**STUDENTS' PERCEPTIONS ABOUT ONLINE
ASSESSMENT : A CASE STUDY**

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Approval of the Graduate School of Natural and Applied Sciences

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ABSTRACT

STUDENTS' PERCEPTIONS ABOUT ONLINE ASSESSMENT : A CASE STUDY

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For many reasons, the use of computer based of assessment is increasing. Although there is an increasing usage of computer based exams, there are not enough researches about student perception towards online assessment in general and perception of students towards categorized fields of online assessment systems.

To figure out the students' perceptions of online assessment an exam web site has been developed and implemented. This web site is a database driven web site and containing multiple choice questions. This online assessment site used as assessment module of "Masaüstü Yayıncılık" course given by Department of Computer Education, Kocaeli University. The perceptions of the students' towards online assessment have been evaluated in terms of User interface,

Impacts on learning process, System usage and general opinions on online assessment.

The aim of the study is to investigate students' perceptions of the use of CAA and to investigate the potential for using student feedback in the validation of assessment.

The results indicated that students have positive attitudes against online assessment. Results of questionnaires showed that user interface of the assessment web site is proper and well designed but need to be further development. The system use of the web site is easy. The impacts of the learning progress of the web site are sufficient but assessment web site should be developed by enriching the system components meeting the student needs. Security should be ensured.

Keywords: Online assessment, online exam, computer assisted exam, web based testing.

ÖZ

ÖĞRENCİNİN ÇEVRİM İÇİ SINAV ALGISI :
BİR DURUM ÇALIŞMASI

Şanlı, Refik

Yüksek Lisans, Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü

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Birçok nedenden ötürü, bilgisayar tabanlı sınavların kullanımı artmaktadır. Sınavlarda bilgisayarın kullanımı artmasına rağmen, genel olarak öğrencinin çevrim içi sınav algısı ve öğrencinin çevrim içi sistemde farklı gruplardaki alanları algılaması ile ilgili yeterince araştırma yoktur.

Öğrencinin çevrim içi sınav algısını ortaya çıkarmak için bir sınav web sitesi geliştirilmiş ve uygulanmıştır. Bu web sitesi veritabanı tabanlı ve çoktan seçmeli sorular içeren bir sitedir. Bu çevrim içi site, Kocaeli Üniversitesi Bilgisayar Öğretmenliği Bölümü tarafından açılan "Masaüstü Yayıncılık" dersinin değerlendirme kısmı olarak kullanılmıştır. Kullanıcı ara yüzü, öğrenme sürecine etkileri, sistem kullanımı ve çevrimiçi sınav hakkında genel düşünceler alanlarında çevrimiçi sınava karşı öğrenci algıları değerlendirilmiştir.

Araştırmanın amacı bilgisayar destekli sınavda öğrenci algılarını incelemek ve sınavın geçerliliğinde öğrenci geri beslemelerinin potansiyelini araştırmaktır.

Sonuçlar göstermiştir ki ; öğrenciler çevrim içi sınava karşı pozitif davranışlara sahipler. Anket sonuçları, kullanıcı ara yüzünün kullanışlı ve iyi bir tasarımı olduğunu fakat daha fazla geliştirilmesi gerektiğini göstermiştir. Sistemin kullanımı kolaydır. Çevrim içi sınav için hazırlana web sayfasının öğrenme sürecine etkisi yeterlidir fakat bu etki öğrencilerin sınavdaki ihtiyaçlarını karşılayıcı parçalar eklenerek geliştirilmelidir. Güvenlik sağlanmalıdır.

Anahtar Kelimeler: Çevrim içi değerlendirme, çevrim içi sınav, bilgisayar tabanlı sınav, web tabanlı test.

To my nieces, Fezya Nur POLAT, Elif POLAT & Zeynep ŞANLI

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INTRODUCTION

1.1 Background of the Study

In the recent years developments in Information and Communication Technologies (ICT) have led to a growth in the range of Internet-tools which can be used for learning and research. Some have gained wide scale acceptance (for example, the ease with which email has been taken up), others seem to find either niche applications or are less pervasive than one might have first imagined (for example, video conferencing). Barnett et al. (Barnett, 1997) provides a adequate introduction to learning technologies and their role within Higher Education. A more recent report, produced by the Association of Learning Technology (Seale & Rius-Riu, 2001), provides a useful contextualization of learning technology and technologies, an overview of the main tools and the ways in which they can be used.

This study will describe the findings of an external evaluation of a project which aimed "to disseminate good practice, guidelines and models of

implementation and evaluation" of one particular type of learning technology, namely computer-assisted assessment (CAA). In particular the evaluation explored the impact of integrating CAA within learning and teaching and perception of students.

CAA encompasses a range of activities, including the delivery, marking and analysis of all or part of the student assessment process using standalone or networked computers and associated technologies. Previous research has shown that there are a range of motivations for implementing CAA within a course and it is often a combination of factors which result in CAA being used (Bull & McKenna 2001). Some of the key reasons frequently cited include:

• To increase the frequency of assessment, motivating students to learn and encouraging skills practice

• To broaden the range of knowledge assessed

• To increase feedback to students and lecturers

• To extend the range of assessment methods

• To increase objectivity and consistency

• To decrease marking loads

• To aid administrative efficiency

The Quality Assurance Standards (QAA, 2000) provide an interesting starting point for examination of perception and assessment.

In line with many writers in the field of assessment, the QAA distinguish three types of assessment:

Diagnostic assessment – provides an indicator of a learner's aptitude and preparedness for a program of study and identifies possible learning problems;

Formative assessment – designed to provide learners with feedback on progress and informs development but does not contribute to the overall assessment;

Summative assessment – provides a measure of achievement or failure made in respect of a learner's performance in relation to the intended learning outcomes of the program of study.

1.2 Purpose of the Study

Over the past decade there has been a large increase in the use of computer based assessment (Stephens & Mascia, 1997). However, there has been little published to date on student views of computer based assessment, particularly that based on more complex interactions offered by the TRIADs system (Mackenzie, 1997).

Given some of the published work on the prevalence of computer anxiety among students (Tseng, 1997, Brosnan, 1999), the use of computers for assessment has been laid open to question. In addition, in some instances the economic imperative to take-up CAA has perhaps left the educational imperative behind. Thus there is a potential concern that the validity of CAA has yet to be established, it is certainly true that there are "rich veins of unanswered questions" in this area (Perkin, 1999). This comes along with a general recognition within HE that assessment is no longer separate to the learning process, but impacts on all stages of the learning process (Brown & Knight, 1994). Given the history of

CAA ,I was interested to observe the impacts of the introduction of CAA on the learning process and to further investigate the perception of students.

The aim of the study is to gain student perception of the use of CAA and to investigate the potential for using student feedback in the validation of assessment.

1.3 Significance of the Study

As indicated above, for many reasons, the use of computer based assessment is increasing. Examples include, entrance exams in education, military training exams, job application exams in the private sector, and certification exams by professional groups (Russo, 2002). Although there is an increasing use of computer based exams, there are not enough researches about students' perceptions towards online assessment in general and perception of students towards categorized fields of online assessment systems.

Researches on students' perceptions towards categorized areas of online assessment systems give a detailed information about which parts of the online assessment systems are important or which parts of the systems should be developed or revised to get the better results.

To figure out the students' perceptions about online assessment a web site has been developed and implemented. The web site is a database driven web site and contained multiple choice questions. This online assessment site used as assessment part of "Masaüstü Yayıncılık" course given by Department of Computer at Kocaeli University at the spring term of 2003. The perception of the students towards online assessment has been evaluated in fields of User interface,

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Impacts on learning process, System usage and general opinions on online assessment.

1.4 Definitions of Terms

Internet : Networks of networks. In another word, The internet is global network that consist of a large collection on interconnected computer networks around the world. There are several services of internet including electronic mail, World Wide Web (WWW), ftp, telnet etc.

World Wide Web (WWW)

It is one of the services of the Internet , such as, Internet Explorer, Netscape Navigator, Mosaic etc.

Distance education :

At its most basic level, distance education takes place when a teacher and student(s) are separated by physical distance, and technology (i.e., voice, video, data, and print), often in concert with face-to-face communication, is used to bridge the instructional gap. These types of programs can provide adults with a second chance at a college education, reach those disadvantaged by limited time, distance or physical disability, and update the knowledge base of workers at their places of employment.

Internet Based Education:

The Internet offers many powerful resources for implementing distance education. Internet-based education can take many forms, including: (1) tutorial, (2) virtual classroom, (3) correspondence course, (4) project-based education, and (5) event-based education. Internet-based education can also provide a valuable supplement to more traditional approaches to education. And as Internet technologies develop, more possibilities emerge.

e- learning :

The growing Internet trend has lead to the establishment of what is defined as E-Learning. E-Learning is such a new concept that you won't find it defined in a dictionary. E-Learning is one of the most revolutionary tools since the Internet. It allows for live virtual classrooms, web-based training, broadband E-Learning, strategic consulting, and courseware development.   E-learning eliminates the barriers of time and distance creating universal, learning-on-demand opportunities for people, companies and countries" (Cisco E-learing.com).   Countries must educate their citizens, businesses must train their workers and educational institutions must offer innovative programs. With the challenges come the opportunities. "In the information age, learning opportunities span a lifetime-from childhood to adulthood.

online learning :

Online learning is referred to as web-based learning, in other words, learning over the Internet. It is a subset of e-learning. E-learning is a subset of all

training, which also includes instructor-led training and text-based training. In this report a distinction between online learning and e-learning will be made, and most of the content focus on online learning and online distance learning (ODL).

Online Assessment :

Online assessment is a method to assess student learning in an online environment (internet). Features in available online assessments include multiple choice, collaborative projects, online debates, team case studies and self assessment. Feedback is either instantly available or is given later by the course administrator. The most commonly used tests, for example tests consisting of multiple choice questions and short answer tests, are automatically handled by computer programs.

Computer-Aided Assessment (CAA) :

The term computer-aided assessment can cover any kind of computer use in the process of assessing knowledge, skills and abilities of individuals (Kuswaha, & Whitescarver, 1994).

Formative Assessment :

Ongoing assessment, with a view to making changes.

Summative Assessment :

Assessment which is made at the completion of a program, to provide information on whole of activity.

Synchronous communication:

Synchronous refers to communication that occurs instantaneously, in real time. The telephone is an example of this --- both participants in a telephone conversation are present --- at their respective locations -- simultaneously.

Asynchronous communication:

Asynchronous communication refers to communication that does not take place in real time but is delayed at the receiver's end. A telephone answering machine is an example of asynchronous communication. Electronic mail is another example.

Active server pages (ASP):

ASPs are server-generated pages which can call other programs to do things like access databases, serve different pages to different browsers - basically, anything we used to do with CGI. ASP is almost as efficient as writing code directly to the server's application program interface, and it's a lot more efficient than CGI because it runs as a service and can take advantage of multithreaded architectures.

Access : It as database and mostly used with ASP developed by Microsoft.

Server : It is main machine in the networks that manages the everything in the networks.

Client : It is the machine operating on the user site.

CHAPTER 2

LITERATURE REVIEW

Today we live in the information age. The most important development of the information age is Computers. Huge developments in computers and computer network systems have given a birth; Internet which is the networks of networks. By means of internet reaching information has become so easy and cheap. Those main features of internet made it so popular. It has become main medium of communication, finance and education.

As the scope of the World Wide Web expands to include large number of applications, it seems only natural that education becomes one of them. The opportunities for education presented by the growth of the Web should not be overlooked. The potential audience for a lecture has grown from the number of people who can fit into a classroom, to the number of people with access to Web-enabled computers. The ability to offer quality education to vast numbers of people is within our reach.

Because this field is only a few years old, there are many Universities and companies working to develop useful, marketable systems for Web-based course delivery. Some notable examples include Web Course in a Box (Godwin & Goldberg, 1997).

2.1 Why Online

It is useful to think about the merits of Web-based education in general. What are the advantages and disadvantages of using the Web for distance learning? How should different content delivery systems be compared and evaluated? How do we measure the success of any of these systems?

There are many Web sites which offer some form of educational content. However, most of these sites are limited in either the scope of their content or their potential audience. Some sites are merely lecture notes or slides prepared by individual professors for their own courses. Other sites are designed to replace or support corporate training classes and are therefore only available to a small segment of the population. A useful course delivery system should be a natural extension to the traditional university teaching structure, and should offer comparable quality and types of educational services.

2.2 e-Learning vs. online learning

The term e-learning has existed just for a couple of years and is lacking a worldwide definition. In the daily life e-learning is used interchangeably with online learning, but some definitions is used to cover almost any technology supported learning initiative, such as computer-based learning, web-based learning, virtual classrooms and digital collaboration. Thus, e-learning includes the delivery of content via all electronic media, including the Internet, intranets, extranets, satellite broadcast, audio/video and CD-ROM.

Online learning is referred to as web-based learning, in other words, learning   over the Internet. It is a subset of e-learning. E-learning is a subset of all training, which also includes instructor-led training and text-based training. In this report a

distinction between online learning and e-learning will be made, and most of the content focus on online learning and online distance learning (ODL) (see Figure 2.1)
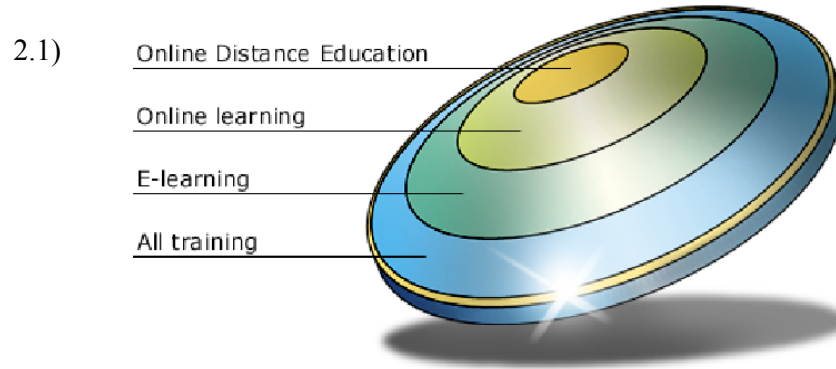
Figure 2.1: Categories of learning

Online learning is currently presented as the next evolution of the education

industry. The market can be divided into corporate organizations, schools and universities.

Today the corporate learning market is relatively small, but it is expected to explode in a couple of years. Analysts have issued amazing growth for the e-learning industry. The International Data Corporation (IDC) has predicted the online delivery of distributed learning to grow at 83% a year over the next three years (Barron T.,2001). When looking at the Nordic countries the corporate e-learning market are forecasted to grow by 71% in the next 5 years (IDC,2001). However, the e-learning market is very fragmented and difficult to get a grip on.

One reason for that is the lack of technology standards. Another reason is that the focus on technology, such as developing online learning platforms has left the question of content and learning issues behind. The primary growth drivers include the demand for skilled workers and a global economy where a company is located in several countries.

The area where online learning is getting more and more attention is in schools and universities. Several kinds of educational institutions are active with different approaches to web-based learning.

First and foremost there are the traditional colleges and universities that uses online distance learning as an extension to classroom-based learning (c-learning). Nearly every university is experimenting with or planning for online programs. In addition there are nonprofit open universities, for example The Open University in the U.K. that combines c-learning and online learning strategies.

There are also nonprofit virtual universities, cyber campuses, such as the Community College Distance Learning Network in U.S.A. They are primarily based
on online methods for instruction.

The other side is the for-profit universities, for instance, the University of Phoenix Online in U.S.A., the undisputed leader on the market with over 18,000

students. Getting an MBA degree at Phoenix costs $23.000. Jones International University, the country's first totally online university is another example.

Table 2.1 shows the number of colleges and universities that offer online courses throughout the world. The Carnegie Classification includes colleges and universities in USA that are degree granting and accredited by an agency recognized by the U.S. Secretary of Education. The only Swedish University that was found in this list is the Royal Institute of Technology (KTH) in Stockholm. The table shows how much USA has adopted and used the online learning strategy. Nearly 47 percent of U.S. colleges offered some form of distance learning last year. According to analysts IDC, almost 90 % of US colleges will offer e-learning by the end of 2004 (Barron, 2001).

Table 2.1: ODL providers by type (elearning.com)

Online distance learning providers by type	
Carnegie Classified Higher Ed 1003	**1003**
Master's Colleges & Universities	207
Baccalaureate Colleges	86
Associate's Colleges	412
Doctoral / Research Universities	231
Specialized Institutions	67
Misc. Higher Ed. Institutions	**224**
(not Carnegie Classified)	
U.S. Institutions	125
Non-U.S. Institutions	99
Other Learning Providers	**418**
Training Providers	162
Misc. Learning Providers	202
Virtual High Schools	14
Non-U.S. Learning Providers	40

The universities are also starting to break into two new markets that have been relatively neglected: international and adult learners. Many universities are

partnering with vendors to distribute their content. Other recent developments include the collaboration between universities, for example the Alliance of Four, consisting of four universities in U.S.A. "Distanskonsortiet" in Sweden is a similar approach where the universities in Lund, Uppsala, Växsjö, KTH and Umeå, are working together with the development of online distance courses (Distanskosortiet,2001).

2.3 LMS, Learning Management System

Learning environments can be categorized in three different types: traditional, virtual and cyber learning . The traditional environment is another term for an old fashioned, physical classroom. Virtual Learning Environments (VLE), is the online version of traditional learning. Lectures, discussions and examinations are placed online but the content is almost the same as in c-learning. The most recent approach is to change the concept of learning, the theory behind, and implement something that is being called "a new learning paradigm". This may be described as a "cybernetic learning environment" (James, 2001), since it takes advantage of the capabilities of the online environment instead of merely repackaging existing forms of delivery.

The tools used in an online learning environment are, when combined together, called a Learning Management System (LMS). An LMS is a platform developed for managing an educational process online, giving course administrators and teachers a possibility to track and monitor learner activity and

completion. The most common LMS model is based on client/server architecture. The client consists of a web browser that accesses HTML pages on the server. The server software either resides behind an existing web-server or includes its own web-server.

Current LMS's make use of a wide range of technologies and media. A basic LMS consists of the following components:

_ *A content delivery function*
The content may be in the form of text, images, sounds, animations, videos or simulations. However the basic functionality that can be expected from an online learning environment is the creation of plain text and HTML documents.

_ *A navigation model*
Calendar, links and bookmarks.

_ *Online assessment*
Tools for delivering and managing tests .

_ *Data*
Course outline, class lists and student home pages.

_ *Synchronous tools*
Chat-rooms and shared whiteboards. The chat-rooms allow the course members to communicate in real time. Shared white boards can be used during an online discussion. This tool allows the user to insert graphics and draw objects.

_ *Asynchronous tools*
e-mail and web-forums.

The users of LMS are generally divided in groups with different access to the system. While teachers have a similar view of the system as students, in addition they will have tools and privileges that allow them to add materials, track

student progress and so on. Some LMS's also have different views for parents and course administrators (managers).

Choosing a platform is not an easy task. There are many vendors that develop their own LMS, and it seems that the market changes from day to day. Among the most popular platforms are Blackboard, IntraLearn, TopClass, WebCT and Learning Space.

2.4 TYPES OF ASSESSMENT

2.4.1 Authentic Assessment

Assessment is authentic when we directly examine student performance on worthy intellectual tasks. Traditional assessment, by contract, relies on indirect or proxy 'items'--efficient, simplistic substitutes from which we think valid inferences can be made about the student's performance at those valued challenges.

Do we want to evaluate student problem-posing and problem-solving in mathematics? experimental research in science? speaking, listening, and facilitating a discussion? doing document-based historical inquiry? thoroughly revising a piece of imaginative writing until it "works" for the reader? Then let our assessment be built out of such exemplary intellectual challenges.

Further comparisons with traditional standardized tests will help to clarify what "authenticity" means when considering assessment design and use:

- Authentic assessments require students to be effective performers with acquired knowledge. Traditional tests tend to reveal only whether the student can recognize, recall or "plug in" what was learned out of context. This may be as problematic as inferring driving or teaching ability from written tests alone.

- Authentic assessments present the student with the full array of tasks that mirror the priorities and challenges found in the best instructional activities: conducting research; writing, revising and discussing papers; providing an engaging oral analysis of a recent political event; collaborating with others on a debate, etc. Conventional tests are usually limited to paper-and-pencil, one- answer questions.

- Authentic assessments attend to whether the student can craft polished, thorough and justifiable answers, performances or products. Conventional tests typically only ask the student to select or write correct responses-- irrespective of reasons.

- Authentic assessment achieves validity and reliability by emphasizing and standardizing the appropriate criteria for scoring such products; traditional testing standardizes objective "items" and, hence, the right answer for each.

- "Test validity" should depend in part upon whether the test simulates real-world "tests" of ability. Validity on most multiple-choice tests is determined merely by matching items to the curriculum content .

- Authentic tasks involve "ill-structured" challenges and roles that help students rehearse for the complex ambiguities of the "game" of adult and professional life. Traditional tests are more like drills, assessing static and too-often arbitrarily discrete or simplistic elements of those activities.

Beyond these technical considerations the move to reform assessment is based upon the premise that assessment should primarily support the needs of learners. Thus, secretive tests composed of proxy items and scores that have no obvious meaning or usefulness undermine teachers' ability to improve instruction and students' ability to improve their performance. We rehearse for and teach to authentic tests--think of music and military training--without compromising validity.

The best tests always teach students and teachers alike the kind of work that most matters; they are enabling and forward-looki ng, not just reflective of prior teaching. In many colleges and all professional settings the essential challenges are known in advance--the upcoming report, recital, Board presentation, legal case, book to write, etc. Traditional tests, by requiring complete secrecy for their validity, make it difficult for teachers and students to rehearse and gain the confidence that comes from knowing their performance obligations (Bugbee, 1996).

2.4.2 Group work

Students learn best when they are actively involved in the process. Researchers report that, regardless of the subject matter, students working in small groups tend to learn more of what is taught and retain it longer than when the same content is presented in other instructional formats. Students who work in collaborative groups also appear more satisfied with their classes. (Beckman, 1990)

Various names have been given to this form of teaching, and there are some distinctions among these: cooperative learning, collaborative learning, collective learning, learning communities, peer teaching, peer learning, reciprocal learning, team learning, study circles, study groups, and work groups. But all in all, there are three general types of group work: informal learning groups, formal learning groups, and study teams (Johnson & Smith, 1991).

Informal learning groups are ad hoc temporary clusterings of students within a single class session. Informal learning groups can be initiated, for example, by asking students to turn to a neighbor and spend two minutes discussing a question you have posed. You can also form groups of three to five to solve a problem or pose a question. You can organize informal groups at any time in a class of any size to check on students' understanding of the material, to give students an opportunity to apply what they are learning, or to provide a change of pace.

Formal learning groups are teams established to complete a specific task, such as perform a lab experiment, write a report, carry out a project, or prepare a position paper. These groups may complete their work in a single class session or over several weeks. Typically, students work together until the task is finished, and their project is graded.

Study teams are long-term groups with stable membership whose primary responsibility is to provide members with support, encouragement, and assistance in completing course requirements and assignments. Study teams also inform their members about lectures and assignments when someone has missed a session. The larger the class and the more complex the subject matter, the more valuable study teams can be.

2.4.3 Minute Paper

The Minute Paper is the single most commonly used classroom assessment technique. It really does take about a minute and, while usually used at the end of class, it can be used at the end of any topic. Its major advantage is that it provides rapid feedback on whether the professor's main idea, and what the students perceived as the main idea, are the same. Additionally, by asking students to add a question, this assessment becomes an integrative task. Students must first organize their thinking to rank the major points and then decide upon a significant question. As we quickly realize, really good questions are hard to formulate (Johnson & Smith, 1991).

Students need not necessarily be asked to list the most important or main point of a session. Sometimes a professor may wish to probe for the most disturbing or most surprising item. The Minute Paper is creatively variable to match the teaching/learning environment.

The Minute Paper assists students to organize a "chunk" of information and reduces the threshold for expressing ignorance by making it easier to ask a question. Minute Papers generally provide positive reinforcement for the professor and have the added surprise that students DON'T all have the same questions. Professors can read about four Minute Papers per minute(Johnson & Smith, 1991).

2.4.4 Portfolios

Portfolios vary greatly in the following four ways:

Target populations: students, faculty, institutions

Content: coursework, reflections, samples of best work

Purpose: assessment of subject-area knowledge, assessment of overall skills, self-presentation (for employment or tenure), program assessment, reflection on growth, goal-setting

Media: paper, web, CD-ROM, video, or some combination.

The database may be searched by purpose, media, institution, or keyword (such as "reflection" or "tenure"). The current records focus primarily on student

portfolios, both paper and electronic, used for assessment and reflection. (Crooks, 1988).

2.4.5 Quizzes, Tests, and Exams

Many teachers dislike preparing and grading exams, and most students dread taking them. Yet tests are powerful educational tools that serve at least four functions. First, tests help you evaluate students and assess whether they are learning what you are expecting them to learn. Second, well-designed tests serve to motivate and help students structure their academic efforts. Crooks (1988) reports that students study in ways that reflect how they think they will be tested. If they expect an exam focused on facts, they will memorize details; if they expect a test that will require problem solving or integrating knowledge, they will work toward understanding and applying information. Third, tests can help you understand how successfully you are presenting the material. Finally, tests can reinforce learning by providing students with indicators of what topics or skills they have not yet mastered and should concentrate on. Despite these benefits, testing is also emotionally charged and anxiety producing.

2.4.6 Performance Assessment

Performance assessment, also known as alternative or authentic assessment, is a form of testing that requires students to perform a task rather than select an answer from a ready-made list. For example, a student may be asked to explain historical events, generate scientific hypotheses, solve math problems, converse in a foreign language, or conduct research on an assigned topic.

Experienced raters--either teachers or other trained staff--then judge the quality of the student's work based on an agreed-upon set of criteria. This new form of assessment is most widely used to directly assess writing ability based on text produced by students under test instructions (Clark, 1994).

2.5 COMPUTER ASSISTED ASSESSMENT

The term computer assisted assessment can cover any use of computers in the process of assessing the knowledge, skills and abilities of individuals (eg for selection or as part of training). Most computer assisted assessment (CAA) falls into one of two categories, which are described separately in this Briefing:

- **recording and guidance systems**
- **computer delivered assessment.**

As with technology-based training (TBT), CAA software can be purchased 'off the shelf' or can be developed to your specification. Except where complex graphics or video are involved, much CAA software can be used on a network, as well as on a stand-alone PC, (Mazzeo, Druesne, Raffeld, Checketts, & Muhlstein, 1991).

2.5.1 Recording and guidance software

What the software does ?

- Recording software designed for use by personnel staff or trainers is usually intended to help the user to keep track of individual performance, eg:

- training undertaken and its results (some products may link this with wider personnel management systems)

- competence of candidates working towards National Vocational Qualifications (NVQs)

- competence of individuals, matched to the competence needs of the organization

- job applicants, especially where testing is involved.

Available products offer a wider range of different features. More expensive products may have a wider range of features than many users need. Others offer a modular approach, allowing users to purchase only those modules which are relevant to their needs.

2.5.1.1 Advantages and pitfalls

- The main advantages of recording and guidance systems are that they:

- Aid efficiency and save time

- Keep track of people and associated data.

- Potential pitfalls to bear in mind when introducing computerized recording and guidance systems are:

- Recording systems are only as good as the data put into them; entering data onto computer does not improve the reliability of assessment results based on poor tests or on poorly specified competences or on subjective judgments

- Systems which hold personal data about individuals are subject to the requirements of the Data Protection Act, for example on prevention of unauthorized access.

2.5.2 Computer delivered assessment

What the software does ?

'Computer delivered assessment' means a test or assessment which is taken at the computer. The individual being tested responds to questions or tasks presented by the software and the software marks the response and provides feedback where required.

Many computer delivered assessments are based on objective questions, such as multiple choice questions in which the user has to select the correct answer from a number of given options. However computer delivered assessments also include tests of typing skills and of software use and simulations of industrial processes or fault finding.

There are three main types of computer delivered assessment product:

- Tests of aptitude or personality, usually used for recruitment and selection. These are normally prepared by chartered Psychologists and sold only to users who have been trained in the administration of such tests and in the interpretation of results
- Tests of specific knowledge or skills. The range of tests currently available off the shelf includes IT skills, knowledge of motor cycle

maintenance, business, science, emergency procedures for security

guards and a simulation of process control for plastics processing

- Question setting shell systems, into which the users put their own

  questions; the software stores the questions and delivers them to

  the individuals according to rules devised by the user.

Products of all three types normally include features to record and track

individuals taking the assessment and may provide statistical analysis of results, (

Mazzeo, Druesne, Raffeld, Checketts, & Muhlstein, 1991).

2.5.2.1 How it is used ?

Computer delivered assessment can be used in a number of different ways:

- for selection of staff for employment or promotion

- for training needs analysis of individuals

- to assess the results of learning

- as a 'license to practice', whether formally or informally (eg to

  determine readiness for a particular job role)

- as part of the assessment for national certification.

2.5.2.2 Benefits and pitfalls

The advantages of computer delivered assessment depend partly upon the

content of the assessment. for example, it may be used to:

- simulate dangerous, expensive or time-consuming processes

- provide rapid assessment of a wide range of knowledge

- incorporate sound, color graphics or moving images into the assessment.

Computer delivered assessment also offers the benefits of:

- greater efficiency than paper and pencil testing or oral assessment

- immediate feedback

- availability 'on demand'

- high potential for interactivity ,(Bugbee, 1996).

2.5.2.3 Pitfalls to avoid are

- using computer delivered assessment for inappropriate knowledge or skills (eg some aspects of interpersonal skills)

- poor quality assessment material (eg outdated, irrelevant or ambiguous questions, lack of attention to equal opportunities issues)

- inadequate briefing and practice opportunities for candidates, which may lead to unfair results or to opposition to the assessment

- lack of attention to security issues (eg cheating, impersonation, results distorted by unintended prior knowledge of questions)

- data protection issues if personal data is stored (Bugbee, 1996).

2.6 ON-LINE ASSESSMENT

Assessment plays an important role in the learning process whatever the mode:

Knowing what you know and don't know focuses your learning. In getting started, students need help in assessing their existing knowledge and competence. Then, in class, students need frequent opportunities to perform and receive feedback on their performance. At various points during college, and at its end, students need chances to reflect on what they have learned, what they still need to know, and how they might assess themselves (Chickering & Ehrmann, 1990).

Some important things to remember when selecting assessment strategies:

Assessment strategies should be employed as integral parts of the learning experience - enabling learners to assess their progress, to identify areas for review, and to re-establish immediate learning or lesson goals (Ragan, 1999).

Assessment techniques work best where learning outcomes have been articulated in advance, shared with students and assessment criteria agreed (Brown & Knight, 1995).

Assessment strategies should accommodate the special needs, characteristics, and situations of the distance learner (Ragan, 1999).

2.6.1 Summative assessment

Assessment which is made at the completion of a program, to provide information on whole of activity.

2.6.1.1 Features of summative assessment:

- is an 'end-point' judgment of the extent to which learners have achieved subject objectives

- is of little value to student learning although grades/outcomes are of great importance to learners

- can lead students to concentrate on a narrow range of skills and content - the things that they think the lecturer is looking for

- often forms the basis of judgments made by others such as employers and academic staff about the student/graduate (Morgan A. 1995).

2.6.2 Formative assessment

Ongoing assessment, with a view to making changes.

The most common distinction in the literature is that made between formative assessment and summative assessment, nonetheless, many assessment activities that learners undertake are both formative and summative: for example, a student may undertake a piece of work and receive extensive feedback from the tutor to guide him or her in their future learning (i.e. formative assessment) but for the same piece of work the student might also be given a grade or a mark that contributes to the overall mark for the unit (i.e. summative assessment). Brown, Bull and Pendlebury (1997) argue that the combining formative and summative assessment in this way may adversely affect the quality of the feedback that learner's receive. The multiple objectives of the assessment may prevent the giving of useful feedback. It may also make it harder for students to focus on the developmental aspects of the feedback if they are sidetracked by personal feelings concerning the mark they have achieved. Indeed, Biggs (1999) argues that for formative assessment, students must feel free to reveal their ignorance and their

errors in their thinking, and if the results are to be used for grading, they will be highly motivated to conceal possible weaknesses. He argues that formative assessment, as a vital function of teaching, should always be present, but the results should not be 'counted' unless the student agrees. The dilemma for tutors then is concerned with student enthusiasm and motivation to take part in formative assessment activities.

2.6.2.1 Features of formative assessment

- a central element in learning

- offers continual feedback and enables learners to correct mistakes or misunderstandings

- helps motivate students by aiding their engagement with the materials and content

- enables learners to develop and extend themselves in ways that end-point assessment cannot

- encourages students to take more responsibility for their own learning

- self and peer assessment are seen as accurate, valid and reliable forms of formative assessment

2.6.2.2 Self and peer assessment

- Both self and peer assessment can enable learners to develop their own transferable personal skills in such areas as group work, problem-solving, leadership, teamwork and creative thinking.

There are some important things to keep in mind about these forms of assessment though:

- students need a great deal of practice in preparation for both peer and self assessment

- closed tasks give more reliable results

- open tasks can be made more closed by sharing the criteria by which they are to be judged

- self assessment is a more sophisticated skill than peer assessment. Peer assessment using criteria provided by the tutor is a good place to start.

- self and peer assessment reinforce each other

2.7 ON-LINE ASSESSMENT – DESIGN & TOOLS

One of the most useful components in any course is assessment, online or not. The primary objective in testing is to determine whether students understand what the course has tried to teach them. Assessment is needed to provide evidence for evaluating student learning and assigning final course grades.

Online assessment of students is today a reality in all forms of education including universities, business and industry training. Almost every LMS has some kind of testing functionality (Brown & Knight 1995).

The key components of the assessment system are (IMS,2001):

_ *Authoring system*
An authoring component used by the course administrator in creation and edition of the assessments.

_ Registration system
The database with the student specific information.

_ Assessment engine
The process that support the evaluation of the responses in terms of producing

scores, evaluation and feedback, a grading component for mechanically scoring the

quiz, reporting the results either to the student or to the instructor.

_ Assessment display system
A delivery component for actually administering tests.

_ Security system
A component for controlling whom can take the assessment, etc.

There are today several assessment systems, available on the market, and

they are all open book tests. That means students can use among other things, available

literature and the Internet, to help them solve questions. One thing that can be

restricted is the time the test is available for the student.

Many of these systems are platform-independent and have their own built-

in testing generating routines. Features in available online assessments include

multiple choice, collaborative projects, online debates, team case studies and self

assessment.

Feedback is either instantly available or is given later by the course

administrator. The most commonly used tests, for example tests consisting of

multiple choice questions and short answer tests, are automatically handled by

computer programs. Where online tests are accepted for grading, they range from

a minor weighting of 5% through to 100% of mark(EDE,2002).

Example of LMSs with an assessment capability are WebCT, TopClass and Toolbook. The University of Technology in Sydney uses top Class as a conferencing tool for management of large classes, i.e. 1100 students. In order to sit at the final exam (proctored), students are required to prove their competency in at least three out of six optional quizzes.

Another approach is to use a separate assessment tool. In Question Mark the following question types are available:

_ *Multiple choice*

_ *Fill-in-the-blank*

_ *Essay questions*

_ *Word response*

_ *Numeric questions*

_ *Matching/ranking*

_ *Hotspot (choosing among pictures)*

_ *Matrix (several multiple choice questions together)*

_ *Explanation screens (insertion of text or graphics for the student to view prior to answering a series of questions)*

All of the above question types can be automatically corrected. For example essay answers can be scored based on the presence or absence of keywords or key phrases. The software provides instant feedback and responses to the user, for example tells the student if he has failed or passed.

Question Mark is sometimes used together with LMS:s as a plug-in. The University of Wisconsin is currently working with Lotus Learning Space and

course administrators use Question Mark as self-assessment tools. Question Mark is also used for pre- and post-course surveys as well as graded quizzes (Question Mark,2001).

A ongoing Swedish project evaluates LMSs. One area investigated is that of capabilities for online assessment. The facilities of online testing in the platforms evaluated seems to be similar to each other and covers at least the first six types mentioned above. If online learning systems just transfer the traditional assessment process into the online course, there will be a lack of emphasis on the special advantages that the computer can provide. Communication works somewhat differently in web-based training and distance education than in the traditional classroom. In the traditional classroom, face-to-face communication allows all parties to send and receive a full range of verbal messages, written, oral and non-verbal communication. Assessment at a distance should take advantage of the best features of the online environment.

2.7.1 On-line quizzes

Students will be expected to practice self-evaluation in every area of their lives on graduation, and it is a good exercise in self-development to ensure that these abilities are extended (Brown & Knight , 1995).

On-line quizzes usually take one of the three forms ;

- short answer questions (fill in the blanks, match/label items, order text, enter text)

- multiple choice questions

- true/false questions.

They can be a powerful and empowering formative and summative assessment tool. They can be marked by the computer on-line or completed and lodged electronically but marked by a teacher or another student.

Self (and peer) assessment give learners a greater ownership of the learning they are undertaking'(Brown & Knight 1995).

Most students will not take part in on-line activities ... unless there is some form of reward for their participation. It is grading which helps establish the worth and therefore the importance of the activity. Where there is little reward the student will treat the activity as unimportant (Harasim, 1995).

2.7.1.1 Advantages

On-line quizzes:

- enable learners to take greater responsibility for their own learning by:

- informing students about their progress

- providing immediate feedback where they are making mistakes

- identifying areas for review

- assisting students to re-establish their learning goals

- helping students to choose topics or pathways to learning

- enable rapid turnaround of student work

- can assist teachers to identify problem areas

- enable staff to attend to students requiring greater assistance

2.7.1.2 Disadvantages

- Cheating?

- Technology Problems

- Students require some technology skills

2.7.1.3 Forms of Usage

On-line quizzes can be used for both formative and summative assessment activities. For some teachers, academic misconduct on the part of students is an issue that they believe cannot be overcome and they are reluctant to use on-line quizzes for the purpose of summative assessment. Others are using it for portions of their summative assessment. Decisions about appropriate use will depend on a the balance of a range of factors including the nature of the subject matter, the nature of the student group, and the policies of the institution.

On-line quizzes can be used to:

- test understanding of core concepts

- test development of key skills

- provide gateways for students as they progress through the content

- provide multiple opportunities for practice

- identify areas of misunderstanding

- provide feedback on teaching strategies

- engage students with content and maintain their interest levels

2.7.2 Advantages with online assessment

Online assessment in distance education can make use of Internet technologies that allow greatly increased communication, interactivity, and collaboration compared to the traditional classroom. In addition, online

assessment can take advantage of the capabilities of other software applications to develop interactive online tests with a wide array of functions. Embedding tools for graphics, video and animation within questions can use the possibility of interactivity. The student can then observe and respond to questions based on different scenarios.

Other advantages are the ease of distribution of content and the possibility to make timed tests. Provision of feedback scores and explanations may be given immediately; e-mail allows for both individual and group feedback. Many students are combining study with work and family responsibilities, and are thus studying at odd hours, maybe evenings and weekends. Students may also be located in different countries (Black & Wiliam, 1998).

2.7.3 Disadvantages with online assessment

One problems with online assessment is uneven access of learners to technology and resources, such as limited bandwidth that affects media-rich learning activities such as videos. Another problem is the time course administrators spend managing test scoring and provide feedback.

Online testing is also limited to objective type questions which may be best suited for undergraduate courses but may not find appropriate use in graduate courses that emphasize case study, discussion, critical thinking and reasoning. Also, electronically graded exams, while providing feedback to students, leave out the personal nature of positive reinforcement provided by using comments from instructors while using traditional paper based medium to inform students why the

answer was marked incorrect instead of providing a generic response and the correct answer. For instructors who decide that online testing is suitable for use in their classes, there are many different approaches. Although high end products have more features but involve complex technical setup and high cost, there are low-end freeware and shareware programs that can be used. Another problem with online assessment is the lack of instructor control over assessment conditions. Because students take tests remotely, there is no way to determine if the tests are being taken by students registered for the course without assistance from either other students or resource materials such as text books. Other issues are students blaming mistakes on technology, sharing answers and computer or server problems during tests.

Without any Internet-based form of authentication of the student's identity, the idea of a "real" online distance learning environment breaks down at this point. The main part of this thesis will look at different approaches to student authentication within the limits of modern technology (Black & Wiliam, 1998).

2.8 SECURITY FRAMEWORK

2.8.1 Security framework

If online assessment is to become an established practice within online distance learning, the need for an overall security methodology will increase greatly. General requirements concerning security in online assessment includes the following (Schneider, 2000).

2.8.1.1 Confidentiality

Confidentiality is the prevention of unauthorized disclosure of information. This can be the result of poor security measures or information leaks. An example of poor security measures would be to allow anonymous access to sensitive information, such as student registration details.

2.8.1.2 Privacy

Privacy is the protection given to prevent unauthorized access to the information in the system, i.e. example, privacy of communication with the teacher and safeguarding of submitted work.

2.8.1.3 Integrity

Integrity is concerned whether data has been modified or destroyed since its creation. Maintaining the integrity of data and information during transmission is of great importance.

2.8.1.4 Authorization

The process of allowing only authorized users access to sensitive information. This concerns access to databases containing tests and answers from students.

2.8.1.5 Non-repudiation

Non-repudiation is the capability, in security systems, of proofing that a message or data originated from a specific person. In other words the ability to

trace a sender and/or prove the ownership of material to prevent unauthorized copying, reuse or redistribution.

2.8.1.6 Authentication

Authentication is about verifying an identity, i.e. the owner of some data. The process of authentication does not grant the user access to resources, this is achieved through the authorization process (Collis, 1997).

Literature view showed that there is a big movement towards distance education caused by huge developments in computer and network technologies. Today, there are different forms of the distance education and also there are lots of researches on distance education. On the other hand there are not many researches about assessment part of the distance education systems. Assessment part of the online education systems is a though problem of the distance education. There are lots of questions in minds related with assessment done online. Key words; authentication, security, technical problems, user perceptions about online assessment system, types of the questions, credibility, and etc are main problems of the online assessment systems. With developments in technology and changing learning styles of the people the problems of the online assessment will be solved and in the close future online assessment will be more widely used in our educations system.

CHAPTER 3

METHOD

This chapter presents the research question, overall design of the study, development and implementation of the online assessment web site, materials, data collection instruments, data collection techniques and sources, data collection and analysis procedure , assumptions and limitations of the study.

3.1 Main problem and sub problems

3.1.1 Main Research Question

The aim of the study is to investigate students' perceptions about the use of Computer Assisted Assessment.

3.1.2 Sub-Questions

In this section the research sub-questions were presented.

Question 1 : How is an online assessment tool is evaluated ?

Question 2 : What are the participants' familiarity with computers ?

Question 3 : What are the prior experiences of participants for online assessment ?

Question 4 : What are participants' perceptions about the user interface of the online assessment web site ?

Question 5: What are participants' perceptions about impacts of learning process of the online assessment web site ?

Question 6 : What are participants' perceptions about system use of the online assessment web site ?

Question 7: What are the participants' opinions about the online assessment web site?

3.2 Design of the Study

The study was a descriptive study, based on online survey and interviews for data collection. For the purpose of the study, online assessment web site was developed in the spring semester of 2003, and implemented as an assessment part of Masaüstü Yayıncılık course given by Department of Computer at Kocaeli University. After online assessment web site was developed to make the participants familiar with the assessment site sample exams were given to participants. Finally, online assessment web site was used as an assessment module "Masaüstü Yayıncılık" course given by department of Computer Education at Kocaeli University. There were 50 multiple choice questions in the online exam. 46 students registered the course "Masaüstü Yayıncılık".

3.3 Method of Sampling

In this study, convenient sampling was used, and participants were 3rd year students of the Department of Computer Education , Kocaeli University. The online assessment web site used for summative assessment of "Masaüstü Yayıncılık" course. 46 students registered to the course and demographic characteristics of the students are in the table 3.1.

Table 3.1 Demographic characteristics of participants

		N	%
SEX			
	Male	40	87
	Female	6	13
AGE			
	20	6	13
	21	30	65
	22	10	21

3.4 Instrumentation

A Questionnaire, user interviews and expert views were used to investigate the student perceptions towards the online assessment. Each tool used in this study is described as follows;

User evaluation questionnaire :   This research has designed its own questionnaire for user evaluation to examine computer familiarity, prior online assessment experience, user interface, impacts on learning process, system usage, etc. of the online assessment web site. There are six major components for the contents of this questionnaire: Computer familiarity, Prior experiences of online assessment, User interface, Impacts on learning process, System usage, Student opinions. The contents of this questionnaire are based on relevant literature and discussions of scholars and experts. They have gone through the process of examination for validity and reliability. The questions have been presented based on likert's five-point scaling method-strongly agree, agree, average, disagree, and strongly disagree.

Questions for In-Depth Interviews :   In order to understand the relevant questions and suggestions for the online assessment system in depth especially in terms of its function designs, implementations and web site productions, it was

necessary to supplement the study through the researcher self designed "Questions for In-Depth User Interviews" after the completion of user evaluation questionnaire analysis. Interviews in-depth would then probe the opinions and suggestions of the user concerning the unresolved answers and controversial issues that could never be revealed through the previous questionnaire.

Questions for Expert Interviews : In terms of the expert evaluation were conducted for system evaluation based on the researcher's self designed "Questions for Expert Interviews". In this way that we understood the expert opinions in regarding to the appropriateness of this system in terms of its functions. The convenience of screen design and interface operation, the opinions and suggestions for system revision in terms of its impact on learning and teaching. The data or information collected was then used as the reference for future system revisions and improvements.

3.4.1 Validity Test

Validity refers to whether a tool for measurement / survey may achieve its intended function or purpose. The user evaluation questionnaire has gone through the processes of pre-test and pilot-study to verify its validity.

3.4.1.1 Pre-test

To attain the goal of questionnaire validity, it was necessary to consult three experts of online assessment web site and one instructor who instructed the course after the completion of the questionnaires. They were asked for their opinions on revising the framework of said contents, words and expressions relating to the issues, etc. The suggestions for revising the questionnaire include: increasing the contents of the questionnaire, more articulation in the expressions of the questions, etc. This improved the questionnaire so that it was able to attain the goal originally intended for the effectiveness in measurement/survey. Through this method of expert validation this research meets the needs of measurement/survey tool efficiency.

3.4.1.2 Pilot-study

More complete validity might be achieved verification through the further process of pilot study. Five students were picked at random for the purpose of this research at that time to conduct pilot-study based on the rough draft of the questionnaire. It was hoped that by giving such a pilot-test the researcher would confirm whether the questionnaire could effectively measure/survey the purpose of this intended research. The opinions or feedback for the revision include the clarification of some questions, etc., so as to present the questions better to the students.

3.4.2 Reliability Test

Reliability refers to being consistent and steady in terms of measurement/survey method. In order to attain the reliability goals for this questionnaire, Cronbach's alpha coefficient was calculated from the results of the pilot study and thus determined the extent or degree of consistency within the questionnaires. Then, reliability of the research measurement tool was found good enough for the further research. The test results are shown in table 3.2 and the reliability of formal questionnaire after revision is shown in table 3.3:

Table 3.2: Cronbach's alpha coefficients of the questionnaire from pilot study (n=5)

Part Number	Evaluation Parts	Cronbach's Alpha Coefficient
Part I	Screen and Interface design	.75
Part II	Impacts on Learning Process	.79
Part III	System Usage	.76
Part IV	Students Opinion	.82
All Part		.83

Table 3.3:Cronbach's alpha coefficients of the questionnaire from pilot study (n=46)

Part Number	Evaluation Parts	Cronbach's Alpha Coefficient
Part I	Screen and Interface design	.76
Part II	Impacts on Learning Process	.75
Part III	System Usage	.75
Part IV	Students Opinion	.79
All Part		.85

The Croncbach's alpha coefficients in the questionnaires of this research are all above 0.75 showing that the reliability level of this research is high.

3.6 Materials

The online assessment web site for the course "Masaüstü Yayıncılık" was used as the online assessment tool of this study. The course instructor was responsible for the instructional design, content creation and all activities for the course but researcher of this study designed and developed an online assessment web site. The web site was developed by using new and powerful internet technologies i.e., Active Server Pages (ASP), Microsoft Access Database, Cascading Style Sheets (CSS).

The online assessment web site mainly designed as two modules, user and administrator interfaces.

User logon area includes exam, past exam results, statistical evaluation, exam result , and help page interfaces

Administrator logon area includes choose exam, number of questions in exam, general exam results, statistical evaluation of all exams, student tracking, add student, delete student, arrange student, student exam result evaluation, and from the choose exam, take the exam, add question, delete question, arrange question, evaluation of questions interfaces.

3.6.1 Entry of the online assessment web site

Figure 3.1 : Screen view of Login screen

"Entry" page of the online assessment web site contains the user name and password fields for the existing user, and new user registration page link

3.6.2 Registration page

Figure 3.2 Screen view of New user registration page

Any user must be a member of the online assessment web site to take the exam. Hence to be a member of the system ,new user registration page is used. New registration page contains eight fields must be filled. The most important thing in the new user registration page is user name; user name must be unique in order to track the user. One user name is matched with one user. Generally users uses their id numbers as user name. If user enters a user name which is already registered user is warned to enter another user name.

3.6.3 User Logon Area

Figure 3.3: Screen view of User logon area

From the user logon area, user can choose the exam that will take, can see the previous exam results, see the statistical evaluation of his/her previous exam results, and see the help page about the web site.

When a user takes any exam from the online assessment system s/he will see a similar page like in figure 3.4. Administrator of the system can change the

total number of questions and number of questions appears on each pages. There are some important points must be considered for performing exam accurately. First, user can see the questions on other pages by using page numbers. But, if user wants his or her selections to be evaluated then he or she must click "Kaydet ve [X]. Sayfaya Geç" button where [X] is the next exam page number. By using that button all of the selections in the current exam page are stored in the database. After that, the questions of the next exam page are appeared on the screen. In that way, user can go to the last exam page of . By clicking the button "temizle" all the selections on the page are cleared, this makes sense when the action is done before clicking the "Kaydet ve [X]. Sayfaya Geç" button. If user wants to change the answer of a question then s/he can go to the page , containing the question to be changed, and just clicks all choices again.

3.6.4 Exam Screen

Figure 3.4 Screen view of Exam page

3.6.5 Last Exam page screen

Figure 3.5: Screen view of Exam Last page

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When user comes to last exam page, different form of exam page is presented , just clicking "Kaydet ve Sınavı Bitir" button al of the data is recorded to the database.

In the Exam result page with the success of the user some statistical information is appeared on the screen. Number of correct answered questions, number of questions leaved blank, Number of questions answered wrongly, number of questions asked, percentage of success and the date of exam are appeared on the screen. Apart from those statistical information exam result page also provides the user all the questions answered wrongly with correct answers. In that way user learns the correct answers of the questions.

3.6.6 Exam result interface

Figure 3.6: Screen view of Exam result page

3.6.7 Past exam results interface

Figure 3.7: Screen view of Past exam results page

In the past exam results page user can see all of the previous exams with percentage of success and date of the exams. In that way, s/he can see the his or her progress.

3.6.8 Statistical evaluation of past exams

Figure 3.8: Screen view of Statistical evaluation page

Statistical evaluation page shows a detailed information about the success note of the user. This page shows users' weakness and strongness unit based of course. According the unit based analysis user understands the his or her unit of course which is weak, so s/he may spend extra time on those units.

When the user enters the online assessment web site, for the first time, s/he is directed to the help page to learn the everything on the system.

3.6.9 Help Page Interface

Figure 3.9: Screen view of Help page

Administrator Logon area is designed for system administrator and course instructors. Administrator logon area includes, choose exam, number of questions in exam, general exam results, statistical evaluation of all exams, student tracking, add student, delete student, arrange student, student exam result evaluation. From the choose exam option ,user can see the exam, add question, delete question, arrange question, and evaluation of questions interfaces.

3.6.10 Administrator logon area interface
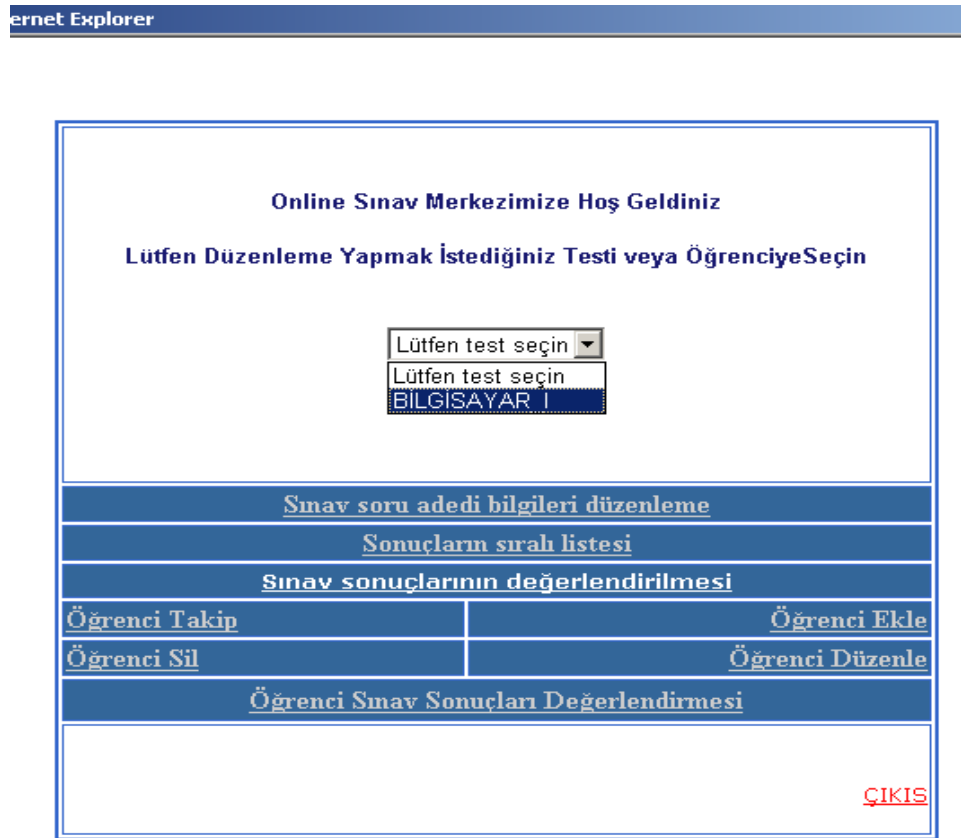
Figure 3.10: Screen view Administrator logon area

When a user selects an exam from the administrator logon area the question bank page appears on the screen. By using that page administrator can take the exam, add new questions to database delete any question from database, edit the any question, and see the item analysis of the questions.

3.6.11 Question bank interface

Figure 3.11: Screen view of Question bank page

In the arrange question page administrator / teacher can select the question to be edited. After selecting any question any changes can be done that question.

3.6.12 Arrange Question Interface

Figure 3.12: Screen view of   Arrange question page

Like the arrange question page , question evaluation page shows all of the questions in the database of related subject. From that list user can easily select any question to see the item analysis report. That reports tell the user that question is difficult or so easy or moderate. According the item analysis the question might be taken from database or edited. Figure 3.14 shows the sample item analysis report.

3.6.13 Question evaluation page

Figure 3.13 : Screen view of Question evaluation page

3.6.14 Item analysis interface

Figure 3.14: Screen view of item analysis page

In the Number of questions page user defines the number of questions asked on each page and total number of questions asked.

3.6.15 Number of questions interface

Figure 3.15 : Screen view of Number of questions page

General exam results page gives the exam success percentage of the all users from all courses.

3.6.16 General exam results interface

Figure 3.16 : Screen view of General exam results page

3.7 Procedure

For the purpose of study an online assessment web site was developed. First of all a prototype of the web page has been designed and that prototype has been developed according to the need of the instructors , users. Based on the expert view the final form of the web page developed. This web site has been used as the assessment part of "Masaüstü Yayıncılık" course given by Department of Computer at Kocaeli University. After online assessment web site was completed to make the participants familiar with the assessment site sample exams were

given to participants. All the participants were informed about the research and hot use the assessment web site. At the end of the spring term of the 2002-2003 academic year this assessment web site was used as final exam of the course. Students took the exam in the computer labs under control of proctors. Same questions were asked to the students but the order of the questions and option placement of the questions were different from one user to another user. Before applying questionnaires to all students five students among students were selected randomly and questionnaire was answered by the randomly selected students. Later on the questionnaire was given to all students. Results of the questionnaires were used to ensure the reliability.

3.8 Data Analysis Procedure

Qualitative data analysis is the process of systematically searching and arranging the data collected by the researchers to increase understanding of them and to enable the investigator to present the discovered to others. This process involves working with data, organizing them, breaking data into manageable units, synthesizing them, searching patterns, discovering important things, and deciding what to present (Bogdan and Biklen 1998).

There are no absolute rules in the process of analyzing qualitative data, but this process demands judgment, and analytical intellect and style of the analyst. The interpretation of qualitative analysis also depends on the researcher's background, so the readers of qualitative research should have access to descriptive information about the researcher's interpretations to comprehend how the researcher reached the conclusions (Patton, 1990).

This study is a descriptive one. The data obtained from the questionnaire was in nominal, Likert scale and open ended types.

The nominal data was strengthened through open-ended contributions of subjects. The answers of open-ended questionnaires were analyzed qualitatively.

The data analysis steps include the following steps: firstly a group of 5 students were selected from our population and questionnaire was applied to that group and later on that questionnaire was applied to all participants. Data obtained from those two groups were compared in terms of Cronbach's alpha coefficients to ensure the reliability of instrument. In order to ensure the validity pilot study and expert view were used. Answer of open ended questions provided by students and experts were evaluated qualitatively to redesign the online assessment web site. Finally to figure out the perceptions of participants towards online assessment questionnaire was used. In the questionnaire The questions have been presented based on likert's five-point scaling method-strongly agree, agree, average, disagree, and strongly disagree and each item was given a number from 5 to 1. By means of those number mean values of each question was calculated. And also percentage of answer items was calculated. And as a last step total mean values of each question category were calculated. After that those mean values were used for interpretation of category of questions.

3.9 Assumptions and Limitations

3.9.1 Assumptions

In this study, the following assumptions were made:

- All the subjects responded to the questions accurately
- The application of the test was done with the personal computers with the same technical features.
- Application of the test was completed under the standard conditions
- The data was accurately recorded and analyzed
- Reliability and validity of the all measures used in this study were accurate enough to permit accurate conclusion.

3.9.2 Research Limitations

3.9.2.1 Limitation of research target

This research hopes Online assessment system can serve the general needs of university students in their curriculum. Nevertheless, due to the limited time and manpower of the research, the primary research target of this research was limited those students who were taking the course "Masaüstü Yayıncılık" at the department of Computer Education at Kocaeli University , 2002-2003 academic year. As a result, it cannot take into consideration the special needs of the other disciplines.

3.9.2.2 Limitation of Research Method and Interpretation

The user evaluation of this research in terms of its impact on learning process was designed to understand that if online assessment system could enhance the learning process and outcomes of students. However, since a questionnaire method had been used for users' self evaluation, it led to a higher degree of subjective recognition of the learners involved in this research, lack of more objective standard to determine learning effect. Hence , it can be used to explain and deduce the learners' recognition of learning effect based on the results of questionnaire data collected. That implies we can only attain the goal of subjective feeling level in terms of learning effects evaluation.

CHAPTER 4

RESULTS AND CONCLUSIONS

In this chapter, the problems presented in chapter 3 were analyzed through descriptive statistical methods such as frequency distribution, mean, percentages of agreement and standard deviation. This chapter presented the results of the frequency distributions, means, percentages of agreements and standard deviations and related responses of the subjects.

4.1 Results

4.1.1 Problem 1

Question 1 : How is an online assessment tool is evaluated ?

The evaluation of online assessment web site includes two major categories:

4.1.1.1 Formative evaluation

The primary purpose of formative evaluation is to gather the relevant data for system revisions and improvements. Since the development method of online assessment system covers the development method of prototype, the formative evaluation process of this research had been conducted concurrently with the reviewing and revising process for establishing the prototype system. Therefore,

the data sources of our formative evaluation were derived from the system problems found by the developer during the process of system development, or the shortcomings and problems found by course teachers and consulting experts. Final version of the online assessment system was so different from the first draft of the system. At he design and development stages of the assessment system was changed because of the different problems caused, need of the instructor and experts.

4.1.1.2 Summative evaluation

The purpose of summative evaluation is the understanding of perception towards the Online assessment system of the intended learners. This includes conducting the following aspects of evaluation work: computer familiarity , prior online assessment experience, Screen and Interface design, Impacts on Learning Process, System Usage, Students Opinion.

There are three major components for summative evaluation: user evaluation, user in-depth interviews, and expert evaluation.

l. User evaluation: The evaluation method was conducted one and half months after the system implementation. It was carried out through the system evaluation questionnaire designed by the researcher. The questionnaire was distributed in several copies to a class of 46 students who were taking the course " Masaüstü Yayıncılık " in Department of Computer Education.

2. User in-depth interviews: Targeting the unresolved questions and the controversial issues of the previous questionnaire of user evaluation, in-depth interviews were then conducted on 5 students selected randomly after the

completion of questionnaire analysis work in order to understand the users' opinions and suggestions in more depth.

3. Expert Evaluation: Three experts (including the course instructor, an online assessment expert, and a web technology expert) were invited to conduct the expert evaluation by using this Online assessment system. The evaluation work was then conducted through interview method after one week.

4.1.2 Problem 2

Question 2 : What are the participants' familiarity with computers ?

The purpose of that question is to investigate the students' familiarity and competency of computer application programs such as , web browsers, email programs etc. Since being familiar with those programs is a prerequisite condition to figure out the results of the other research questions. There were six sub questions in the questionnaire to collect the relevant data. The sub questions and their qualitative analysis were as follows.

Table 4.1. Percentage distribution of students computer familiarity (n=46)

	Computer Familiarity	Advanced %	Good %	Introductory %	Poor %	None %
1	Competency of web browser	25	54	17	4	0
2	Competency of chat	25	34	29	8	4
3	Competency of telnet	21	37	17	0	25
4	Competency of email	25	45	13	13	4
5	Competency of FTP	8	46	21	0	25
6	Competency of Mailing lists	33	38	8	4	17

4% of all students indicated their competency of web browser as "POOR". For effective use of the developed online assessment tool, it was enough to have an

introductory competency level. The total percentage of the students beyond the introductory competency level was 96%. Before the final exam students were given sample quizzes and trained with the important points of the online assessment tool. In that way any problem caused by the browser usage was eliminated.

It can be said that students have to be trained on how to use online assessment tool without considering students' prior computer and internet competency level.

4.1.3 Problem 3

Question 3 : What are the prior experiences of participants for online assessment ?

This question was asked to students to get the students' prior experiences for online assessment. In order to figure out the prior experiences for online assessment six sub questions were asked to students. The sub questions and their qualitative analysis were as follows.

Table 4.2. Percentage distribution of students prior experiences of online assessment (n=46)

	Prior experiences	Yes %	No %
1	I am taking course(s) online	0	100
2	I have attended an online course before	0	100
3	I have taken TOEFL or GRE before	0	100
4	I have taken some kind of online assessments before	33	67
5	I have taken an online quiz on the web	20	80
6	I have used web for instructional purposes	42	58

As results indicated, Most of the students had no prior experience of any kind of online assessment. Only 42% of the students used internet a tool of instruction , 20% of them took online web quizzes in any way and 33% of the students attended any kind of online assessment before the research. Unfortunately, none of the students took any kind of online course before the research. That is another reason for why students must be trained before the application of online assessment tool.

4.1.4 Problem 4

Question 4 : What are participants' perceptions about the user interface of the online assessment web site ?

Table 4.3 reveals the evaluation items of the system in terms of screens and interface. The agreeability mean of the users is also quite high at above 3.75. Almost all standard deviations are less than 1.00. It indicated that almost all users have common thoughts in terms of the user interface. Based on the results of our survey, we may deduce that the appropriateness in terms of the overall framework, the overall configuration of colors and background, the overall layout of screen and window design, and overall interface operation method, had high appraisals. In addition, the appraisal of the appropriateness of screen design, and ease of use of the interface operation were both score highly and evenly.

30% of the users indicated that the help page interface was not clear and easy to operate. The standard deviation for this item was also In terms of the standard deviations, the biggest standard deviation is 1.38 It also has the smallest

mean score in that category which is 3.33. All those show that in terms of the help page users do not have common thoughts whether it is good or bad. But the trend in that question is negative relative the other items in the questionnaire. Even though all the users were asked to read the help page , most of them did not read the help page and passed the exam pages directly. Because of the reading problem some applicants said that help page interface is not clear and easy to operate. Thus, there should be more effective and easy to use help pages meeting the learners needs while they are using the online assessment tools. In contrast the above almost all the users indicated that The help page interface design was appropriate. Mean value for this questionnaire item was 4.03 and standard deviation was 1.11. That situation shows that the interface design of the help page is good but is not good to use. That is a bit surprising.

On the average, 87% of the users regard of that Login interface as clear and easy to operate and 91% of the users regard "The Login" interface design is appropriate. Standard deviations for those items is so close to 1.00 so it can be said that students have common sense in terms of login interface. Only 13% stated it, as hard to use, and only 9% of the users thought that "The login" interface design inappropriate. 96% of the users regard of that the register interface as clear and easy to operate and "The register" interface design is appropriate. On the average, 93% of the users regard The exam interface as clear and easy to operate and The exam interface design as appropriate.

On the average, 93% of the users regard "The statistical evaluation" interface as clear and easy to operate and The statistical evaluation interface design as appropriate. 88% of the users thought "The past exam results" interface's design was appropriate but according to the 12% of the users the design was not appropriate. The results can be explained by that that part of the online assessment tool was not used by students very often. This might led students to think such a way. On the average 94% of the users thought The exam result interface was clear and easy to operate and The exam result interface design was appropriate.

Even though the mean values in User interface evaluation are above 3.50. Therefore, it can be said that there are lots of rooms need further improvement.
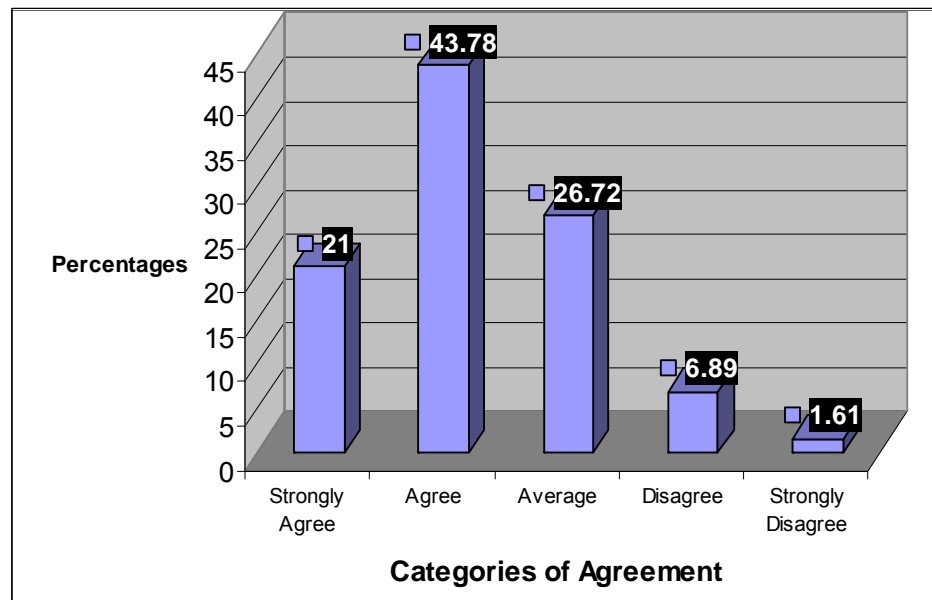
Figure 4.1 : The distribution of means for student agreement percentages in online assessment system "User interface evaluation"

Table 4.3. Frequencies, percentages and means of student agreement in Online Assessment System "Screen and interface design"

Evaluation of User Perception towards Online Assessment	Percentages of Agreement (%)					Means	SD
	Frequency Distribution						
	5	4	3	2	1		
User interface evaluation							
1 The overall framework and operation levels of the system are clear and smooth	23	36	35	4	0	3.77	0.86
	11	16	17	2	0		
2 The overall configuration color and background is normal harmonious for the system	14	55	27	4	0	3.79	0.75
	6	26	12	2	0		
3 The overall screen layout and window design of the system is appropriate	18	64	14	4	0	3.96	0.72
	8	30	6	2	0		
4 The overall interface operation method is easy and appropriate	17	35	35	9	4	3.52	1.03
	8	16	16	4	2		
5 The Login interface is clear and easy to operate	22	35	30	9	4	3.62	1.07
	10	16	14	4	2		
6 The Login interface design is appropriate	22	52	17	9	0	3.87	0.86
	10	24	8	4	0		
7 The register interface is clear and easy to operate	23	30	43	4	0	3.72	0.87
	11	13	20	2	0		
8 The register interface design is appropriate	18	48	30	4	0	3.80	0.79
	8	22	14	2	0		
9 The exam interface is clear and easy to operate	27	39	30	4	0	3.89	0.86
	12	18	14	2	0		
10 The exam interface design is appropriate	18	43	30	9	0	3.70	0.87
	8	20	14	4	0		
11 The past exam results interface is clear and easy to operate	17	58	17	8	0	3.84	0.81
	8	26	8	4	0		
12 The past exam results interface design is appropriate	26	29	33	8	4	3.65	1.09
	12	13	15	4	2		
13 The statistical evaluation interface is clear and easy to operate	16	50	25	9	0	3.73	0.87
	7	23	12	4	0		
14 The statistical evaluation interface design is appropriate	17	46	33	4	0	3.76	0.79
	8	21	15	2	0		
15 The exam result interface is clear and easy to operate	29	42	25	4	0	3.96	0.93
	13	19	12	2	0		
16 The exam result interface design is appropriate	13	50	29	8	0	3.68	0.81
	6	23	13	4	0		
17 The help page interface is clear and easy to operate	21	38	11	13	17	3.33	1.38
	10	17	5	6	8		
18 The help page interface design is appropriate	37	38	16	9	0	4.03	1.11
	17	17	8	4	0		
Total Mean	21.0	43.8	26.7	6.9	1.6	3.8	
	10	20	12	3	1		

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4.1.5 Problem 5

Question 5 : What are participants' perceptions about system use of the online assessment web site ?

The aspect of system use are shown in Table 4.4 Items 1-9. The means are between 3.50 and 4.17 and standard deviations of the questions are mainly less than 1. Hence it can be said that almost all users have the same thoughts about the system use. This shows that users used the web pages without any significant problems. Here the problem of the use of the help page is appeared again. Hence we can say it again, help page must be improved for better use. 17% of the users thought help page did not have any effect on a better use of the system. Standard deviation for this item was 1.97 and it showed that the answers given that questions were quite distributed. On average 93% of the users thought that browsing among the web pages was easy, directions were followed without any problem, registration to the system and taking the exam were easy, system was ease of use and comfortable, changes can be done easily.

The total mean value of the system use is almost 4.00 and such a high score might be result of initial training of system use and sample quizzes taken before the final exam.
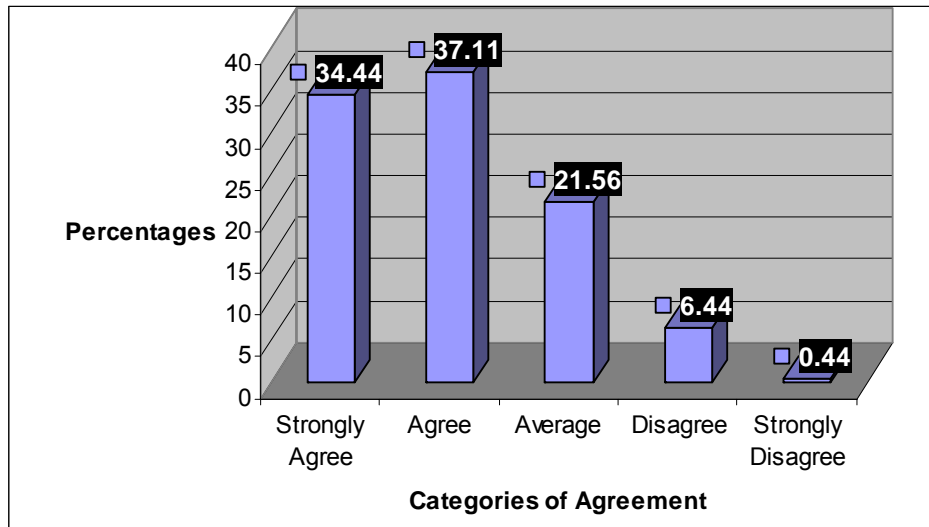
**Figure 4.2 :** The distribution of means for student agreement percentages in online assessment system "System use"

Table 4.4. Frequencies, percentages and means of student agreement in Online Assessment System "System use"

	Evaluation of User Perception towards Online Assessment	Percentages of Agreement (%)					Means	SD
		Frequency Distribution						
		5	4	3	2	1		
	System Use							
1	I have browsed among web pages easily	21	50	25	4	0	3.88	0.82
		10	22	12	2	0		
2	I have followed the direction without any problem	46	29	21	4	0	4.17	0.91
		21	13	10	2	0		
3	It is easy to register to system	46	29	21	4	0	4.17	1.05
		21	13	10	2	0		
4	It is easy to take an exam	47	29	20	4	0	4.19	0.92
		22	13	9	2	0		
5	Easier to correct work	31	46	19	4	0	4.04	0.79
		14	21	9	2	0		
6	Ease of use and comfortable	37	38	21	4	0	4.08	0.88
		17	17	10	2	0		
7	I often visit the past exam result page	28	42	17	13	0	3.85	0.92
		13	19	8	6	0		
8	Help page made me use the web site better	16	38	29	17	0	3.53	1.97
		7	18	13	8	0		
9	Seeing left time makes me progress better	38	33	21	4	4	3.97	1.07
		17	15	10	2	2		
	Total Mean	34.4	37.1	21.7	6.4	0.4	4.0	
		16	17	10	2	1		

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4.1.6 Problem 6

Question 6: What are participants' perceptions about impacts of learning process of the online assessment web site ?

In the Impacts on learning process category of the questionnaire the total mean value is 3.75 which is smallest mean value in the other categories of the questionnaire. It means that we should develop or add new tools to online assessment web site to increase the Impacts on learning process. Except cheating for the all items in this category standard deviations are around 1.00 so it can be said that students mainly had similar thoughts on system use of the online assessment tool. Here the most important issue is that 54% of the users thought that cheating was not difficult in the online assessment tool. Thus that caused a lower total mean value in that category. Standard deviation for that item was 1.47 which indicated that students had different thoughts about difficulty level of cheating in the exam. To prevent the cheating in the system , questions are asked in a random order and placement of the options of the questions are also changed from user to user. Another step to prevent the cheating was that all exams were taken in the labs under the control of proctors. Based on research results a new way should be developed to prevent the cheating.

Apart from cheating item, 95% of the users thought that assessment was fair. Another low mean value in that category is 3.53 which belong to the "Statistical evaluation page gives a detailed information on units where I am good at or unsuccessful" item. Here, that page is a bit complex relative to other pages so it might cause ambiguities in minds. To understand what that page says extra

efforts might be needed. That might be why mean value of the that item was relatively low.

On average 85% of the users thought that System feedback, Tracking past exam results and questions appeared page by page had a positive impact on learning process. 92% of the users wanted to take this kind of assessment in other courses as well. Based on that result it can be said that students have positive thoughts against online assessment.
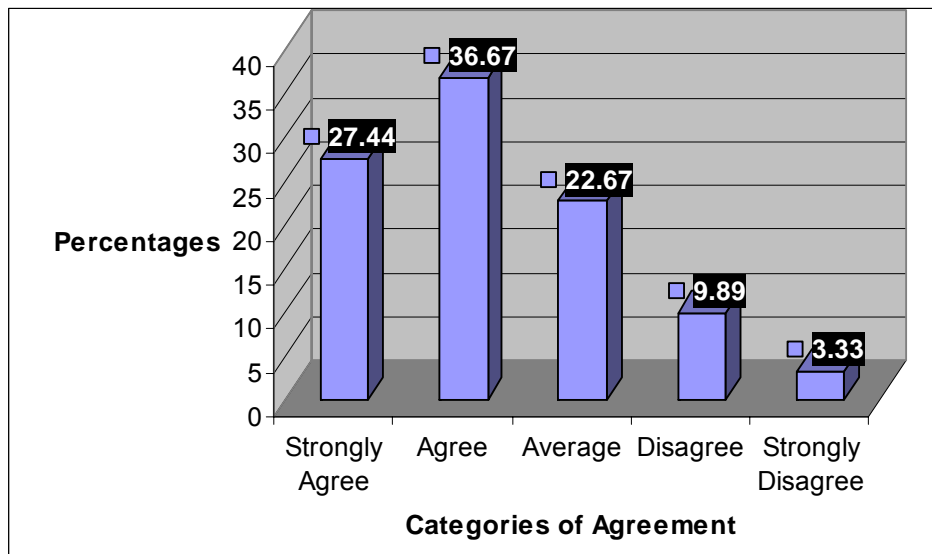
Figure 4.3: The distribution of means for student agreement percentages in online assessment system "Impacts on learning process"

Table 4.5. Frequencies, percentages and means of student agreement in Online Assessment System "Impacts on learning process"

Evaluation of User Perception towards Online Assessment	Percentages of Agreement (%)					Means	SD
	Frequency Distribution						
	5	4	3	2	1		
Impacts on learning process							
1 Assessment is fair	41	33	21	5	0	4.10	0.97
	19	15	10	2	0		
2 Cheating is difficult	20	13	13	33	21	2.78	1.47
	9	6	6	15	10		
3 System feedback helps me to reflect on my merits in learning	18	64	18	0	0	4.00	0.61
	8	30	8	0	0		
4 Tracking past exam results makes me understand my progress	41	36	13	5	5	4.03	1.04
	19	17	6	2	2		
5 Statistical evaluation page gives a detailed information on units where I am good at or unsuccessful	18	30	39	13	0	3.53	0.94
	8	14	18	6	0		
6 It helps me to better understand my growth and improvements in the course by using the system	13	50	33	4	0	3.72	0.75
	6	23	15	2	0		
7 It helps me to learn this course by using this system	21	42	29	8	0	3.76	0.89
	10	19	13	4	0		
8 I hope to use this system in other courses as well	38	29	25	4	4	3.93	1.03
	17	13	12	2	2		
9 Page by page questions makes me feel better in the exam	37	33	13	17	0	3.90	1.07
	17	15	6	8	0		
Total Mean	27.4	36.7	22.7	9.9	3.3	3.8	
	12	17	10	5	2		

4.1.7 Problem 7

Question 7: What are the participants' opinions about the online assessment web site?

In the "Student Opinions" Category students' general thoughts against the online assessment tool were investigated. 96% of users indicated that system provided immediate feedback. 92% of the users regard online assessment as better

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than paper-pencil form and 96% of users regard online assessment as faster than paper-pencil form. 96% of the users regard online assessment as contemporary and more systematic. All the users thought that that kind of the online assessment was consistent with the teaching style. In that category 27% of the users regard online assessment as exciting. The biggest deviation is 1,35 for question "less excited" and also this item has the smallest mean value in the students opinions category. It can be said that thoughts of the students against that question is not clear. Their thoughts varied since the standard deviation is 1.35. But relative the other items in the questionnaire it can be said that students thought that this assessment system is not less excited relative to the paper based exams. Since the users were not so familiar with online assessment system they might be excited. When they become familiar with the system, it is expected that they will not be excited any more.
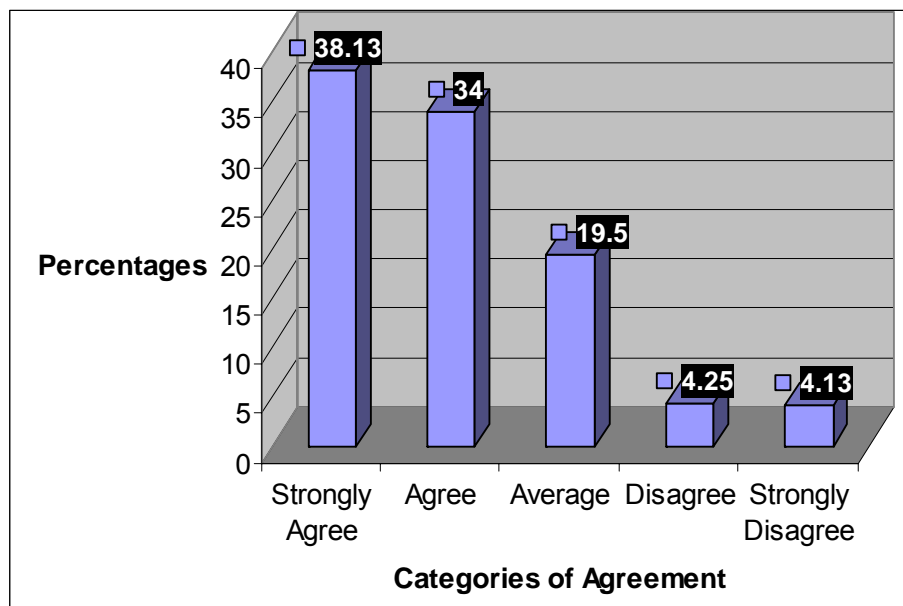
Figure 4.4 : The distribution of means for student agreement percentages in online assessment system "Student Opinions"

Table 4.6. Percentages and means of student agreement in Online Assessment System "Student opinions"

Evaluation of User Perception towards Online Assessment	Percentages of Agreement (%)					Means	SD
	Frequency Distribution						
	5	4	3	2	1		
Student Opinions							
1 System provides immediate feedback	**12**	**46**	**38**	**4**	**0**	**3.66**	**0.76**
	6	21	17	2	0		
2 Less excited	**15**	**38**	**17**	**13**	**17**	**3.21**	**1.35**
	7	17	8	6	8		
3 Better than paper-pencil form	**71**	**8**	**13**	**4**	**4**	**4.38**	**1.13**
	32	4	6	2	2		
4 Consistent with the teaching style	**25**	**42**	**33**	**0**	**0**	**3.92**	**0.77**
	12	19	15	0	0		
5 Faster than paper-pencil	**59**	**33**	**4**	**0**	**4**	**4.43**	**0.92**
	27	15	2	0	2		
6 Contemporary	**62**	**17**	**17**	**0**	**4**	**4.33**	**1.04**
	28	8	8	0	2		
7 More systematic	**37**	**38**	**21**	**0**	**4**	**4.04**	**0.99**
	17	17	10	0	2		
8 Can be applied to other courses	**24**	**50**	**13**	**13**	**0**	**3.85**	**0.94**
	11	23	6	6	0		
Total Mean	**38.1**	**34.0**	**19.5**	**4.3**	**4.1**	**3.9**	
	18	6	9	2	1		

4.1.8 Results of user in-depth interviews

After analyzing the results, we conducted in-depth interviews with 5 users (who were chosen randomly from the students who had been taking the course) to deduce or conclude a few important user opinions or suggestions.

Looking at system function, some students regard the exam style as inconvenient because questions were selected randomly from a question pool. They suggested that questions should be appeared in the form of ordered categories and questions in that categories should be appeared randomly on the exam screen.

Some students suggested that we should add a notebook area for the students to take notes. This would allow students to keep their notes permanently and to use whenever they want. That would have a positive impact on learning process.

Another problem discovered while conducting user in-depth interviews is that students could not be able to see the selections in the completed exam pages even though they could see the all the exam pages. They suggested that when they visited an exam page which was completed they should be able to see their selections in that page so they could make any change easily. In order to prevent cheating such a way was used. Based on the interview, that way should be reconsidered to improve the effectiveness of the online assessment tool.

4.1.9 Results of expert evaluation

Once the system was established, we invited experts (including a online assessment expert, an Internet technology expert, and the course instructor) to use it. They were interviewed one week later. In this way we obtained the valuable opinions and suggestions of these experts.

Their responses to the questions of "Whether the contents of this online assessment system are appropriate?" and "Is there any shortcoming or inappropriateness?" indicated that the contents have met the basic needs of assessment, but may still include some interesting materials to motivate students to use it. That could be shared among students in classroom or on campus. The experts also pointed out that the contents of this system tend to be "teacher or

instructor-directed" in its method, and lack the students' voluntary participation. Another suggestion was that inter-disciplinary curriculum or other courses may also be introduced for the future .

The experts were asked about the functions that this "Online assessment system" might provide and further questions such as "Is there any way that the unique features or functions of online assessment system can be much more manifested?" and "Which component or area needs to be improved most?" Their responses to those questions indicated that this tool decreases the some work load of the instructor while giving grades and evaluating the questions but adds some extra work load while preparing the questions. The item analysis part of the questions and obtaining the exam results right after the exam made instructors feel better. Again experts indicated that help pages can be better in the system. That part should be improved.

When a question asked about "whether the screen and interface design of this online assessment system is appropriate and convenient to use?" the experts' feedback suggested that the overall configuration of screen design and page layout was appropriate. The method of interface operation and use was rather simple and easy to use. But the explanations found in help page of the system could be more articulate to facilitate comprehension.

When asked "whether there are any other issues or areas that have not been mentioned but need to be improved?" one of the experts mentioned that the

current assessment tools supports only text based questions, it also provide multimedia support at least instructors should be able to ask graphic based questions. He also said that we should use main features of the computers. Mainly this type of examination should be different than paper based multiple questions, in computer-based exams, difficulty levels of the questions can be arranged according the users' progress in the exam and finally he added that there should be some cautions for the electricity cut, for example, an UPS (Uninterrupted Power Supply) should be connected to the computers.

4.2 CONLUSIONS

Day by day technology is enhancing and with developments in technology, education system is shifting from in class settings to online environment. Assessment system can not stand out of that trend. Assessment must be parallel with teaching. Today it is out of debate that whether Online assessment should be used. The main issue in online assessment is how it can be more effective, valid, reliable and secure. Based on the results indicated in previous chapter those conclusions have been reached in terms of online assessment.

- Students should be familiar with the assessment tool, in specific they should be familiar with web browsers.

- Students should be trained to prevent problems caused by lack of system use.

- In general students regard online assessment tool as appropriate for assessment.

- Students wanted to take the same form of the exam for the other courses as well.

- In order to prevent problems might be caused an electricity cut there should be an UPS (Uninterrupted Power Supply) connected to computers used for online assessment.

- Students should be informed about the security features of the system.

- The online assessment system should be secure and authentic

- Server must be powerful enough to support the online assessment tool without any problem.

- Computers used for online assessment should be running properly.

- Students regard developed online assessment tool as effective and easy to use.

- Immediate feedback makes student progress better.

- Immediate feedback has a positive impact on learning process.

- Students should be able to learn in exams as well.

- Assessment style should be parallel with the teaching style.

- In the exam Students should be able to take notes

- In the exam students should be able to see their initial answers.

- Questions should be appeared page by page instead of showing all the questions in one page and number of questions appeared in a page should be arranged easily.

- Students should be able to see (if they want) left time for exam.

- Online assessment delivered via web pages should be designed properly. The overall framework and operation levels of the system should be clear and smooth

- The overall configuration color and background should normal harmonious for the system

- The overall screen layout and window design of the system should be appropriate

- The overall interface operation method should be easy and appropriate

- Navigation between web pages should be easy

- Help pages should be effective enough for the students to make them feel comfortable while they are using the online assessment tool.

- The assessment system should not allow the cheating. Any cautions must be taken to prevent cheating.

- Questions should be selected randomly from a question pool.

- The placement of the options of questions should be changed also.

- All the students should answer the same questions.

- The difficulty level of the questions can be arranged automatically in the exam according to progress of the user.

- The system should make item analysis

- Instructors should be able to track students progress

- Students should be able to see their progress.

- Students should be able to see their weak sites in terms of course units.

- Students should be able to change their answers easily.

- Significantly less time is needed to administer online assessment system than fixed-item tests since fewer items are needed to achieve acceptable accuracy. Shorter testing times also reduce fatigue, a factor that can significantly affect an examinee's test results.

Some problems might be occurred while students are taking the online exam caused by the nature of the web based environment. Those problems can be listed as below;

- If the exam duration is extended ,students' eyes get tired because of the looking the screen for a long period of time. Therefore, the design of the web pages has an important role to reduce that effect.

- If the exams are being taken in the internet environment, unexpected termination of the internet connections might occur.

- If the server where online assessment system is running is not powerful enough, when there is a overload on the server it might be crashed.

- In the long period of time, making students sit in front of a screen makes them feel bored.

With the changing learning culture, those negative sites of the online assessment are reducing day by day and online assessment is becoming crucial in our education system.

CHAPTER 5

DISCUSSION, IMPLICATIONS AND RECOMMENDATIONS

5.1 Discussion

The purpose of the this study was to investigate students' perceptions about the use of Online assessment. A web site and exam system was used for the purpose of summative assessment of Computer Education students for "Masaüstü Yayıncılık" course in the spring term of the 2003-2004 academic year at Kocaeli University.

Descriptive analysis of the questionnaire and interviews showed that the most prominent features of the system were immediate feedback, randomized question order, item analysis of the questions and obtaining the scores right after the exam.

Analysis of data revealed that participants have agreed the effectiveness of the online assessment system.

Some students suggested that they should be able to see their initial answers of the questions when they go back to answered exam pages. In order to prevent the cheating such feature did not added to online assessment web site. For the further research that request should be reconsidered in terms of the cheating. And also some students indicated that they need some extra tools i.e.; notebook, bookmark etc in the exam. Finally some students also suggested that unit of the subjects should be appeared in a ascending order but the questions it the units should be appeared randomly. Item order (computer administered test items are presented in a randomized order) and the order of multiple-choice response options (randomized in computer administered tests) can affect performance on an item (Beaton & Zwick, 1990). This likely relates to "ordered" versus randomized test item sequencing. Specifically, when the instructional lesson content and the test items are in the same order, the "ordered" test will likely obtain greater scores than a randomized version of the test. In the present investigation, computer based test was randomly generated, thus justifying an order effect.

Most of the students argued that features of obtaining immediate score and feedback motivated them and contributed positively to their achievement in the exam. Those features are main advantages of the computer based assessment relative to the paper based exams. The greatest physical differences between computer and paper test administration involve perceived interactivity and physical size of the display area. The amount of information comfortably presented in a computer display is only about one-third of that presented by a standard piece of paper. For example. Haas & Hayes (1986) reported that when a

text passage associated with a test item requires more than one page. computer administration yielded lower scores than paper-and-pencil administration. apparently due to the difficulty of reading the extended text on screen. The student can rapidly scan all of the questions on a page and can easily flip backward or forward to other pages (a form of interactivity). On the computer-based assessment. one test item was presented on each computer screen display and the student must physically art to move from screen (item) to screen (another form of interactivity). This difference likely leads to greater "focus" and closure with each computer-based item. Thus computer-based items (relative to paper) may increase transition time and memory load. with a tighter focus on and closure of each individual item (Clariana, 1997).

The other valued features were simplicity of entire testing, comfort, speed, simplicity of editing and alterations, effective measure of learning outcomes and decreasing excitement (Karakaya, 2001).

Both high- and low-able students should benefit from greater focus on an item; though due to the greater cognitive load required, only high-able students would be able to tie ongoing items together to "Learn" from the test in order to answer other test items. To examine this hypothesis, a test could be designed that intentionally provides items that, if remembered, will allow the student to answer other items correctly. If high-able learners do learn during the test (relatively), a pattern of means similar to that observed in this present investigation should

occur. If display size format is the primary factor, then the multiple-page group should out perform the one-item per page format.

Based on our review and study results, it is anticipated that computer and assessment tool familiarity are the most fundamental key factors in the perception of online assessment, especially for unfamiliar content and/or for low attaining examinees (especially an issue for students with reduced computer access. such as women and minorities). In general, higher-attaining students will adapt most quickly to any new assessment approach (Watson, 2001) and will quickly develop test-taking strategies that benefit from the new approach. Thus, in the current investigation, since students are from department of computer education, the higher-attaining students likely accommodated more quickly and so benefited more from computer-based assessment. Once all students are fully familiar with computers, then computer familiarity should become less important.

Even though students trained before the exam about how to use the online assessment system some students felt excited in the exam. In order to prevent such problems students must be comfortable with the online assessment system and the context where students are taking the exam should has a warmly atmosphere for the students.

Applying exams in the form of online by means of computers require close cooperation of some academic and technical units. First of all preparing questions for online settings require extra efforts. Questions should be asked by means of

computers and should measure the intended level of knowledge. Instructors should be trained on how conduct a course online and ask questions via internet. Administrative unit should support the such a teaching-learning environment and should prepare the required backbone for the system. And finally, this type of assessment system occurs by means technological devices; computers, network devices etc. Those devices and programs should handle the all educational context. Computers must be powerful enough to run the web pages and server should be stable also. Any problems might be occurred on the server should be defined initially and required cautions should be taken. At first application of the assessment an error caused by database occurred. Since access database was used as a database application, almost an half later the online assessment web site has been crashed. In order to prevent that error database was improved and number of cpu s in the server was increased.

Bugbee (1996) recommends that test developers must show that computer-based and paper-based test versions are equivalent, and/or must provide scaling information to allow the two to be equated. Most instructors, and in fact, even most instructional designers, do not have the skill nor the time to expertise and extensively pilot their examinations. However, additional time and effort must be invested by instructors to design high-quality test items for use in online testing. With the likely production of web-based courses and of inexpensive fingerprint identification computer devices and other automatic proctoring technologies, there will likely be a substantial increase in computer-based testing. The findings of this investigation indicate that it is critical to realize that computer-based tests, even

with identical items, will not necessarily produce equivalent measures of student learning. Instructors and institutions should spend the time, cost, and effort to create a positive student perception.

Most of the students suggested that this kind of the online assessment system should be applied to other courses as well. They also expressed that the way of instruction should be parallel with the way of assessment. Finally students suggested that examinations of all the computer related courses should be done by means of computers.

5.2 Implications

Online assessment tools are becoming important day by day. Research studies shows that with the time, perceptions towards online assessment are becoming more positive. Our learning styles are changing like everything. The potential developers of the online assessment tools should consider these guidelines during their design process.

Implication 1 : User Interface should be proper and well designed.

User first faces with the user interface and works with it to do anything so user interface has a crucial role in online assessment. Colors, placement of objects and navigation should be appropriate for the students. Some colors and objects might bore the users so it causes low scores in the exam. In terms of user interface the developed online assessment tool is proper.

Implication 2 : System use should be easy and operatable.

Almost anybody should be use the developed online assessment tool. Since the tool was developed for online use, user should be able to use it without needing another person's help. In order to provide easy use first tool must be simple, and directions should be clear. The developed online assessment tool is easy to use for students. It has two interface one for students and the other for the instructors. The user's area is simple enough and clear for the students there are only a few links which are so important for system. On the other hand, instructor's area is a bit complex relative to the user's area. In that area instructors can do lots of things about, students, questions and analysis of exam. In order to use that area without problem instructors should be trained.

Implication 3 : System should enhance the learning.

Learning is a going on process and it also takes places in the exam settings. System feedback has a critical function in online assessment. If system provides right feedback against any action taken place by user (s)he will learn what to do in next time. In developed online assessment tool especially feedbacks for the wrongly answered questions were so effective. Students were shown their wrongly answered questions and their correct answers also.

Implication 4 : System should meet the needs of the students

In fact that topic should be searched in detail. While students were taking the exam the main question arose was "how can I take notes". Thus online

assessment tool should allow students to take their notes while they are in the exam. The developed online assessment tool did not provide such a feature but in next versions it will provide.

Implication 5 : System should be modified easily

The system should be open to the modifications; any change on the system should be done easily. The developed system can be adjusted easily. First of all, number of questions appeared on each page can be changed easily. The exam duration also can be changed. More than one exam can be served to the students. While one student is taking an exam another student can take another exam. Instructors can create new exams. Questions are multiple choice and number of choices can be changed easily with a little change in the code of the assessment tool. True/False questions can be asked. And also again, with a little change in code of the assessment tool fill in blank questions can be asked. This assessment tool can be used as a tool for surveys.

Implication 6 : System should be secure.

Security in exams is so important and it is more important in the online exams. The system should be protected against illegal attacks. In the developed system users can enter the system via their user name and password. They have to enter the system form the first login page. If they try to enter a web page just writing down its full path they are directed to the out of the system. All the exams were taken under the control of proctors while research was being conducted

5.3 Recommendations

Online assessment in education needs more research to be used more effectively. There is lack of research on online assessment. Some recommendations are listed below to those who want to conduct a similar research :

1. The population where the online assessment tool is applied should be changed in order to investigate the perceptions of other people having different backgrounds.

2. The assessment tool should be developed some extra tools should be added in order to make students more comfortable using the tool.

3. Multi media support should be enhanced. Graphic based questions should be asked.

4. Matching questions and drug and drop capability should be added.

5. Further studies using quantitative research method should be conducted to get more quantitative evidence about the students' perceptions and achievements.

6. Some tools or systems should be developed to ensure the security.

7. Further studies should be done on using the system without the under proctor in distance learning settings.

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STUDENT QUESTIONNAIRE

This questionnaire is for the evaluation of the online assessment. Your feedback is most important to make improvements to this course and assessment system. Your answers will be collected and analyzed solely by the evaluator (Refik ŞANLI, refiksanli@yahoo.com) and the important information about the improvement of the course and assessment system will be notified to the instructor in a report including only the information without attribution to any individual. Feel free to contact the evaluator if you have any questions about this evaluation. Thank you!

Age   :
Sex (f/m)   :

Part 1

	Computer Familiarity	**Advanced**	**Good**	**Introductory**	**Poor**	**None**
1	Competency of web browser					
2	Competency of chat					
3	Competency of telnet					
4	Competency of email					
5	Competency of FTP					
6	Competency of Mailing lists					

Part 2

	Prior experiences	**Yes**	**No**
1	I am taking course(s) online		
2	I have attended an online course before		
3	I have taken TOEFL or GRE before		
4	I have taken some kind online assessments before		
5	I have taken an online quiz on the web		
6	I have used web for instructional purposes		

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Part 3

	Evaluation of User Perception toward Online Assessment	Strongly Agree	Agree	Average	Disagree	Strongly Disagree
	User interface evaluation					
1	The overall framework and operation levels of the system are clear and smooth					
2	The overall configuration color and background is normal harmonious for the system					
3	The overall screen layout and window design of the system is appropriate					
4	The overall interface operation method is easy and appropriate					
5	The Login interface is clear and easy to operate					
6	The Login interface design is appropriate					
7	The register interface is clear and easy to operate					
8	The register interface design is appropriate					
9	The exam interface is clear and easy to operate					
10	The exam interface design is appropriate					
11	The past exam results interface is clear and easy to operate					
12	The past exam results interface design is appropriate					
13	The statistical evaluation interface is clear and easy to operate					
14	The statistical evaluation interface design is appropriate					
15	The exam result interface is clear and easy to operate					
16	The exam result interface design is appropriate					
17	The help page interface is clear and easy to operate					
18	The help page interface design is appropriate					

		Strongly Agree	Agree	Average	Disagree	Strongly Disagree
	Impacts on learning process					
1	Assessment is fair					
2	Cheating is difficult					
3	System feedback helps me to reflect on my merits in learning					
4	Tracking past exam results makes me understand my progress					
5	Statistical evaluation page gives a detailed information on units where I am good at or unsuccessful					
6	It helps me to better understand my growth and improvements in the course by using the system					
7	It helps me to learn this course by using this system					
8	I hope to use this system in other courses as well					
9	Page by page questions makes me feel better in the exam					
	System Use					
1	I have browsed among web pages easily					
2	I have followed the direction without any problem					
3	It is easy to register to system					
4	It is easy to take an exam					
5	Easier to correct work					
6	Ease of use and comfortable					
7	I often visit the past exam result page					
8	Help page made me use the web site better					
9	Seeing left time makes me progress better					
	Student Opinions					
1	System provides immediate feedback					

		Strongly Agree	Agree	Average	Disagree	Strongly Disagree
2	Less excited					
3	Better than paper-pencil form					
4	Consistent with the teaching style					
5	Faster than paper-pencil					
6	Contemporary					
7	More systematic					
8	Can be applied to other courses					

APPENDIX B

EXPERT VIEW INTERVIEW QUESTIONS

Are the contents of this online assessment system appropriate?

Is there any shortcoming or inappropriateness?

Is there any way that the unique features or functions of online assessment system can be much more manifested?

Which component or area needs to be improved most?

Is the screen and interface design of this online assessment system appropriate and convenient to use?

Are there any other issues or areas that have not been mentioned but need to be improved?

APPENDIX C

STUDENT INTERVIEW QUESTIONS

Which component or area needs to be improved most?

Is the screen and interface design of this online assessment system appropriate and convenient to use?

Is the System use of this online assessment system easy to use?

Does the online assessment system have positive effect on learning progress ?

What are the difficulties faced while using the online assessment system ?

What did you like at most while using the online assessment system ?

Is there any other issue or area that have not been mentioned in the questionnaire but need to be improved ?