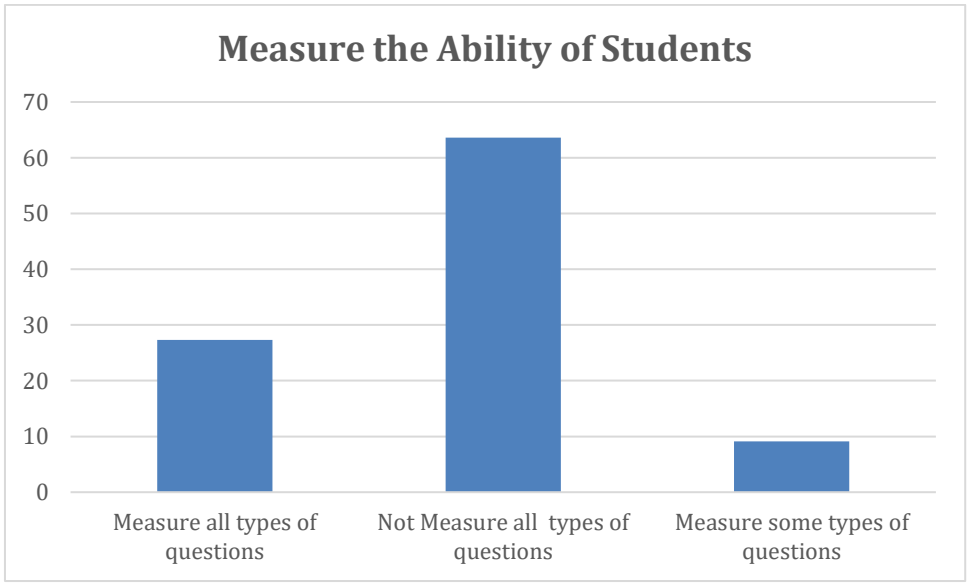

Figure 4.14 Measure the Ability of Students

Questions are used to measure the student's abilities: in figure 4.15 there are 5(45.5%) of teachers used MCQ to measure the ability of students, 1(9.1%) of teachers used drag and drop questions, 1(9.1%) of teachers used matching questions and 4(36.4%) of teachers used all the type of questions.

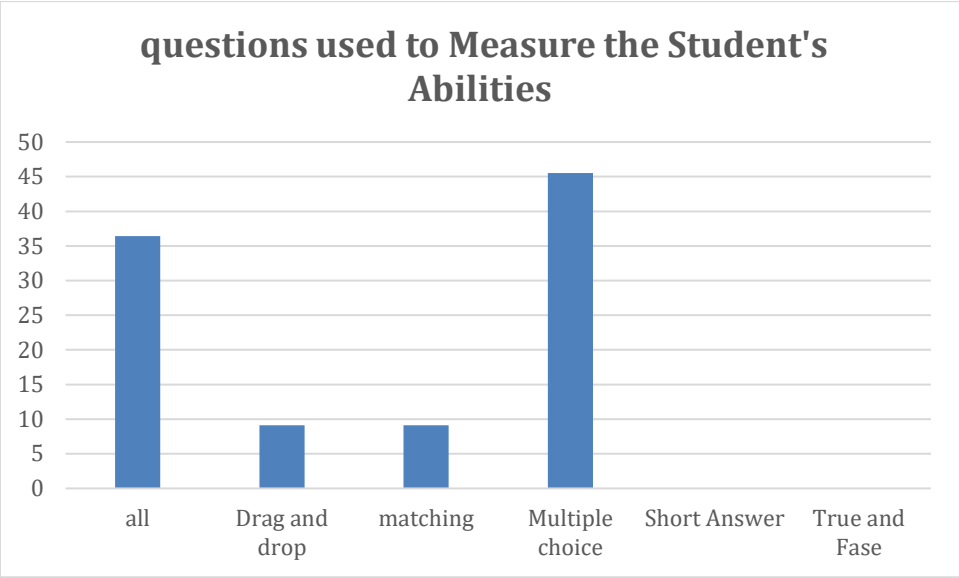

Figure 4.15 questions are used to Measure the Student's Abilities

Difficult questions when preparing exam questions: 9(81.8%) of teachers agree that the MCQ is very difficult question to create and 2(18.2%) of teachers agree that the matching is very difficult question to create see figure 4.16**.**

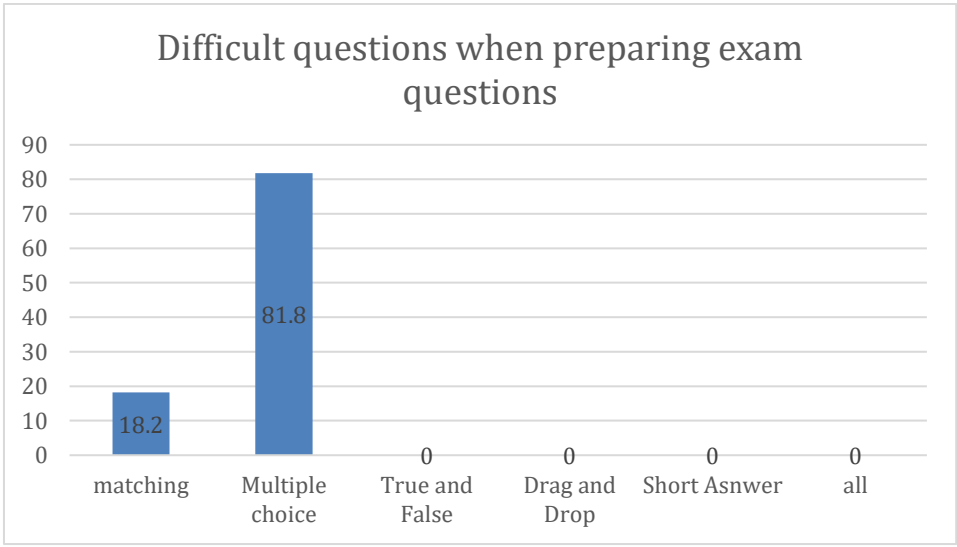

Figure 4.16 Difficult questions when preparing exam questions

Measured electronic exam according to the bloom standard: 4(36.4%) of teachers agree that the Electronic Exam measure between 1-2 of knowledge level depend on bloom taxonomy see figure 4.17, 1(9.1%) of teachers agree that measure between 3-5 of knowledge and 6(54.5%) of teachers don’t use bloom taxonomy when designing exam.

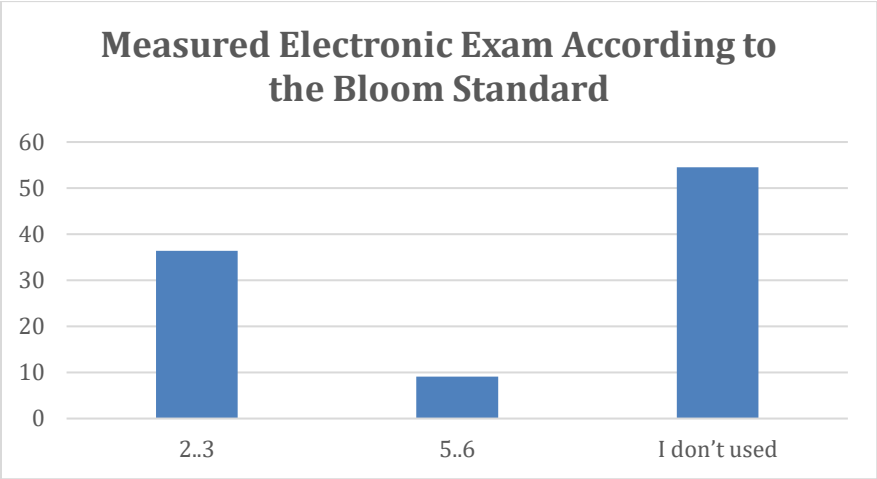

Figure 4.17 Measured Electronic Exam According to the Bloom Standard

4.2.4 Time of exam

In the previous chapter we have discussed about before in the Sudanese Universities there is no standard to determine the time of exam, in Alneelane, Alnhda, International University of Africa ,the determine time depends on credits hour, and in Open Sudan University determined the time of exam without any standard see figure 4.18,figure 4.19 and figure 4.20.

After interview with all administrators in Sudanese Universities and choosing random course from different faculties and different levels to show the average time of time taken see the next figures:

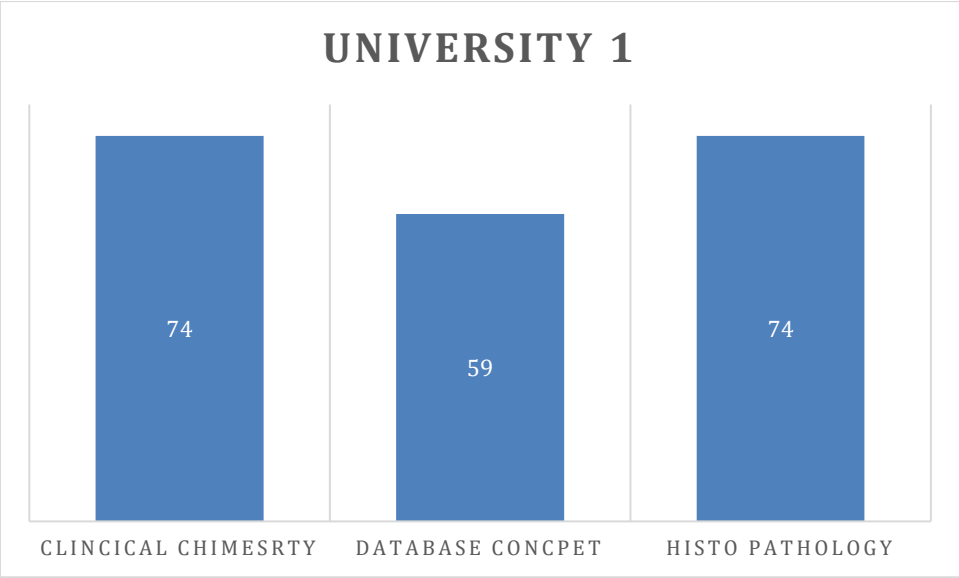

Figure 4.18 University 1

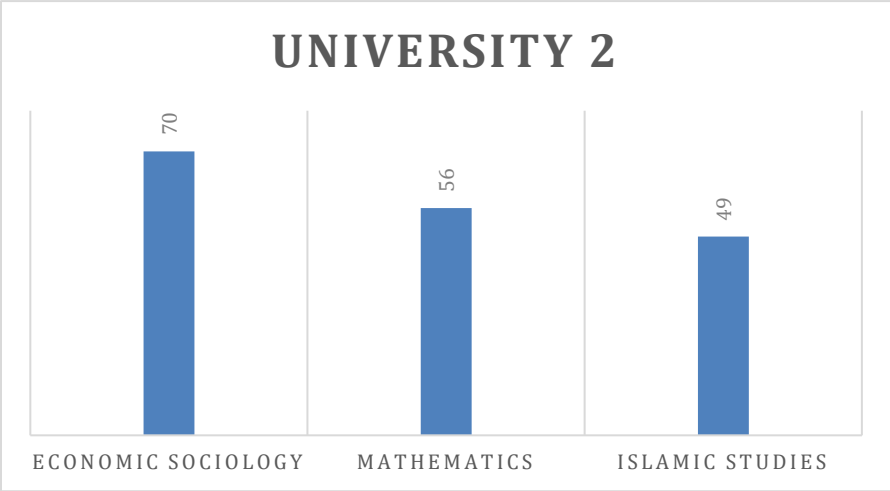

Figure 4.19 University 2

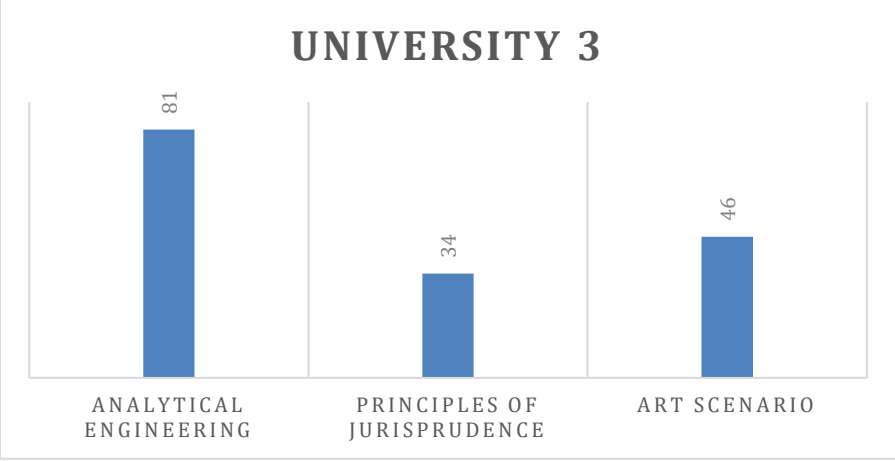

Figure 4.20 University 3

In this study we choose the course of software engineering see figure 4.21 to shows the average time of student in this course:

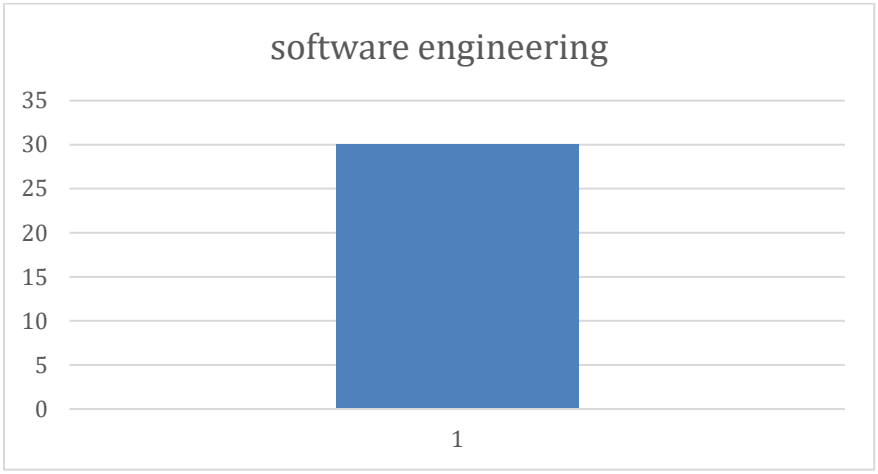

Figure 4.21 shows average time of student in the course of software engineering

4.3 Design model

In this section we will discuss about the proposal solution and what is the step to write the objective and to design the blueprint of the course linking with bloom taxonomy that can be used to design the questions of exam with standards which is reflected by extraction of the perfect exam.

The base of model depends on teacher and the extent of the commitment to design the perfect exam, the model is divided into four categories. The first level the teacher enters the name and the grade of the subject after that in any program or subject there are some objectives that Students understanding during the course when the teacher writing this information the second level becomes visible see figure 4.22.

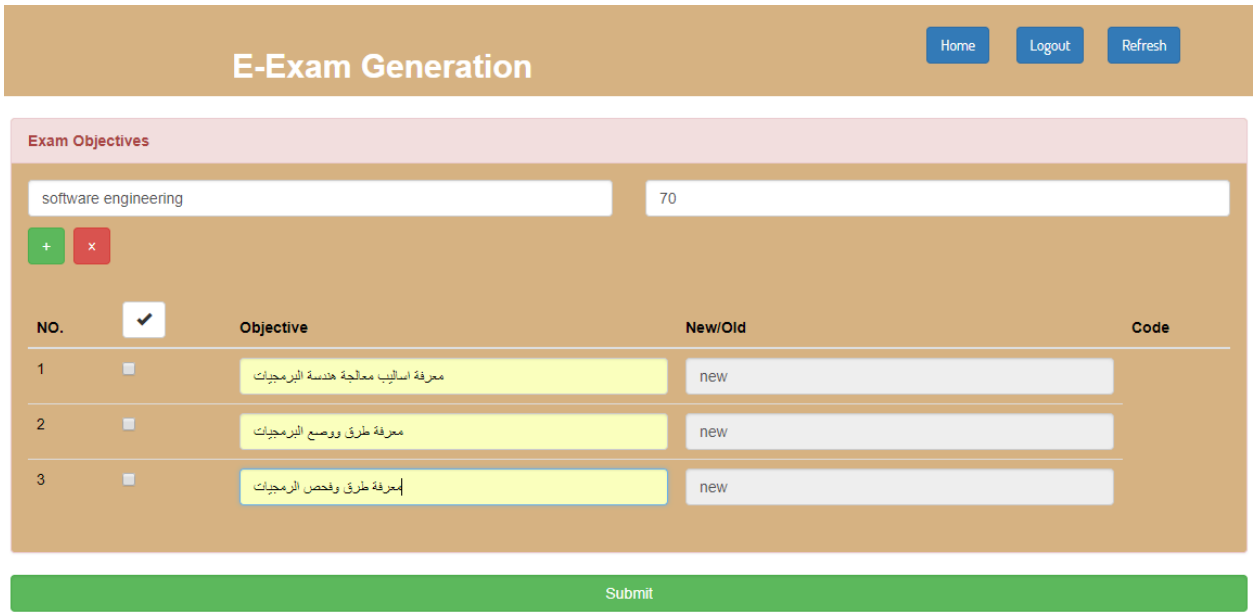

Figure 4.22 Exam Objective

The second level the teacher writes the name of the chapters in the course and choose what objective that can be written in the first level measure of objective and writing the outcome that student Skills acquired by the student and what is very important is that teacher must determine the weight of any chapter see figure 4.24,

this weight is liking by the grade of exam and the total of chapter must be equal to the total grade of exam.

Figure 4.23 Exam Chapter

Now the third level becomes visible and it is very important level in the model because here is to implement the blueprint and bloom taxonomy which we discussed about in Chapter 2 , here the information that was written in the first and second levels are used to print the blueprint and that can be viable to the final level. In this level we can firstly see the name of chapters ,weight of chapters and converting the weight of chapters to mark that all these data have been entered in the previous level see figure 4.24 ,.After that we can see the cognitive level (bloom taxonomy) which we discussed about in chapter 2 and in this study as a researcher we use this taxonomy because this taxonomy is a public taxonomy and reference to any another taxonomies like (fink or solo), this cognitive level contains six categories(remember , understanding ,apply, analyze ,evaluate , create) .

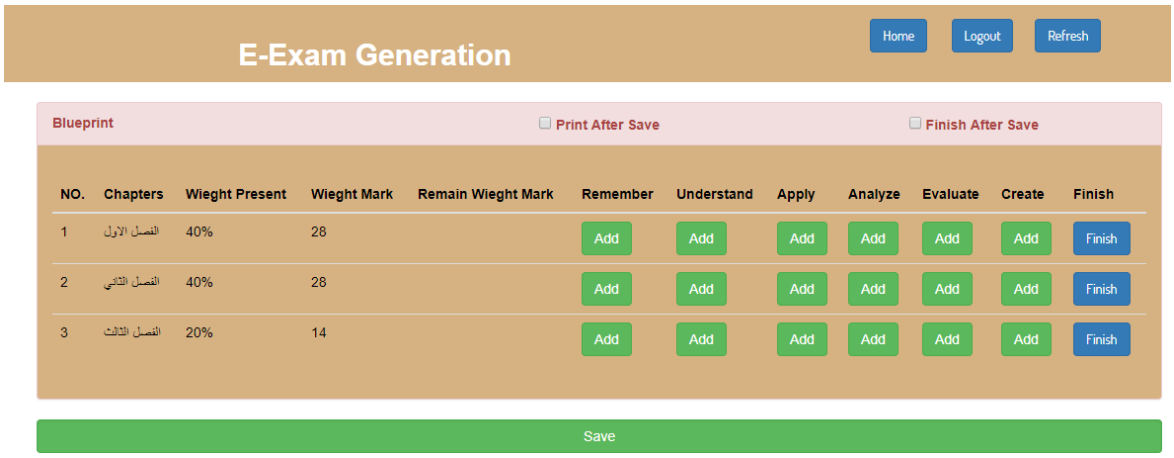

Figure 4.24 prepare blueprint

The teacher must start from chapter one and determine the cognitive level. Firstly that can be tested in this chapter and after that choose the type of question and the result of this question see figure 4.25. This step is applied to all chapters and the total of all questions must be equal to the total of weight that the teacher has written. In this study the researcher choose two types of questions (True and False, multiple choice).

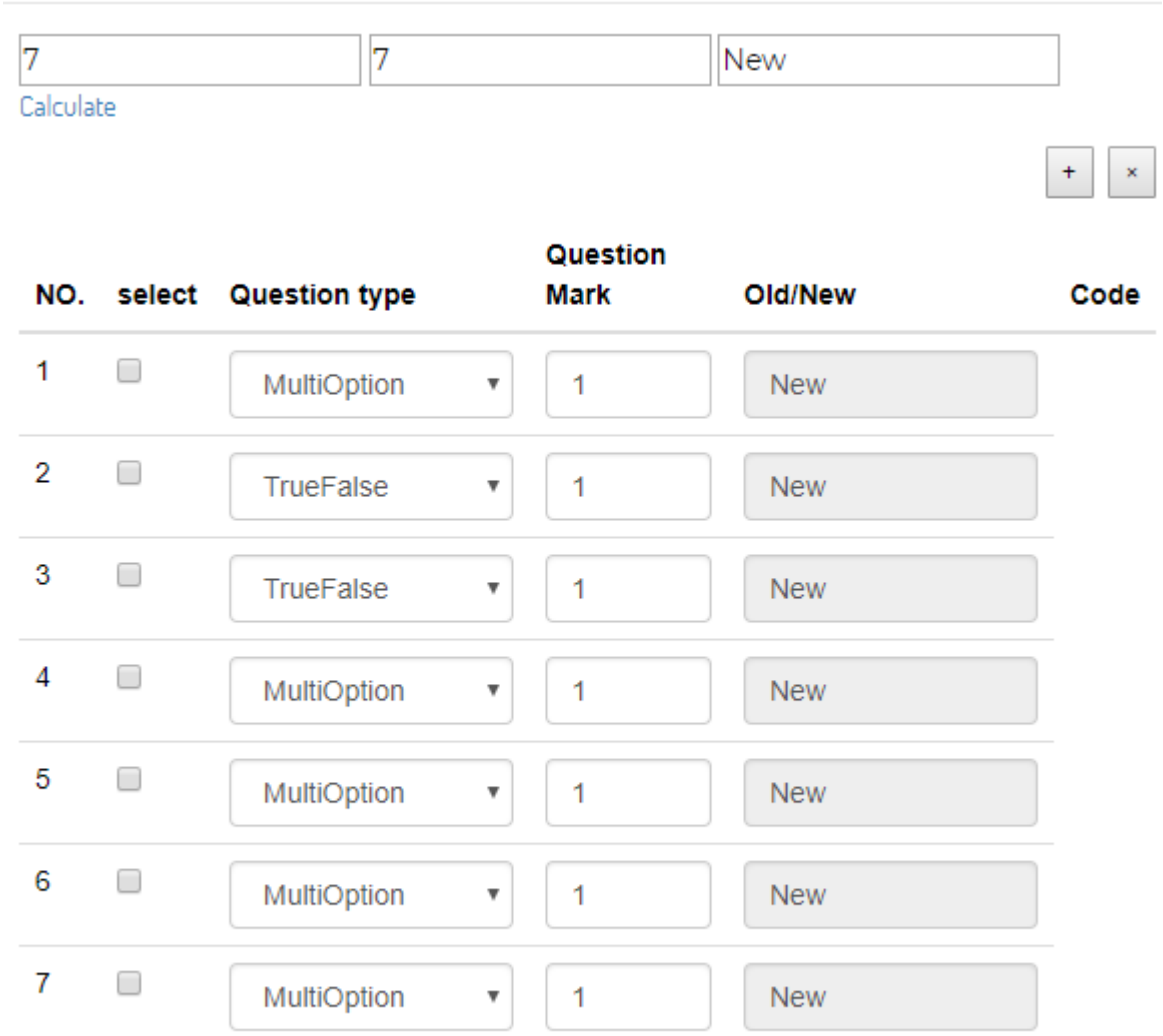

Figure 4.25 prepare types of questions

After the teacher finishes of all chapters the teacher can download the blueprint as pdf file. The file contains the name of course, marks of exam, time of exam determined automatically by the system depend on the number of questions. Each True and False question calculated by 30 seconds and each MCQ questions in lower cognitive level (remember and understanding) calculated by 1 munities. But in higher

conative level (apply, analyze, evaluate, create) calculated by 1 minute and 30 seconds, the calculation of time depends on the international standard of timing of exam which we discussed in chapter 3, and finally show the details of questions that are prepared in the third level see figure 27. When the blueprint has finished and the teacher click into finish, this level the teacher cannot return to this level again and can be show the report of the course see figure 4.26 and after that the forth level becomes visible see figure 4.27.

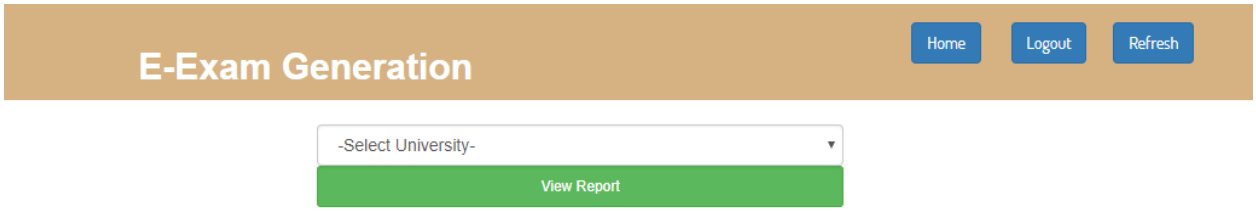

Figure 4. 26 report of blueprint

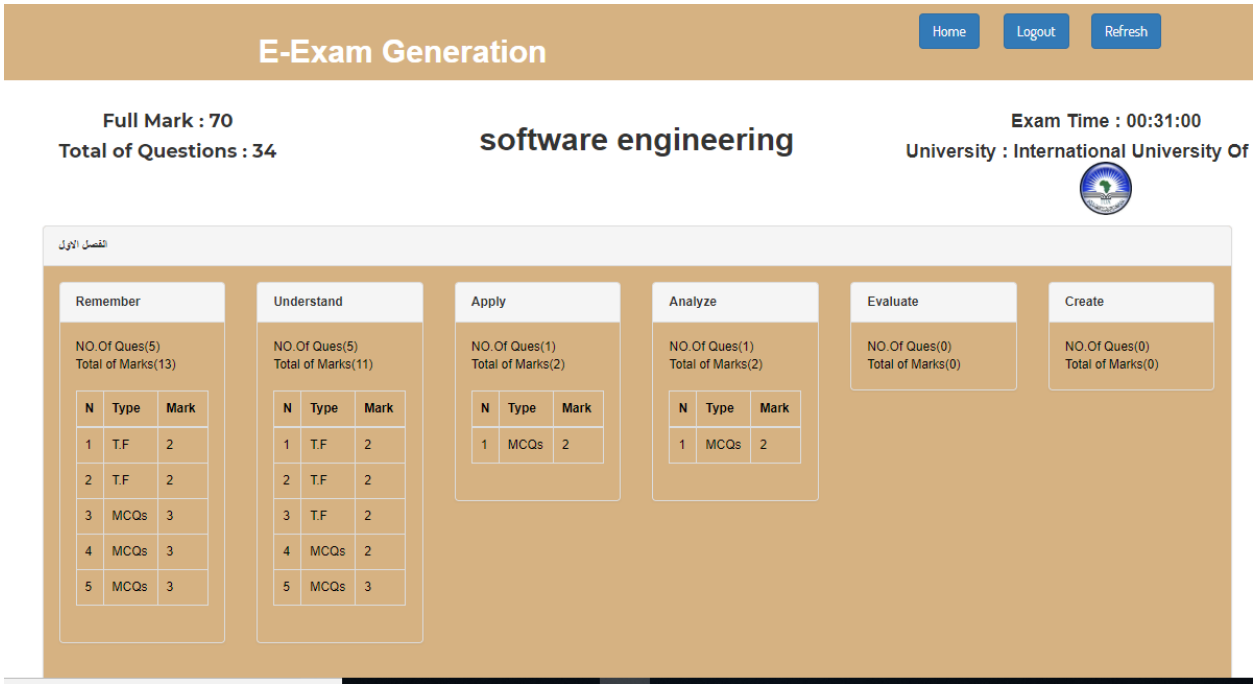

Figure 4.27 details report of blueprint

This level shows the type of questions that entered in blueprint level and the teacher must enter the statement of question and choose the correct answer see figure 4.28. The questions are sorted by chapters and the sorted cognitive level, after completing writing the questions the teacher clicks download file as text file and this file can be imported into Moodle automatically as Aiken format see figure 4.29.

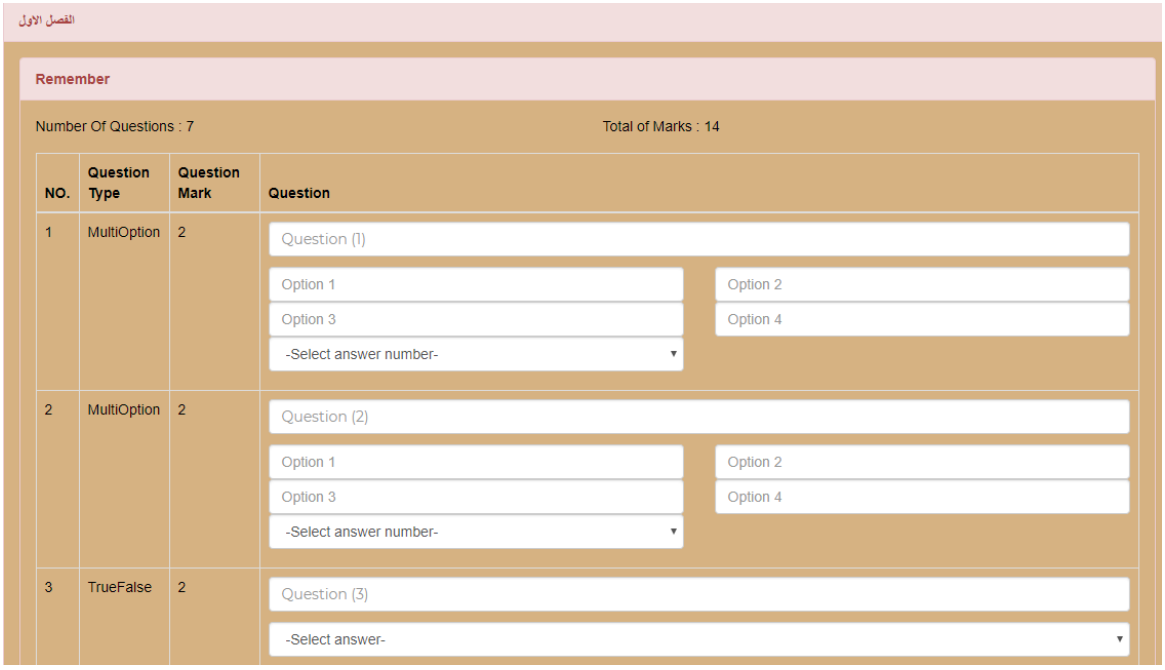

Figure 4.28 questions of exam

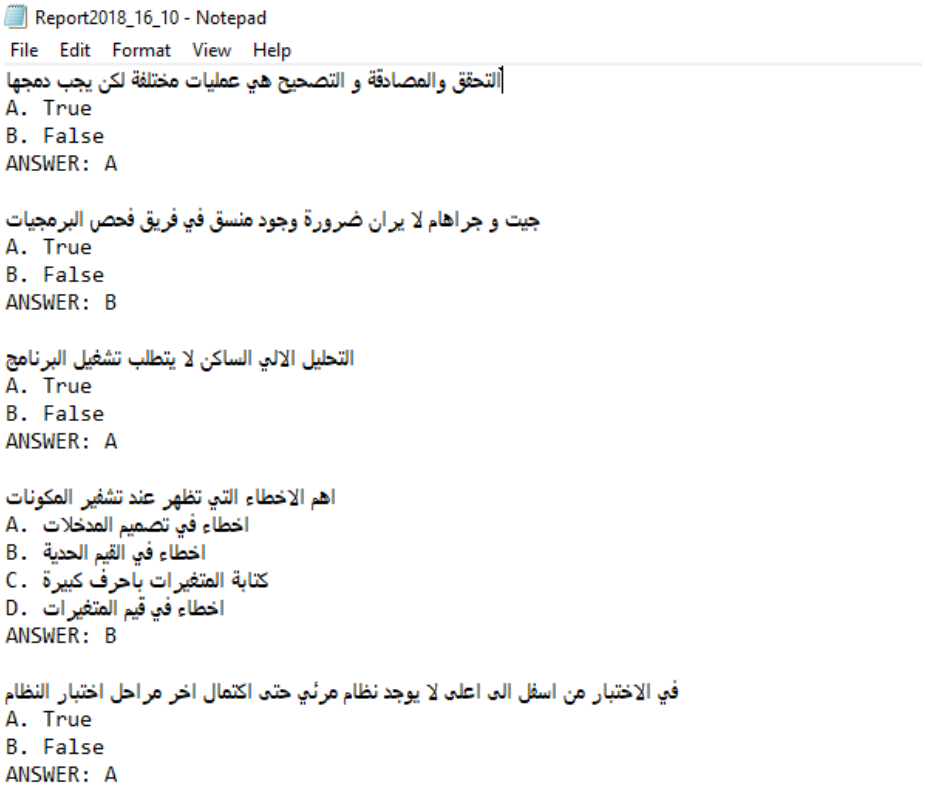

Figure 4.29 Aiken format file

4.4 Results and discussion

After finishing the analyzing data and designing the Generated Automated Exam there are many results in this study:

- There is no standard to determine time of exam and the number of questions per exam:

In Sudanese Universities that applying E - Examinations and that can be shown clearly in the analysis of data collection in Alnhda Faculty used 2 hours of exams without any standard. In Alneelane University, it determines used 2 hours depending on the credit hours of the program and the International University, it determines 2 hours depend on the credit hours also.

- There is no any difficulty with student to complete exams in Sudanese Universities:

This result is consistent with the previous study of Qabous University and Portuguese University in chapter 2, and also can show the analysis in chapter 4 after the survey is distributed to students.

- More than 50% from the teachers who are interviewed and distributed questioner among them don't know the bloom taxonomy :

This result is shown clearly after the interview with teacher from four Sudanese Universities and 50 % of teachers design exam without knowing the knowledge of cognitive of bloom taxonomy.

- Designing model to be standard and working in all Sudanese University that are applying E- Examinations:

when applying this model to all Sudanese Universities that want to implement e-exams there is standard to design exams and that guarantee the level of students is

the same between Universities because the standard of exams is also the same differently rather than designing exam manually.

- Helping the teachers to prepare a perfect exams and design blueprint:

To design the exam and blueprint manually is very difficult and decreases the time and effort and are extracted through personal interviews with teachers but with model to design the exam and blueprint are more easier and very efficient rather than manual.

- Decrease the timing and effort:

Of nature to prepare exam firstly design the blueprint manually and printing the report of exam after that link the blueprint with questions and design question, all this procedure in word document, after that we enter the exam manually into Moodle question by questions and that is consumption of time and effort.

- Design the blueprint, questions and import questions into Moodle automatically:

Depending on the result above and to decrease consumption of time and effort by this model to design the blueprint automatically and when teacher designs it, the question can be created automatically. Also when the teacher enter all the questions of exam the model enable to export a text file that can be imported into Moodle automatically.

- Guarantee deigning exams with international standard:

In manual prepared each teacher prepares an exam different from other teacher knowing that the exam is the exam. When the teachers use this model all of them they will abided by the criteria for the preparing of examinations.

- Determine the time of exams in all Sudanese Universities automatically by the model:

We take in the previous chapter the techniques of Sudanese Universities to determine the time of exam depending on credit hours of determine without any

standard. By model in the report of exam the time of exam generated depends on the time of type's questions of the international standard and that can be shown in the time of question in Table 3.3.

- Increase the abilities of teachers to create exams:

When the teacher generates exams with model the abilities will be continuously increased with guarantee that the teacher will know the cognitive level.

- The most difficult type of questions is multiple choice question:

Depending on figure 4.14 we can see clearly the mcq question is very difficult when the teacher create it because 45% of the teachers whom the questionnaire was distributed among them expressed this.

- No standard to determine the number of questions in exams :

In figure 4.11 there is no standard to determine the number of questions and the number of questions is different depending on the courses.

- Depending on figure 4.20 and figure 4.26 model measure the time of exam efficiently:

After analysis the time limit of the course of software engineering the average of students to complete exam is 30 munities, and when use the model and designed the blueprint and exported the report of exam it becomes clearly the time of exam is 31 munities and this time and that time are dealt with the average time of student to complete exam.

4.5 Summary

This chapter is discussed in our three sections. In the first section we discuss about analysis of data. The second section discuss about the proposal solution and the final section is to discuss and result.

In the first section the data analysis by spss software and in this section we can see more figures about the teacher and teachers. In section two the proposal solutions were discussed clearly, what is the step to use the model, how to create blueprint. In this section we can also see how the time of exam is generated and in the final section of this chapter we discuss the result and the final result is to design model to help the teacher to prepare exam automatically to reduce consumption and effort.

CONCLUSION AND FUTURE WORK

This chapter aims to describe the conclusion of this research. It presents the main contributions, followed by future work and research deficiencies.

Thesis Summary and Achievements

The research objectives stated in Chapter 1 have been establishing and in this part we summarize how to implement these objective.

To determined the application of e - examinations in Sudanese Universities that that are applied for e- Exams:

Firstly in chapter 2 we study the area of e – examination. We study the experience of international Universities and what is the step to implement e - examination in these Universities. Also we can show the previous study of International Universities like how to design e - exams, how to design blueprint some paper to explain the steps to secure e – examinations. The details of technical support and technical error when to implement e - examinations in Sudanese Universities and International Universities, in chapter 2 also we show how student complete exam, in chapter 3 we can see the data collected that to have been compiled from Sudanese Universities. In chapter 4 after data collected we can see the analysis of the data of Sudanese Universities.

To proposed standard model for Sudanese universities for that generated e - exams:

To achieve this objective with chapter 2 to understand the area of study, understand how to convert from manual exam to e - exams, understand the bloom taxonomy and blueprint clearly and use this taxonomy in this study and after understand what is the step to implement e - exams, in chapter 3 by the survey with teachers to show the steps of generated exam manually, the researcher desgin a model of generated e - exam.

(i) To developed a new tool based on proposed model for facilitating the generated of e - exams:

(ii) To develop a new tool based on proposed model for facilitating the generation of e - exams

Based on previous objectives and after understanding how Sudanese universities applied e - exams and steps to design a model, the researcher develops a new tool to generated e - exams stared from designing the chapters of the course, blueprint, creating types of questions depending on bloom taxonomy and generated the exam time and export the Aiken format file automatically .

Summary of the Main Contributions

The main contribution of this thesis is to develop Generated Automated Exam. The main contributions are summarized as:

The model is divided into four levels, objective, chapters, blueprint and questions. For the first information of Generated Automated Exam it is to write the name, marks of exam and the objective of course, after that to write the chapter of exams and determine the weight of each chapter and write what outcome of the course.

To design the blueprint the model retrieve information of the previous levels (objective , weight) and the model converted weight to mark , the model enables teacher to enter the types of questions (true and false ,Multiple choice) and determine the knowledge level of cognitive after teacher finishes the model printing the blueprint matrix of the course and enable the last level of this model is to enter the questions of exams depending on the types of questions and the cognitive level of the previous level , After that the model export import as text file which can be integrated into Moodle directly .

Research limitations

In this study there are some gaps which aren't added to the scope of the study. This research doesn't make the following:

i. The research doesn't make the security reason to secure the model.
ii. The model it hasn't tested perfectly by the teachers.
iii. The model doesn't include all types of questions
iv. The model doesn't integrated with the database of Moodle directly to import exam from database of model to database of Moodle directly without export any files.

Future Works

In this research, we introduced a model to help teacher to design perfect exams and with international standard and design the blueprint of the course without any effort and decreasing timing. All prescribed objectives in this research have been accomplished. This area remains open and there are many issues where further work is required.

(i) In future we can add the API techniques to link the learning outcome of the course with the questions and exporting the file of questions depending on the learning outcome.

(ii) Add to all the types of questions of e - examinations (matching, drag and drop, short answer) into the model to increase the chance of the teacher to test the ability of students.

(iii) In future we can design another model by adding some features like study of deploy e - exams with negative mark.

(iv) In future we can integrate between bloom taxonomy and solo taxonomy.

(v) Linking between the two database of Moodle and model to move exam without exporting or importing any files.

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Appendix A

Surveys

A.1: Student Survey (English):

Name									
Gender	male ( )			female( )					
Name of university			faculty		degree				
Age									
Do you have a computer?	Yes ( )			No ( )					
Do find it difficult to deal with it?	Yes ( )			No ( )					
Use your computer:	Daily ( )	Weekly ( )	Monthly ( )	Yearly ( )	never ( )				
Do you have access to the internet?	Yes ( )			No ( )					
How many time access to internet?	. Daily ( )	Weekly ( )	Monthly ( )	Yearly ( )	Never ( )				
When to the last time you access the Internet	Moments ago ( )	Yesterday ( )	Last week ( )	last month ( )	Last year ( )	Never ( )			
Login to internet using:	Mobile ( )	Computer ( )	Both ( )	Never ( )					
Do you have an email?	Yes ( )			No ( )					
Do you find it difficult to work with PowerPoint files?	Yes( )			No ( )					
Do you find it difficult to work with PowerPoint files?	Yes( )			No ( )					
Can you do exam using a computer?	Yes ( )			No ( )	Sometimes ( )				
How many courses have you been trained to set	1-3 ( )			4-6 ( )	More ( )				

up online exam questions?					
What do you prefer about questions?	multiple choice ( )	true and false ( )	Matching ( )	short answer ( )	All ( )
Which questions cannot answer in online examinations?	multiple choice ( )	true and false ( )	Matching ( )	short answer ( )	All ( )
What do you prefer to put exam questions?	In one page ( )	In two page ( )	Each question in different page ( )	not important ( )	
What are the easiest exams to answer?	Online exam ( )	Paper exam ( )	Two as the same ( )		
Write any notes that you want					

A.2 student survey (Arabic):

الاسم					
الجنس	انثى ( )			ذكر ( )	
الجامعة		الكلية		الدرجة العلمية	
العمر					
هل لديك جهاز حاسب الي ؟	نعم ( )			لا ( )	
هل تجد صعوبة في التعامل معه؟	نعم ( )			لا( )	
تستخدم جهاز الحاسوب:	يوميا ( )	اسبوعيا ( )	شهريا ( )	سنويا ( )	لم استخدمه ابدا ( )
هل تتصفح الانترنت ؟	نعم ( )			لا ( )	
ايّ الفترات تتصفح الانترنت؟	يوميا ( )	اسبوعيا ( )	شهريا ( )	سنويا ( )	لم اتصفح ابدا ( )
ما اخر مره تصفحت فيها الانترنت؟	منذ لحظات ( )	الامس ( )	الاسبوع الماضي ( )	الشهر الماضي ( )	السنة الماضية ( )	لم اتصفح ابدا ( )
باى وسيلة تتصفح الانترنت:	الحاسوب ( )	الهاتف ( )	الاثنين معا ( )		لااتصفح ( )
هل لديك ايميل ؟	نعم ( )		لا ( )		
هل توجد لديك صعوبة في التعامل مع ملفات pdf؟	نعم ( )		لا ( )		
هل توجد لديك صعوبة في التعامل مع ملفات power point؟	نعم ( )		لا ( )		
هل تستطيع اداء الامتحان باستخدام الحاسوب؟	نعم ( )		لا ( )		في بعض الاحيان ( )
كم عدد الدورات التدريبية التى تم تدريبك عليها لكيفية اداء الامتحانات عن طريق الحاسوب؟	3-1 ( )	6-4 ( )	أكثر ( )		

ماهي انواع الاسئلة التى تفضل الاجابة عنها ؟	الاختيار من متعدد ( )	الصواب والخطا ( )	القائمة ( )	الاجابة القصيرة ( )	السحب والافلات ( )	كل انواع الاسئلة المذكورة ( )
ماهي انواع الاسئلة التى لاتستطيع الاجابة عنها ؟	الاختيار من متعدد ( )	الصواب والخطا ( )		الاجابة القصيرة ( )	السحب والافلات ( )	كل انواع الاسئلة المذكورة ( )
ماهي الطريقة التى تفضلها لعرض اسئلة الامتحان الالكتروني؟	في صفحة واحدة ( )			في صفحتين ( )	كل سوال في صفحة ( )	غير مهم ( )
ايهما اسهل بالنسبة لك للاجابة عن الامتحان الالكترونى ام الورقى؟	الامتحانات الالكترونية ( )			الامتحانات الورقية ( )	لايوجد فرق ( )	
ايّ ملاحظات أخرى يمكن اضافتها						

A.3 Teacher survey:

Gender	male ( )	female( )			
Name of university		**faculty**			
Do you have a computer?	Yes ( )	No ( )			
Can you find any difficult to deal with it?	Yes ( )	No ( )			
Use your computer:	Daily ( )	Weakly ( )	Monthly ( )	yearly ( )	never ( )
In manual exam how much number of questions to be prepare?	20-30 ( )	31-40 ( )	41-50 ( )	Than 50 ( )	
Do you have any difference between manual exams and electronic exam during preparing questions?	No differences ( )	There is differences ( )	All exams as the same ( )		
Do you see the electronic exam measure the ability of students?	Measure all types of questions ( )	Not Measure all types of questions ( ) If you check here please justify …… …… …… …… …… ……..	Measure some types of questions ( ) If you cheek here please writes this question …… …… ……...		
Do you take into consideration the psychological aspects of the student during the exam?	No ( )	Yes ( ) if you check it how? ……	Sometimes ( ) if you check it how? …… ……		

What kinds of questions are used that can measure the student's abilities?	True and false ( )	Multiple choice ( )	Matching ( )	Drag and drop( )	All( )
What are the most difficult questions when preparing exam questions?	True and false ( )	Multiple choice ( )	Matching ( )	Drag and drop( )	All( )
How many courses have you been trained to set up online exam questions?	1-2 ( )	3-4 ( )	5-6 ( )	Than 6 ( )	None ( )
How many standards can be measured by an electronic exam according to the bloom standard?	1-2 ( )	3-4 ( )	5-6 ( )	I donot use it ( )	

A.4 administrator survey:

Gender	male ( )		female( )		
Name of university			**faculty**		
What is the system you used for conducting exams?	Moodle ( )	Doodle ( )	Mint ( )	Mahara ( )	Other ( ) If cheek please write the name ……
Questions are randomly distributed to colleges:	Colleges of literature ( )	Scientific Colleges ( )	Both ( )	None ( )	
Exam questions are entered by :	Manually used word by employee ( )	Manually used the exam system by employee ( )	Entered used word by teacher ( )	Entered used system by teacher ( )	
Do you take into consideration the psychological aspects of the student during the exam?	No ( )	Yes ( ) If check it how? ……	Sometimes ( ) If you check it how? ……		
If you export the exam which format are use?	Xml ( )	Gift ( )	Other ( )	None ( )	
Student are login to the system by :	User name & password ( )	Fingerprint ( )	Other ( ) if you check please it write here ……		
Do you agree to randomly distribute exam questions?	I agree ( )	I totally Agree ( )	Objected ( )	Strongly objected ( )	
How much of students enter the exam concurrency at the same time?	100-500 ( )	500-1000 ( )	1000-2000 ( )	More ( )	

How to secure the exam?	
What are the problems that occur during exam?	
What is the infrastructure used for exams?	

Appendix B

Time Taken

B.1 Time taken of course 1:

Started on	Completed	Time taken
12 August 2018 9:06 AM	12 August 2018 10:01 AM	55 mins 20 secs
12 August 2018 9:10 AM	12 August 2018 10:01 AM	51 mins 6 secs
12 August 2018 9:08 AM	12 August 2018 9:59 AM	50 mins 56 secs
12 August 2018 9:10 AM	12 August 2018 10:01 AM	50 mins 41 secs
12 August 2018 9:09 AM	12 August 2018 10:00 AM	50 mins 17 secs
12 August 2018 9:11 AM	12 August 2018 9:57 AM	45 mins 56 secs
12 August 2018 9:09 AM	12 August 2018 9:48 AM	38 mins 48 secs
12 August 2018 9:23 AM	12 August 2018 10:49 AM	1 hour 25 mins
	Time === 2 hours	
	31 questions	

B.2 Time taken of course 2:

Started on	Completed	Time taken
16 August 2018 1:27 PM	16 August 2018 2:26 PM	59 mins 8 secs
16 August 2018 1:27 PM	16 August 2018 2:27 PM	59 mins 38 secs
16 August 2018 1:27 PM	16 August 2018 2:25 PM	58 mins 12 secs
16 August 2018 1:27 PM	16 August 2018 2:24 PM	57 mins 9 secs
16 August 2018 1:27 PM	16 August 2018 2:24 PM	57 mins 8 secs
16 August 2018 1:27 PM	16 August 2018 2:25 PM	57 mins 49 secs
16 August 2018 1:27 PM	16 August 2018 2:24 PM	57 mins 26 secs
16 August 2018 1:48 PM	16 August 2018 2:45 PM	56 mins 39 secs
16 August 2018 1:34 PM	16 August 2018 1:58 PM	24 mins 31 secs
16 August 2018 1:27 PM	16 August 2018 3:34 PM	2 hours 7 mins
16 August 2018 1:28 PM	16 August 2018 3:34 PM	2 hours 6 mins
16 August 2018 1:27 PM	16 August 2018 3:32 PM	2 hours 4 mins
16 August 2018 1:27 PM	16 August 2018 3:30 PM	2 hours 3 mins
16 August 2018 1:27 PM	16 August 2018 3:29 PM	2 hours 2 mins
16 August 2018 1:27 PM	16 August 2018 2:36 PM	1 hour 9 mins
16 August 2018 1:27 PM	16 August 2018 2:35 PM	1 hour 8 mins
16 August 2018 1:27 PM	16 August 2018 2:35 PM	1 hour 8 mins
16 August 2018 1:27 PM	16 August 2018 2:35 PM	1 hour 7 mins
16 August 2018 1:36 PM	16 August 2018 3:36 PM	1 hour 59 mins
16 August 2018 1:27 PM	16 August 2018 3:20 PM	1 hour 53 mins
16 August 2018 1:27 PM	16 August 2018 3:18 PM	1 hour 51 mins
16 August 2018 1:33 PM	16 August 2018 2:38 PM	1 hour 5 mins
16 August 2018 1:28 PM	16 August 2018 3:18 PM	1 hour 49 mins
16 August 2018 1:27 PM	16 August 2018 3:16 PM	1 hour 48 mins
16 August 2018 1:27 PM	16 August 2018 3:13 PM	1 hour 46 mins
16 August 2018 1:27 PM	16 August 2018 3:08 PM	1 hour 41 mins
16 August 2018 1:27 PM	16 August 2018 3:08 PM	1 hour 40 mins

B.3 Time taken of course 3:

Started on	Completed	Time taken
6 September 2018 9:25 AM	6 September 2018 9:46 AM	20 mins 41 secs
6 September 2018 9:25 AM	6 September 2018 10:03 AM	37 mins 56 secs
6 September 2018 9:25 AM	6 September 2018 10:02 AM	36 mins 56 secs
6 September 2018 9:25 AM	6 September 2018 10:18 AM	52 mins 41 secs
6 September 2018 9:25 AM	6 September 2018 10:02 AM	37 mins 23 secs
6 September 2018 9:25 AM	6 September 2018 10:04 AM	38 mins 44 secs
6 September 2018 9:25 AM	6 September 2018 10:16 AM	50 mins 49 secs
6 September 2018 9:25 AM	6 September 2018 10:31 AM	1 hour 6 mins
6 September 2018 9:25 AM	6 September 2018 10:16 AM	51 mins 6 secs
6 September 2018 9:25 AM	6 September 2018 10:13 AM	47 mins 39 secs
6 September 2018 9:25 AM	6 September 2018 9:57 AM	32 mins 8 secs
6 September 2018 9:25 AM	6 September 2018 10:08 AM	42 mins 53 secs
6 September 2018 9:25 AM	6 September 2018 10:01 AM	35 mins 58 secs
6 September 2018 9:25 AM	6 September 2018 10:29 AM	1 hour 3 mins
6 September 2018 9:25 AM	6 September 2018 10:05 AM	39 mins 31 secs
6 September 2018 9:25 AM	6 September 2018 10:12 AM	46 mins 36 secs
6 September 2018 9:25 AM	6 September 2018 9:58 AM	32 mins 59 secs
6 September 2018 9:25 AM	6 September 2018 10:38 AM	1 hour 12 mins
6 September 2018 9:25 AM	6 September 2018 10:12 AM	46 mins 39 secs
6 September 2018 9:25 AM	6 September 2018 10:02 AM	36 mins 39 secs
6 September 2018 9:25 AM	6 September 2018 10:13 AM	48 mins 13 secs
6 September 2018 9:25 AM	6 September 2018 10:04 AM	39 mins 1 sec

B.4 Time taken of course 4:

	Started on	Completed	ime taken
1	7 December 2017 9:02 AM	7 December 2017 10:20 AM	1 hour 17 mins
1	7 December 2017 9:05 AM	7 December 2017 10:19 AM	1 hour 13 mins
1	7 December 2017 9:08 AM	7 December 2017 10:21 AM	1 hour 13 mins
1	7 December 2017 9:06 AM	7 December 2017 10:18 AM	1 hour 11 mins
1	7 December 2017 9:11 AM	7 December 2017 10:23 AM	1 hour 11 mins
1	7 December 2017 9:02 AM	7 December 2017 10:08 AM	1 hour 5 mins
1	7 December 2017 9:11 AM	7 December 2017 10:16 AM	1 hour 4 mins
1	7 December 2017 9:02 AM	7 December 2017 10:06 AM	1 hour 4 mins
1	7 December 2017 9:02 AM	7 December 2017 10:04 AM	1 hour 2 mins
1	7 December 2017 9:02 AM	7 December 2017 10:05 AM	1 hour 2 mins
1	7 December 2017 9:08 AM	7 December 2017 10:08 AM	1 hour
1	7 December 2017 9:12 AM	7 December 2017 10:10 AM	58 mins 10 secs
1	7 December 2017 9:08 AM	7 December 2017 10:06 AM	58 mins 9 secs
1	7 December 2017 9:04 AM	7 December 2017 10:02 AM	57 mins 19 secs
1	7 December 2017 9:04 AM	7 December 2017 10:02 AM	57 mins 13 secs
1	7 December 2017 9:02 AM	7 December 2017 9:59 AM	57 mins 4 secs
1	7 December 2017 9:10 AM	7 December 2017 10:06 AM	56 mins 10 secs
1	7 December 2017 9:10 AM	7 December 2017 10:05 AM	55 mins 42 secs
1	7 December 2017 9:03 AM	7 December 2017 9:58 AM	55 mins 34 secs
1	7 December 2017 9:07 AM	7 December 2017 10:03 AM	55 mins 23 secs
1	7 December 2017 9:05 AM	7 December 2017 10:00 AM	54 mins 27 secs
1	7 December 2017 9:04 AM	7 December 2017 9:59 AM	54 mins 16 secs

B.5 Time taken of course 5:

Started on	Completed	ime taken
15 April 2018 11:55 AM	15 April 2018 12:55 PM	59 mins 59 secs
15 April 2018 11:55 AM	15 April 2018 12:55 PM	59 mins 57 secs
15 April 2018 11:55 AM	15 April 2018 12:53 PM	58 mins 6 secs
15 April 2018 12:01 PM	15 April 2018 1:00 PM	58 mins 6 secs
15 April 2018 11:55 AM	15 April 2018 12:53 PM	58 mins 22 secs
15 April 2018 11:57 AM	15 April 2018 12:55 PM	58 mins 19 secs
15 April 2018 11:54 AM	15 April 2018 12:52 PM	57 mins 57 secs
15 April 2018 11:56 AM	15 April 2018 12:54 PM	57 mins 31 secs
15 April 2018 11:58 AM	15 April 2018 12:53 PM	54 mins 26 secs
15 April 2018 11:55 AM	19 April 2018 9:57 AM	3 days 22 hours
15 April 2018 11:55 AM	19 April 2018 9:56 AM	3 days 22 hours
15 April 2018 11:57 AM	15 April 2018 1:07 PM	1 hour 9 mins
15 April 2018 11:55 AM	15 April 2018 1:03 PM	1 hour 8 mins
15 April 2018 11:55 AM	15 April 2018 1:02 PM	1 hour 7 mins
15 April 2018 11:56 AM	15 April 2018 1:03 PM	1 hour 7 mins
15 April 2018 11:56 AM	15 April 2018 1:02 PM	1 hour 6 mins
15 April 2018 11:56 AM	15 April 2018 1:03 PM	1 hour 6 mins
15 April 2018 11:56 AM	15 April 2018 1:02 PM	1 hour 6 mins
15 April 2018 11:55 AM	15 April 2018 1:49 PM	1 hour 53 mins
15 April 2018 11:55 AM	15 April 2018 1:49 PM	1 hour 53 mins
15 April 2018 11:56 AM	15 April 2018 1:49 PM	1 hour 53 mins
15 April 2018 11:55 AM	15 April 2018 1:48 PM	1 hour 53 mins

B.6 Time taken of course 6:

Started on	Completed	Time taken
24 April 2018 8:39 AM	24 April 2018 9:16 AM	36 mins 15 secs
24 April 2018 8:57 AM	24 April 2018 9:41 AM	43 mins 33 secs
24 April 2018 8:41 AM	24 April 2018 9:26 AM	44 mins 55 secs
24 April 2018 8:26 AM	24 April 2018 9:13 AM	46 mins 48 secs
24 April 2018 8:14 AM	24 April 2018 9:02 AM	48 mins
24 April 2018 8:33 AM	24 April 2018 9:21 AM	48 mins 8 secs
24 April 2018 8:25 AM	24 April 2018 9:14 AM	48 mins 33 secs
24 April 2018 8:40 AM	24 April 2018 9:29 AM	49 mins 6 secs
24 April 2018 8:13 AM	24 April 2018 9:03 AM	49 mins 48 secs
24 April 2018 8:40 AM	24 April 2018 9:30 AM	49 mins 52 secs
24 April 2018 8:21 AM	24 April 2018 9:11 AM	50 mins 7 secs
24 April 2018 8:41 AM	24 April 2018 9:31 AM	50 mins 24 secs
24 April 2018 8:40 AM	24 April 2018 9:31 AM	50 mins 38 secs
24 April 2018 8:28 AM	24 April 2018 9:19 AM	50 mins 42 secs
24 April 2018 8:18 AM	24 April 2018 9:09 AM	51 mins 53 secs
24 April 2018 8:26 AM	24 April 2018 9:18 AM	52 mins 22 secs
24 April 2018 8:14 AM	24 April 2018 9:07 AM	52 mins 41 secs
24 April 2018 8:16 AM	24 April 2018 9:09 AM	52 mins 48 secs
24 April 2018 8:16 AM	24 April 2018 9:10 AM	54 mins 18 secs
24 April 2018 8:42 AM	24 April 2018 9:36 AM	54 mins 21 secs
24 April 2018 8:15 AM	24 April 2018 9:09 AM	54 mins 42 secs
24 April 2018 8:13 AM	24 April 2018 9:08 AM	54 mins 44 secs
24 April 2018 8:28 AM	24 April 2018 9:22 AM	54 mins 46 secs