COMPUTER-AIDED EDUCATIONAL MEASUREMENT AND EVALUATION SYSTEM FOR PRACTICES OF DATABASE COURSE STUDENTS

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Abstract
Courses with practice need additional time for measurement and evaluation of the students. This additional time causes a decrease in the number of practices and educators' performance nevertheless, the measurement and evaluation of many students might not be achieved properly. In order to overcome the difficulties mentioned above, a software which executes the necessary measurement and evaluation for "Database Course" lesson in short time for at the Computer Technologies Laboratory of Usak University.

Each student connects to a remote MySQL database server computer with his/her own computer and sends SQL query to perform practice stage given in Table 1 via MySQL Workbench that Database Management System Software. The designed and implemented software running on the server checks and scores accuracy of the queries of each student.

In this study, classic measurement and evaluation of each student who performed the practice stages given in Table 2 takes about 51 minutes and for the 54 attendants, it takes about half an hour. The designed and implemented software takes about 0.6 seconds for each student and for the 54 attendants; it takes about 34.8 seconds depending on the network performance. Since the developed system reduced the usage time in a ratio of 100 to 1 for the measurement and evaluation, the educational length of duration has become more efficiency.

Keywords: education, measurement, evaluation, database, sql.

INTRODUCTION

Technology is used in the fields like health, communication, industry and education. Therefore, there is very important place of technology in the development of countries. Countries that use technology more effectively become more developed. Computer Technologies are at forefront in more effective use of technology. Therefore, development of technology goes parallel with development of computers.

Education provides expected behavior to individuals and aims at changing his/her behavior. This is must knew that success or failure of the training program and in which degree and which students have the benefit.

Obtaining the degree of success and recognition of those who fail, however, the students measured and evaluated by behavioral changes occurring in is possible (Baykul: 1992) .

Computer Technologies deliver training services to a wider audience from any place more efficiently and more quickly (Dostál, Serafín, Havelka, & Minarcík, 2012). It helps students develop basic skills, it makes teaching process faster and keeps the students more interested and motivated (Schacter, 1999) [K9]. It also provides efficient for preparing and representing training program and course contents in terms of measurement and assessment.

Evaluation in education as a term is a research model about instruction and a method for identifying the most effective teaching methods (ERWIN, 1991). The evaluation should be more controlled, more effective and more durable in order to get more valid, reliable and purposive result. In educational-teaching processes as in other social studies, the teachers can detect the scope of attainments via various assessment and evaluation approaches. These approaches are generally grouped into two subcategories as "traditional" and "alternative" assessments and evaluation (Çalışkan & Kaşıkçı, 2010).

Computer technologies are used effectively to get more valid results in evaluation and measurement. In this study it is aimed to show that alternative evaluation and measurement using computer technologies is more efficient and more rapid than traditional evaluation and measurement methods.

Problem Statement

Education of technical courses demands a lot of practical qualification, which enables achieving of practical experiences and knowledge (Fiksl, 2012). The practices should be done many times to provide permanency. Teachers or Lecturers measure and evaluate this process by students attendance to course and vocational education. This measurement and evaluation are performed whether the practice are at desired level or not.

METHOD

The students apply practice stage prepared by an educator as shown on the blackboard. After the students finished their practice, the educator checks each practice of the students one by one. Then he writes the measured score of practice in the list as in the traditional measurement of method. Practice of every course attendee or student is checked by lecturer one by one in traditional evaluation method of vocational education. Therefore duration of education increases in parallel with the numbers of students. This long duration of measurement and evaluation training has been tried to be eliminated with a software application. This innovative software has been studied in this article.

Structured Query Language

A data query language or tools were needed after Database approach. Firstly, there has been developed a language having mathematical syntax which is called SQUARE, However, this language was abandoned due to its lack of comprehensibility. Therefore an alternative syntax was created. It is called SEQUEL (Structured Query Language) which is similar to English language. Later on this this SEQUEL language, was evolved into SQL to adjust to English pronunciation (Hongsiri, Patcharin, Parames, Watcharee, & Ruenwongsa, 2013).

SQL become very popular and it came into standard use in all platforms. Therefore, it should be known by every technical staff working in the field of database. Having learned the basic database terminology, the students execute commands called query sentences. These commands are written in standard SQL language. Some of these commands are given in Table 1.

Table 1 Some Query Functions and Commands SQL Query Clauses

Query Functions	SQL Commands
Creating a database is the name of e-commerce	CREATE DATABASE Eticaret
Creating a Database Table Structure named users and Specifying Column Properties	CREATE TABLE IF NOT EXISTS kullanicilar (KullaniciNo integer(11),Ad varchar(50),Soyad varchar(50));
Users Viewing Table Structure	DESC Kullanicilar;
Users All Records in Table View	SELECT * FROM kullanicilar

Computer Software

The specified application is controlled by trainer and applications are scored based on whether or not the right after students performed the steps in Table 2. In the traditional method these scores are written to the list consists of the practice steps with the student information in Figure-6. Student applications to be controlled individually by the instructor and points to be written to the list extend the training period. The check of practice within training time decreasing the duration and made more efficient than conventional methods are performed in the experimental using the developed software.

Table 2 :The Practice Stages

No	The Practice Stages
1	The Creation of a Database
2	The Select of Character Set to Database
3	The Creation of a Database Table Column and its properties
4	The Insert of Data to Database Table
5	The Select of Data
6	The Update of Data
7	The Delete of Data
8	The Creation of Index
9	The Creation of View
10	The Alter of Table

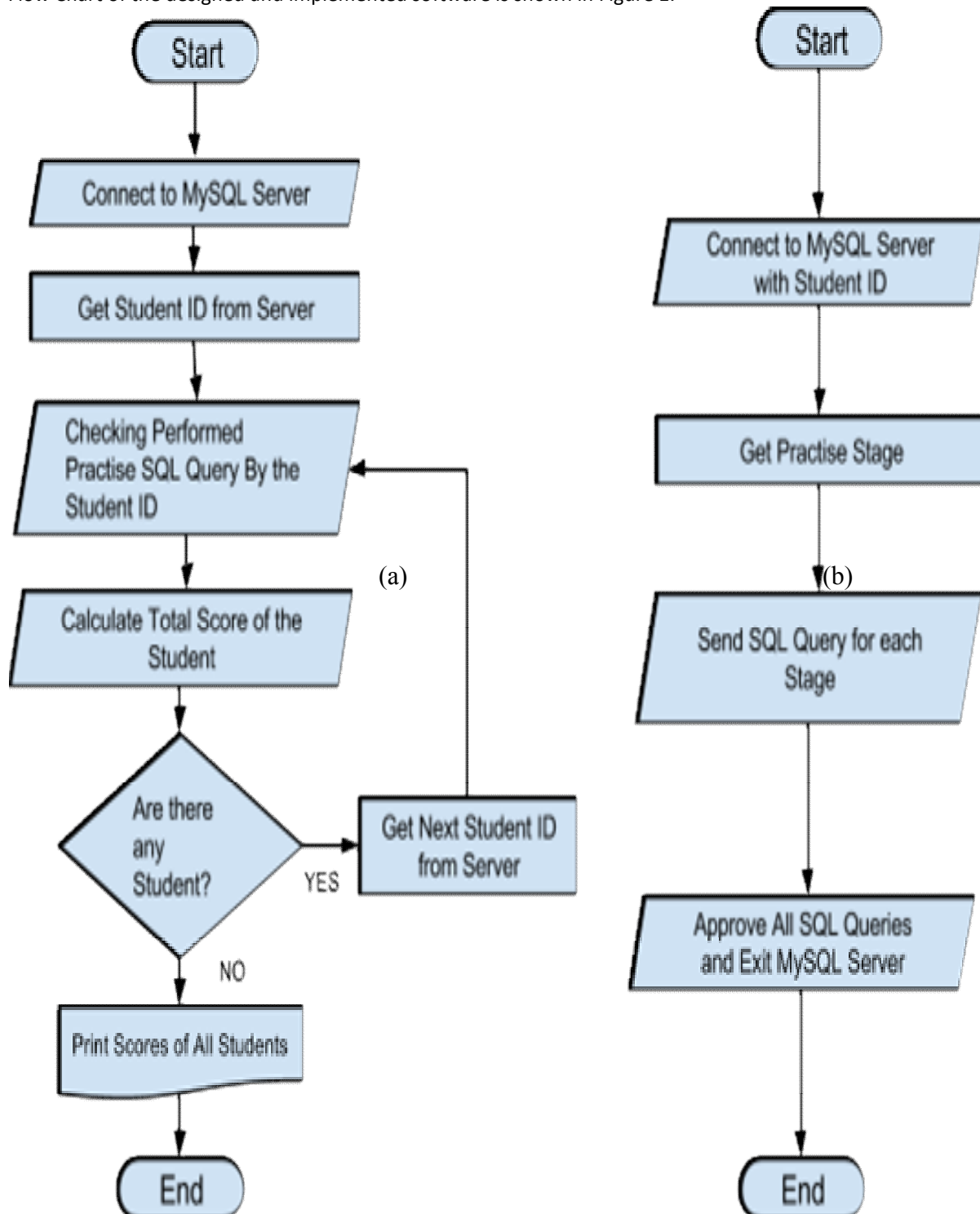Flow Chart of the designed and implemented software is shown in Figure 1.

Figure 1 Flow Chart of the designed and implemented software (a) Educator Side, (b) Students Side

At the first, trainers add into the software each student the practical steps respectively. Some of these stages are shown in Table 2 and Adding Screen Practice Steps is shown in Figure 2.

Lecturer	**Lec. Hüseyin COŞKUN**	
Duration	50 minutes	
Practice Subject	E-Commerce Web Site	
NO	**PRACTICE STAGE & CONTROL SQL QUERY**	**SCORE**
1	PRACTICE STAGE — Create a Database for Using in E-Commerce Web Site CONTROL SQL QUERY — `CREATE DATABASE ECommerce`	20
2	PRACTICE STAGE — Select a Character Set to Database for International Using CONTROL SQL QUERY — `SET CHARACTER SET utf8;` `SET COLLATION_CONNECTION = 'utf8_turkish_ci';`	20

3	PRACTICE STAGE — Create a Database Table Column and its properties for this 4 object Products,Custo
	CONTROL SQL QUERY — `CREATE TABLE Products(`
	`ProductID INTEGER(11) PRIMARY KEY AUTO_INCREMENT,`
	`ProductName VARCHAR(11),`
	`Category VARCHAR(50),`
		20

4	PRACTICE STAGE — Insert of Data to Database Table for Products,Customers,Sales
	CONTROL SQL QUERY — `INSERT INTO Customers`
	`(MemberID,Name,Surname,Address,Email,City,Phone)`
	`VALUES (1,'Ahmet','Beyaz','Karşıyaka Mah.`
	`No:23','ahmet@beyaz.com','Istanul','905324567890');`
		20

5	PRACTICE STAGE — Select of Data of Product for Sales use Relations Database Query
	CONTROL SQL QUERY — `SELECT *`
	`FROM Product AS P AND Sales AS S`
	`WHERE P.ProductID=S.ProductID`
		20

Go Back   Save Practice Stages

Figure 2: Adding Screen Practice Steps for Educators

Each student chosen from Table 1 in the overall practice steps in a particular subject are to perform at the specified time. Each student's performances are checked by the software developed for this practice and giving points designated for each correct application to students, score of student's practice is calculated. Practice Detail Screen for students is shown in Figure 3 and SQL Query Screen for each practice stage is shown Figure 4.

Student ID	**132155001**		
Name and Surname	**Yakut ÖZCAN**		
Total Score	**100 points (20*5)**		
Duration	**50 minutes**		
Practice Subject	**E-Commerce Web Site**		
NO	**PRACTICE**	**OPERATION**	**SCORE**
1	Create a Database for Using in E-Commerce Web Site	Enter SQL Query	20
2	Select a Character Set to Database for International Using	Enter SQL Query	20
3	Create a Database Table Column and its properties for this 4 object Products,Customers,Sales,Categories	Enter SQL Query	20
4	Insert of Data to Database Table for Products,Customers,Sales	Enter SQL Query	20
5	Select of Data for Sales use Relations Database Query	Enter SQL Query	20

Figure 3: Practice Stage Screen for Students

Practice Stage	Create a Database for Using in E-Commerce Web Site
Enter SQL Query	CREATE DATABASE ECommerce
Message	✅ 1 row(s) returned
	Show Practice List Run Query Save Query

Figure 4: SQL Query Screen for Student

The applications made by the student as to identify issues and the intended practical stages are checked by educator with computer software. Practice Control Screen for educator is shown in Figure 5.

Lecturer	Lec. Fatih BOZKURT				
NO	PRACTICE SUBJECT	NUMBER OF STAGE	NUMBER of STUDENT	TOTAL SCORE	OPERATION
1	E-Commerce Web Site	5	54	100	Control Practice
2	Library	5	54	100	Control Practice
3	Hospital	6	54	90	Control Practice
4	Car Technical Service	4	54	80	Control Practice
5	SuperMarket	4	54	80	Control Practice

Figure 5: Practice Control Screen

FINDINGS

Traditional Method of Measurement and Scoring
In the traditional method the list has prepared in Figure 6, the performed practice have been checked and scored by educator. The checking and scoring process time in the traditional method for a total of 54 students took 51 minutes. This time period is equal to a course time.

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Practice Subject	E-Commerce Web Site		Total Score	100 points (20*5)		
Practice Duration	50 minutes		Time	51 minutes for 54 student		
NO	Surname Name	1.Stage Score	2.Stage Score	3.Stage Score	4.Stage Score	5.Stage Score	TOTAL

NO	Surname Name	1.Stage	2.Stage	3.Stage	4.Stage	5.Stage	TOTAL
1	ALBAYRAK İBRAHİM MERT	10	10	15	20	20	75
2	GÖÇMEN GONCA	15	15	10	15	10	65
3	SAĞLAM SERHAT	20	10	15	20	10	75
4	ŞİŞMAN DENİZ HAN	20	10	20	20	20	90
5	ŞAHİN TUĞÇEM	10	10	10	10	15	55
6	ÖZCAN YAKUT	10	15	20	20	20	85
7	CEYLAN ENES	10	15	20(10)	20	10	65
8	ÇAKICI KAĞAN	10	15	20	20	20	85
9	AYDOĞAN EBUBEKİR	15	15	20	10	10	70
10	MUŞTAK FATIMATÜL ZEHRA	15	10	20	20	20	85
11	ERİK MUHAMMED	20	10	20	10	10	70
12	GÜREL MURAT	10	0	10	20	0	40
13	SÜREN MELEK OLCAY	15	15	0	0	0	30
14	AKKUŞ HULYE	20	20	10	15	15	80
15	DOYMAZ KÜBRA	20	15	10	5	20	70
16	AKGÜN RAMAZAN	20	20	20	20	10	90
17	TUNA MEHMET BUĞRAHAN	10	10	10	10	10	50
18	AYYILMAZ MEHMET	0	0	0	0	0	0
19	UYGUN İBRAHİM	10	10	10	10	20	60
20	BAYRAM DİLEK	20	10	15	20	20	85
21	ÇOBAN SÜLEYMAN	10	10	10	10	10	50
22	DEMİRTAŞ ABDULLAH	15	15	15	0	0	45
23	KAYMAK CİHAN	10	10	20	20	20	80
24	YILDIRIM BORAY	10	10	10	20	20	20
25	PINAR PERİ	10	10	15	20	20	75
26	YAREN TEZCAN	15	15	10	15	10	65
27	BURAK YUSUFU	20	10	15	20	10	75
28	KÜNAL AHMET	20	10	20	20	20	90
29							
30	NARBULLE	10	10	10	10	15	55
31	KADİR EGE	10	15	20	20	20	85
32	YILMAZ MERVE	10	15	20(10)	20	10	65
33	ALTAY SÜLEYMAN	10	15	20	20	20	85
34	INAL AKGÖRREZ	15	15	20	10	10	70
35	GÜÇLÜ HELİHAN	15	10	20	20(20)	20	85
36	YÜKSEL MEHMET ALİ	20	10	20	10	10	70
37	AYNA MUHAMMET EMİN	10	0	10	20	0	40
38	ÖZKAN HAZEFE GÜL	15	15	0	0	0	30
39	ÖZCAN ÖZGE	20	20	10	15	15	80
40	YILMAZ GÜLEN	20	15	10	5	20	70
41	KARABULUT SELDA	20	20	20	20	10	90
42	YÜKSEL MUSTAFA	10	10	10	10	10	50
43	YAKICI CEM						
44	UÇAR FARUK	0	0	0	0	0	0
45	ALTAY EMRE	10	10	10	10	20	60
46	YETİM UĞUR CAN	20	10	15	20	20	85
47	ÇETİN EDA						
48	KAPLAN EMRE	10	10	10	10	10	50
49	SAĞLAM AYŞIN	15	15	15	0	0	45
50	FILIZ ALİ OSMAN	10	10	20	20	20	80
51	TÜRK ERAY	10	10	10	10	10	50
52	ÇETİN TANSU	15	15	15	0	0	45
53	AKYÜZ EKTAN	10	10	20	20	20	80
54	ERTAŞ HALİL	10	10	10	20	20	20

Figure 6: Traditional Practice Check List

Computer-Aided Method of Measurement and Scoring
The checking and scoring process in the computer-aided method for a total of 54 students took 34.8 seconds. (Practice control made by developed computer software with 34.8 seconds to control 54 students took place in such a short time).

Practice Subject	E-Commerce Web Site		Total Score	100 points (20'5)
Practice Duration	50 minutes		Execution Time	34.8 seconds for 54 students

NO	Surname Name	1.Stage Score	2.Stage Score	3.Stage Score	4.Stage Score	5.Stage Score	TOTAL
1	ALBAYRAK İBRAHİM MERT	10	*Select a Character Set to Database for International Using*				35
2	GÖÇMEN GONCA	20	0	20	20	0	60
3	SAĞLAM SERHAT	20	0	10	20	20	70
4	ŞİŞMAN DENİZ HAN	20	15	20	10	20	85
5	ŞAHİN TUĞÇEM	0	0	15	15	0	30
6	ÖZCAN YAKUT	0	15	15	20	0	50
7	CEYLAN ENES	10	15	10	15	15	65
8	ÇAKICI KAĞAN	20	20	15	20	15	90
9	AYDOĞAN EBUBEKİR	20	0	10	20	10	60
10	MUŞTAK FATIMATÜL ZEHRA	15	15	15	10	10	65
11	ERİK MUHAMMED	10	20	15	20	20	85
12	GÜREL MURAT	0	20	0	10	0	30
13	SÜREN MELEK OLCAY	20	0	20	20	0	60
14	AKKUŞ HULİSİ	0	10	20	10	20	60
15	DOYMAZ KÜBRA	10	20	15	10	20	75
16	AKGÜN RAMAZAN	0	0	20	15	10	45
17	TUNA MEHMET BUĞRAHAN	0	0	10	10	20	40
18	AYYILMAZ MEHMET	0	20	20	15	15	70
19	UYGUN İBRAHİM	0	20	10	15	0	45
20	BAYRAM DİLEK	15	20	10	20	0	65
21	ÇOBAN SÜLEYMAN	0	15	10	20	15	60
22	DEMİRTAŞ ABDULLAH	10	0	20	15	15	60
23	ÖZTEMÜR CİHAN	20	15	10	20	0	65
24	YURDAKUL KORAY	15	10	15	10	10	60
25	ÖNDER FEVZİ	20	15	0	15	0	50
26	YAREN TOLGAHAN	0	10	20	20	15	65
27	TURGUT BURAK	0	10	0	10	15	35
28	YUSİFLİ ROYAL	0	0	10	20	15	45
29	DURMUŞ KADİR	10	10	20	15	15	70
30	SARI MAKBULE	15	0	20	10	20	65
31	ERSÖZ EŞE	0	10	15	0	15	40
32	YILMAZ MERVE BÜŞRA	10	10	15	20	20	75
33	ALTAY SÜLEYMAN	0	20	20	10	10	60
34	MAL MÜŞERREF	0	0	0	0	0	0
35	ÖZÇELİK OĞUZHAN	20	0	20	10	10	60
36	YÜKSEL MEHMET ALİ	15	0	0	15	0	30
37	AYNA MUHAMMET EMİN	20	20	10	10	20	80
38	ÖZADAM NAZİFE GÜL	10	10	20	20	20	80
39	ÖZCAN ÖZGE	0	20	20	20	0	60
40	OYMAZ GİZEM	15	20	15	0	20	70
41	EDEBALİ SELDA	10	20	10	15	15	70
42	YÜKSEL MUSTAFA	0	0	10	20	15	45
43	TAŞÇI EZGİ	10	0	15	20	20	65
44	UÇAR FARUK	0	10	15	10	10	45
45	ALTAY EMRE	20	20	10	15	0	65
46	ÇİTİM UĞUR CAN	15	10	10	20	20	75
47	ÖZTÜN EDA	10	20	0	15	0	45
48	KAPLAN ŞAKİR	0	15	15	0	0	30
49	SAĞLAM AYSUN	10	20	10	20	20	80
50	YILMAZ Lİ OSMAN	15	20	20	0	15	70
51	TÜRK ERAY	20	15	0	0	10	45
52	ÇETİN TAHSİN	10	15	10	10	0	45
53	AKYÜZ FATMA	10	0	20	10	0	40
54	ERTAŞ HALİL	0	10	10	0	0	20

Figure 7: Computer-Aid Practice Check List

Process time of both methods are comparing in Figure 8. According to this diagram it is understood that the difference between the two duration of the methods is too large compared and duration of the traditional methods, 1 minute per student is increasing proportionally according to increase in the number of students, duration of the computer aid method, 0.01 seconds per student is increasing proportionally according to increase in the number of students.
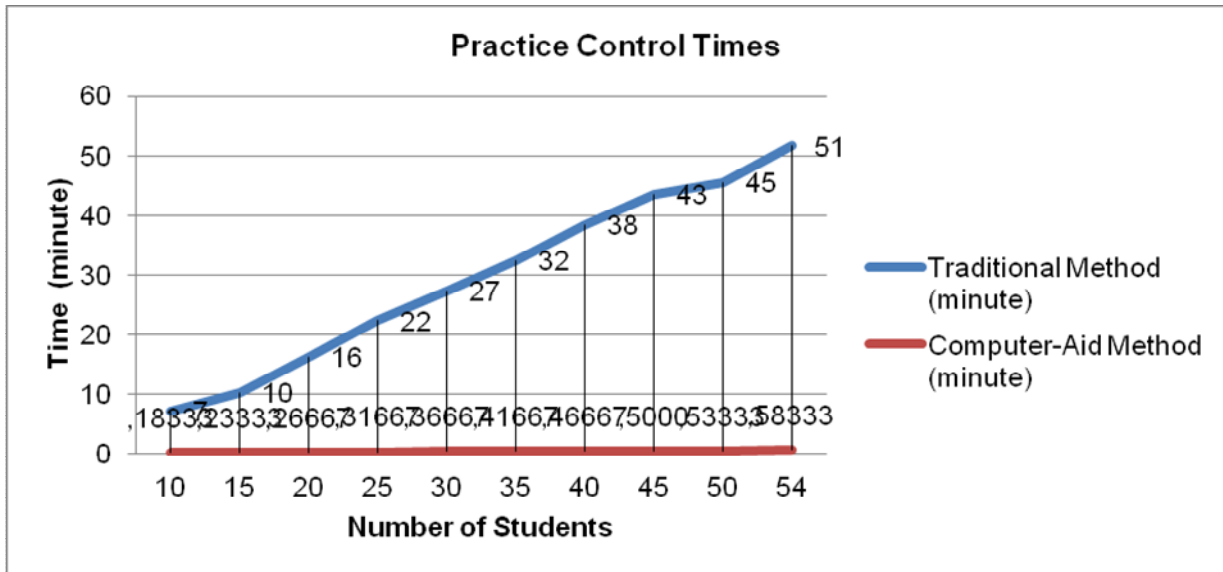
Figure 8: Practice Control Times

The developed software to perform measurement and evaluation process run on fast server computer and Windows Server 2012 operation system. The Server computer has Intel Xeon E3-1220 (3.10GHz 8MB) Quad Core processor, 4 GB PC3-10600E 1333 MHz ECC DDR3-SDRAM, 1 TB SATA 3.5" NHP HDD hard disk and 1Gb 2-port 330i Adapter Ethernet card. Database software is MySQL 5.6.

DISCUSSION AND RESULTS

Velocity
According to findings it is shown that the computer aid method is more effective compared the traditional method. The measurement practice time is decreased in computer aid method and the time problem caused by traditional method has been eliminated. Therefore more time can be allocated more effectively education.

Statistical Evaluation
The computer aid measurement and evaluation of practice stages offers more efficient way in the examination of the statistical evaluation. Average scores of practice stages of "Ecommerce Web site" issue are shown in Figure 9. Statistical information of the student's practice success has been achieved faster with computer software
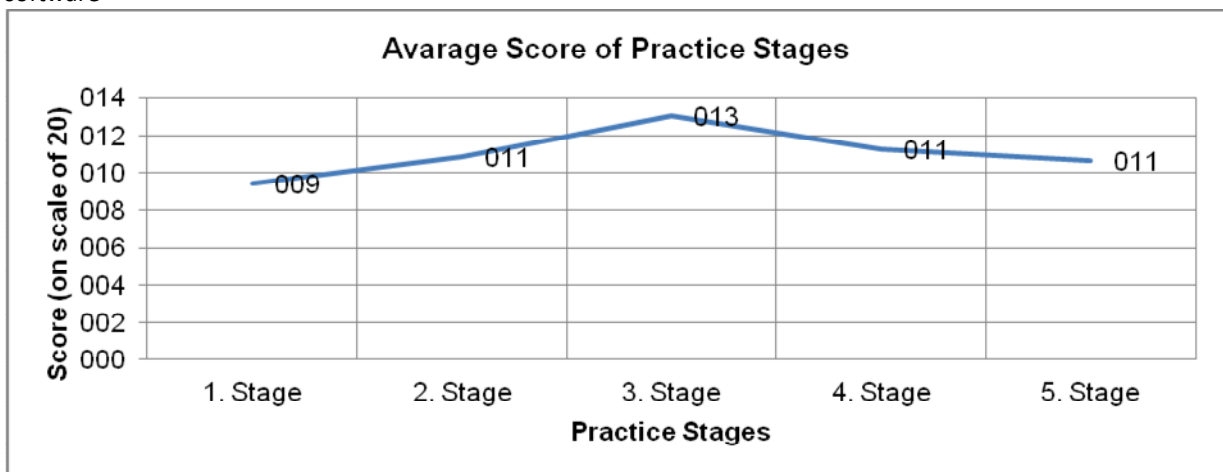

Figure 9: Average of Practice Stage of E Commerce Web Site