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The Online Examination Standards Requirements Framework and its Security Management's System Techniques

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Abstract: ***This research discusses a particular area of web application specifically "the Online Examination System"that exhaustively studied the requirements for Online Examination Systems to generate standard items suited to the specific area of online examination transmission and its security system. Therefore a new model is needed for the e-examination frame. So this research proposed an online examination requirement framework with information security approach based on the prototype of evaluation methods which can comprehend these deficiencies and support online assessments requirements. The main goals of this research are to control the examination information security within any educational institution to reduce the risk of security systems and maintain information privacy with ensuring the honesty and dependability of data security, Furthermore developing online examinations model to evaluate the student's knowledge using modern computer technology without any effects on the traditional university course exam that uses Pens, Papers and invigilators. The usage of e-examination standard in Taif University –faculty of medicine which supports the security control, authentication and integrity of online exam process, also Generaterequirements framesuitedtothespecific areaofonline examination and structuring an algorithm for online examination security. After that, an online examination was conducted on 74 students on fifth-year second-semester student's faculty of medicine –Taif University. A training time was conducting on the student before enrolling through the online examination and get feedback from the ant take in account all the difficulties, besides taking into account all the security features that were proposed in this research.***

Keywords: Online Exam, Security, Learning Management System, Information Security

1. Introduction

No doubt that Web application improvement has occurred as an obvious aspect of information systems development. All web applications have certain features in the community, therefore a set of requirements are being used continually for the web application development.

This research discusses a particular area of web Application namely "the Online Examination System"that comprehensively considered the requirements for Online Examination Systems to generate a standard item suited to the exact area of online examination transference and security system [1].

On-line assessments (e-assessments) have been widely executed in many educational institutions over the last years. But there are still problems in security which limit their potential. The research will study the information security requirements in e-assessments which may be developed in online examination contexts.

Despite information security technologically enhances in recent years, but the best of knowledge, integrated and complete security models have not been completely carried out yet in e-examination. Even when security advanced procedures and technologies are prepared in online examination Systems too many deficiencies still remain opened and unsolved. Therefore a new frame is needed for an e-examination frame. So, this research proposed an online examination requirement frame with information security approach based on a model of evaluation methods which can comprehend these deficiencies and support online assessments requirements [2].

The benefits of defining the frame of online examination that it reduces the time spent to implement it. Easy to navigate and also guides the requirement to detect variations and identify missing requirements during designing and analysis. As a result, we will have a more comprehensive, consistent and a high quality of the on line examination requirements with high security information system [3].

We can see that to deal with the ever-changing nature of e-examination security system, subsequently we need some technique to educate the users in an effective manner to use it effectively [4].

This research discusses the online examination frame and it's security system that can be used to create content and update information security knowledge standards and best practices, orderings its standards to easily understand and locate the right and required information.by this way, we can see that there is a lot of scopes to improve information security using e-assessment security management techniques [5].

2. Problem Definition

Educational institutions spend considerable efforts on building up firewalls, proxies, antiviruses, interruption detection mechanism, digital signatures, and special network devices and protocols.to assume that security of e-examination. This is a wrong notion because security management is more of managing an end-to-end system rather than just installing technical solutions, By means of any other developed system because this area has many components including people, policies, procedures, processes, standards and technology [6].

The main goals of this research are to control the examination information security within any educational institution to reduce the risk of security systems and maintain information privacy with ensuring the honesty and dependability of data security [7]

This research is interested in defining the requirements of online examination and information security management which generally deals with the processes and procedures that should be followed in order to protect the privacy, honesty and availability of exam information. The standard framework approach will be managed to involve conducting a risk analysis to identify risks to privacy, honesty, and availability of information systems [8].

This research proposeda system for good practice online examination frame and provides security to improve on-line examination by utilizing technologies such as biometric authentication, internet-firewall, and cryptography and network protocol. Moreover, the study discusses the presentation of student's online examination with admiration to security and main experiments faced by online exams within the university. An online examination system should allow a potential student to log in, select the examination for which he wishes to appear, further choose the subject option for that examination and set the center date and time of the examination based on the availability on campus [9].

The research questions are:

1) What are the main requirements standards and issues for the online examination frame?
2) What are flowchart frameworks that can be identified the online examination Security and Privacy?
3) What is the prototype for online examination model?
4) What is the impact of online examination security model feedback from students?

Aims:

1) The main goal of the research is to provide student registration and examination frame with perfect security system.
2) Develop online examinations model to evaluate the student's knowledge using modern computer technology without any effects on the old-style university holding exam that uses Pens, Papers and supervisors [10].
3) The online process and security of the online exam system helps with reducing cheating [11].
4) The usage of e-examination standard which supports the security control, authentication and integrity of online exam process.
5) Develop E-monitoring of students uses fingerprints and cameras for preventing cheating and substitution of the original student [12]
6) Generate a requirements frame suited to the specific area of online examination.
7) Online examinations are measured a significant foundation for university examination, and the expansion of network technology regulates has given the option to comportment the exams online.

3. Background and Literature Review

The research of (Srivastava, 2013) is talking about online examination Over the past decade the web has been contained by millions of people as an inexpensive network to connect and discussion information between them. Therefore, web application development has appeared as a projecting aspect of information systems growth. All web applications have partial structures in shared, therefore a set of requirements are being used repeatedly for the web application progress. This boring amount of requirements patterns can be reused. This paper sets preceding a standard Software Necessity pattern template and a foundation of the various types of Software, Requirements Outlines for an online examination system which can be used frequently by the requirements engineer for a faster supplies elicitation, investigation and validation. [13]

In this paper, (Sarrayrih, 2013) they propose a system that offers security to development on-line examination by using technologies such as biometric proof, internet-firewall, cryptography, network procedure and object-oriented models. Further more, they propose an outline for conducting online exams through unconfident internet support. Though, the proposed system will provide a protected communication-based cryptography and group communications. In this research, they discuss the act of student's online course exam with admiration to security and main encounters faced by online course exams within the university. They accomplish that by decontaminating the security system by using biometrics face recognition that can be joint into the proposed scheme to fulfill the test of the online exam [14]

Experimental research on information security tendencies and applies in e-learning has been done by (Schultz, 2012). Many articles that have been printed apply basic information security concepts to e-learning and list potential threats or propose outlines. The purpose of this research is to recognize, classify and understand tendencies and materials in information security in e-learning as replicated in the discussions on a 'Security and Privacy' discussion forum of the Moodle learning management system. Four main themes were identified, addressed the following topics: verification, permissions, attacks and Moodle configuration. This study should be of interest to educators in information systems management on numerous levels. First of all, as users and in some cases administrators of learning management systems, the themes and trends identified should growth cognizance of security issues inherent in the platform. Secondly, this article serves as an expressive case study on how security issues are defined, discussed and dispersed with by developers, users and administrators within the open source software development standard.[15]

The (Ghosh, 2012) research works on the privacy protection resounded among many researchers. Every individual's credit card communications, phone calls, online looking conducts, and grocery store takes are recorded in one form or another, amassing so much personal data that comprehensive monitoring of everyone's daily activities is already possible, if not existent. For now, we rest comfortably, believing that all these unequal data collectors

are not planning to fit all the parts together. But, if someone did have access to all this data, they could get a fairly complete picture of nearly every detail of our lives. In the wake of heightened attentiveness after 9-11 and pervasive new technologies that can infringe on privacy, IT professionals will face the task of balancing privacy interests of the individual with corporate profit-driven motives and National Security interests. [16]

The research of (Mittal, 2010) has been worked on User's knowledge of information security. This is one of the important issues in information security managing as 70-80% security events occurred due to carelessness or inexperience of users. In this paper, they have analyzed the utility of knowledge management tools to quickly capture, store, and share and distribute the information security related knowledge with the view that it should be effectively applied by the information system users. We found that the knowledge administrationimplement can be used to increase the information safety. [17]

This paper (Miguel, 2015) proposes a trustworthiness model for the design of secure learning assessment in online web collaborative learning collections. While computer maintained collaborative learning has been widely accepted in many educational institutions over the last decade, there exist still problems which limit their possible in collaborative learning activities. Among these limitations, we investigate information security requirements in online assessment, (e-assessment), which can be developed in collaborative learning contexts. Nevertheless information security improvements have been developed in recent years, to the best of our knowledge, combined and round security models have not been completely created out yet. Even when security advanced procedures and technologies are organized in learning management systems, too many types of weaknesses still remain opened and unsolved. So, new models such as trustworthiness approaches can overcome these absences and support e-assessment requirements for e-Learning. To this end, a complete security typical is designed, implemented and evaluated in a real context of e-Learning. Insinuations of this study are commented for secure assessment in online collaborative learning through effective trustworthiness approaches [18] as for (barik,2012) supposed E-Learning system is one of the most effective suggestions of Information and Communication Technology (ICT) and regularly becoming popular among the educational Organization, but the mainstay of the system E-Assessment is not secure adequate in most of the cases. As an effect most of the contributors are still very much reluctant to get developed support via E-learning. In this paper they outline the security measurement related to E-assessment where assessment can be similar to paper-based system. They have used Digital Signature to protect E-assessment documents like Question Papers, Answer sheets etc. and keep on monitoring (e-monitoring) via ICT with VPN, Video conference, etc. Also they deliberated UML created sample Class description, use case figure and Arrangement Illustration to show E-assessment security so that all the participants, Management of the E-learning society (Institutions / Managers), Authors (Books, Content of subjects), Teachers (Professor) and Learners (students) can build confidence in their minds for E-Learning system [19]

4. Features of e-assessment

Assessment is a continuous process provides information for improving learning and teaching. This information is unnamed and not classified. Whereas evaluation is the judgment of a student's performance and it focuses on grades In case of E-assessment system the following four features must be considered [20]

a) **validity:**
Validity is the main part of any assessment system .We need to validate the examinee, examiner, system manager and invigilators at every step in the assessment because it is difficult to identify everybody "face-to-face" continuously in e-learning situations excluding for some video monitoring.

b) **Passwords**:
Inopportunely less interested students can share their password to other students which hints to troubles of the e-learning system. There must be a system to edit the profile variation the password after getting high security password via short message services (SMS). Also there must be time limit after that user must have to change their password.

c) **Biometric:**
Most scientific confirmation by biometric explanation such as fingerprint and face reorganization technique. These are continuous verification methods [21]

d) **Video Monitoring**:
A nonstop video monitoring via webcam (Virtual private network) can validate the system. No user will have the bravery to interrupt the exam hall when they know about video Monitoring. The tendency of invigilators to leave examination hall will also be checked as everything will be recorded and stored in a server.

e) **Answer to Challenge Questions**:
User has to face different tasks related to the data as long as by them during the examination. Though it may interrupt a little the examinee but will increase more trust on E-assessment system.

f) **E-token**:
Institutions can send some code via SMS or E-mail to validate students, invigilators and center head together so that three inputs together allow ongoing examination.

g) **E-Admit Card**:
Similar to e-token, e-admit cards legalize students and invigilator together.

The e-assessment security and privacy encounter:
Many institutions discuss security and privacy without considerate the differences and dependencies between them. Privacy refers to aspects of examinee or objects that the institution wants to remain confidential, hidden from others. These aspects include [22]

- Personal data, all documents an individual wants to keep private
- Possessions, defining features of the individual or entity, including preferences and physical attributes
- Behavioral characteristics of students feedback

Privacy concerns [23]

To develop an expressive privacy policy, the institution should worry with a good starting point. The online users have at least four main privacy worries: They want to know

- What is the information the online examination site gathers?
- How the online examination site possessor uses that information?

Validity in e-assessments

In order to determine whether or not an e-assessment is protected, both from students' as evaluators' point of view, it can be asked if the e-assessment contents the following properties [24]

- Accessibility
  The e-assessment is accessible to be performed by the student at the scheduled time and during the time dated which has been well-known. After the assessment duty, the instructor should be able to access the results to endure to evaluation the task.
- Reliability
  The description of the e- must not be different, destroyed, or lost in an illegal or accidental manner. The result transported by the student must achieve the reliability property too [25].
- Identification and authentication
  While execution the assessment task, the fact that students are who they right to be must be verifiable in a reliable way. In addition, both student's outcomes and evaluation outcomes must actually agree to the activity that students have done.
- Confidentiality and entree control
  Students will only be able to entree to e-assessments that have been exactly prepared to them and instructors will access following the recognized evaluation process [26].
- Non rejection
  The system must provide defense against false rejection of connection in e-assessment

5. Research Procedures

1) Incorporation of the requirement for online examination systems
2) Developing standards frame structure and requirements: Dissimilar parts of the frame should recognize the associations between the exam parts.
3) Essential properties of requirements were also taken into reflection in the search of criteria for designing the structure of the online examination
4) building up a flow chart for online examination security system
5) Creation a structured security for online examination system
6) Software Outlines Requirement is a type of online exam builder software that will be used during necessities that also impact definitely in other activities like analysis, documentation and validation
7) showing online examination over registration of students for an exam, upholding the data of a registered examinee and auditor, simplicity of website navigation, user-pleasantness, simplicity of data content representation, conducting Online Examinations Display of results, Increasing enrollment, [27]
8) piloting questionnaire after the e-exam submission to get students feedback [28]
9) Secure e-assessment this section, the research will present a review of the main factors, classification and security issues involved in security in e-assessments in a diagram
10) an assessment is showed in order to analyses how e-assessments frame and security factors are related to previously security properties [29]
11) Suggest a safety model which covers technological safety techniques adding usefulnecessities to protected e-assessments.

Table 1: The online examination standards requirements and security

The main criteria	*Online examination criteria*	*The item included*
Examinee registration database	Examinee enrollment	Registration all the examinee in the examination database by the institution
	Defining Examinee id	Student id Student name Student password
	User verification	To specify that a person must log in and make their identity known to the System before they can start the registration process on the system.
	Exam information	Exam Date Exam time Exam title Exam schedule
	Exam security by the system	Registration details consistency and completion checked by the system
		Check letters andpassword verified by the system
		Submission ofregistrationform permitted for enrollmentforthe exam.
		Online exam Shouldworkwith all webbrowsers, OS and data tobe
	Exam data base store for student enrollment	The system store student registration and examination registration details
Examinee access	User access	Go to URL exam address by navigation software
	User Process	to specify the ease of user interaction and user process on and across the website and examination give students a prototype exam (small exam model) buttons and tabs on the website and

		question and jet the feed back
	Try it before applying	User registration to specify how new users are registered and their information is stored for authentication later
	Sure users are approved	to specify that a set of users is official or not to access or see certain activities
	Online examination System Operation	To specify the platform to be used to build or run the system or with which the system must be capable of interacting or compatible. E.g. Web Browsers, OS, JavaScript, HTML and DBMS
Building up the exam	Test information	Test name and type
		Text description
		Test instructions
	The online exam body	Create a question –reuse a question – upload a question Define the test category and keywords (category – topics- level of difficulty – keywords)
	Information Content Representation	to define a scheme for representing information content as text, image, audio and video .E.g. presentation and text for the examination paper
	Present interface design	Give good-looking steady interface design to define visual elements and interface layout of the online exam registration and examination website
Test the online exam working	Navigation	To specify how to navigate in the website or the question paper.
	Test feed back	Give Question feedback for each Give Correct response feedback Give Incorrect response feedback
	Marks point	Distribute marks on each question Give a total mark for all the test
	Test options	Content link description Test availability Add announcement about the test Define the student attempt Forth completion Set timer Set display date Set test presentation question (all at once- one at a time)
	Security inside the test	Prohibit pack tracking – randomize the question
Students evaluation	evaluation analysis	Grade Centre – full feedback – finale results for all the assessment tools Course analysis Course report
Online exam data management	Data life length	To specify for how long a convinced type of information must be retained in the active system after which it can be deleted or stored in historical records. E.g. Results
	Data History	to specify which data is to be moved at what time from the active storage system to the history
	EntityDefinition	Todefineanentityfor whichinformationistobe storedanditslifespan. E.g. student
Online exam data analysis and report	Inquiry	Todefinea screendisplay functionthatshows specifiedinformationtothe user.E.g.ExamCentre availabilityinquiry
	Report	todescribea reportthat demonstrationsspecified Informationtothestudents and instructors.
	Responsetime	To specifyhowmuchtime thesystemmaytaketo reappearancetoa request.
	Output and Efficiency	To specify a speed at which the system interfaces must be able to complete some type of input or output processing.
	Active ability	To specify the quantity of a specific type of entity for which the system must be able to achieve processing at the same time .the number of registered users at the same time.
	Static ability	to specify the quantity of an actual type of entity that the system must be able to store forever (typically in a database).Whole number of users in examination database
	Mistakenotification	Todisplayincaseofa mistakeasdefiniteor compulsory
	Availability	todefine whenthesystem isavailabletousers,the examinitial timesshould be open all exam period policies and roles for exam available problems and difficulties
	Expandability	To specifyawayinwhichthe examination systemmustbeableto increaselaterto accommodatedevelopment.
	dependability	To specifyhoweasyitmust betoconnector promotionthe examination system.
	Agreement	tospecifythata specific actionmustbeapprovedby anothercertifiedperson beforeitcantakeplace
	Procedure	Todefinea typeofamountthe online exam will be spread to students

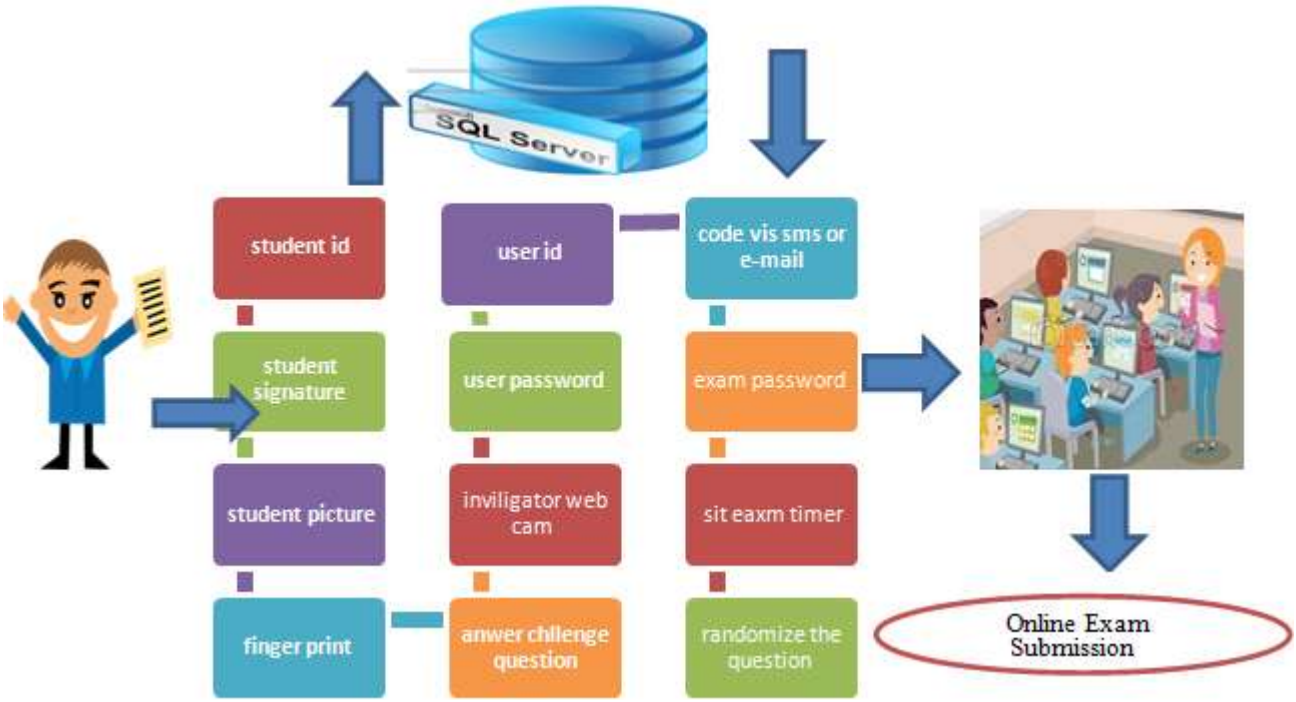
(Table1) presents all the standards requirements for online examination situation between the educational institution, examiner, examinee and invigilator.

Theproposedsecurity system for online examination
Challenge of personal identity:

- Using therecording cameras in the corners and fingerprint scan detection tools will be better to combine at the same time for detecting the individuality for each person.

- The camera and the thumbprinttools will be located in each position in the labs. The biometric thumbprint scanner devices and camera will check the students from the university database which had been collected and kept in the registration unit [30]
- We use the camera for student identifying in Taif University and also for monitoring all the area of examination situationactions.
- students arriving from different IPs into the university domain and attempting the exam on campus , the university domain will add all the students user id's in taif university database ,so The students who enter from the different IP's cannot use the same domain and consequently the system according to this is secured.
- If unauthorized students try to contact the database from a different location off campus they will be not allowed.
- Thespecialexamgroupiscreatedbygroupingthehostnames /IPofclientsforaspecificlocation(computerlab) andtime.
- The user after recognized log in into the system uses the user-id and password provided by the university, which is valid by the server.
- This gives the student's approval to open the exam from the server otherwise the students cannot login into the system.
- The illegal users attempting to login to the system from remote computers are blocked by the proposed system
- Once the assembly begins the timer is on, the student should complete his exam within the due time and once the time is up the system send an alert and logs the user off.
- Using online signature or displaying student photo before the exam.
- We can offer more security to identify the students by using online cameras which are more valuable than other methods of checking the ID cards. Subsequently, we ensure the identity before the exam starting [31]

The flow chart of the secured online exam system proposed. It shows the sequence of stages for online exam from the starting followed by the secured log in using the proposed security system login through server database until the end of exam results.



(Figure1) shows the relation steps between the learner and the exam security system data base

The systems are connected using the security information. The camera and fingerprint scanner inside the exam is connected to the security exam server. Once the security server authenticates get the actual information about the examinee then the users are allowed to access the exam and submit it.

6. Algorithm for Online Examination Security

Step 1: Student Proof of uniqueness: The system will be checked the uniqueness of the student by using camera and scanner which will take the picture and the fingerprint before entering the exam. This will also be checked whether the student is capable of that particular exam.

Step 2: University Domain Login: The student will log into the domain of the university with the user name and password as long as the university domain login, Ex: username: ----, Password: ---

Step 3: Special login into exam domain: The system asks the user to write the username and password. If the user name and password are correct and match the security system Data base, then the student will be able to log into the exam.

Step 4: Admission the Exam: The user will complete the exam file that is located in the application (Online Exam)

Step 5: Online Exam Supervisor Password: The supervisor password should be given to the students who are successfully logged into the exam domain at that time. This gives them admission to the exam session to begin with that exact exam.

Step 6: Random questions and random choices: The random questions are given to the students, who submit the answers to the system; when the session is completed, the system generates the result of the exam.
Step 7: End

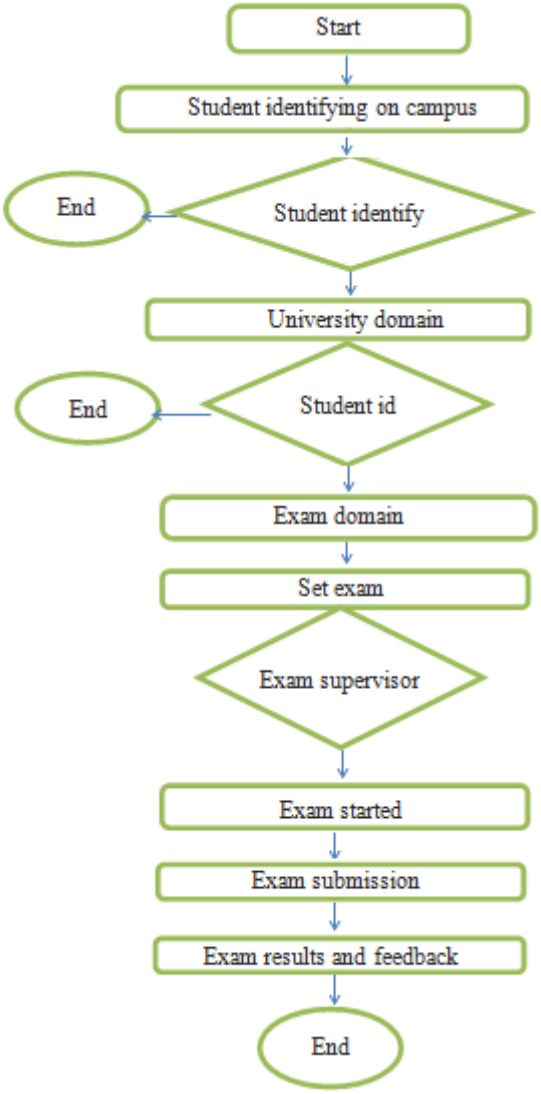


Figure 2: The flowchart for online examination security system

These figure demonstrations the flow steps in online exam security system starting with students identifying on campus followed by university domain and exam domain, the right pass will get the exam submission and the incorrect pass will exit from the exam system.

The application procedures:

a) An online examination was conducted on 74 students on fifth-year second-semester student's faculty of medicine-Taif University.
b) a training time was conducting the student before enrolling the online examination and get feedback from the exam andhad been got in the account all the difficulties
c) Taking into account all the security features that were proposed in this research design and the implementation of an e-assessment method by combining most of the security methods.
d) Regarding the students' e-exam participation, we have monitored the participation values in evaluation method through questionnaire and then get the feedback

Table 2: Feedback results from the questionnaire

Feedback agree points	Responses percentage
Using e-technology applications in e-examination instead of paper exam	84%
preventing cheating in examination	93%
time monitoring the exam	97%
get the results immediately after the exam	100%
the exam navigation is better than paper exam	67%
the security system in comparison to paper exam	95%
the online exam is better than the paper exam	70%
Student time management through all the exam situation	92%
interface design in comparison to paper exam	86%
exam revision after fishing	79%
need training before the exam in proper time	97%
feeling justification than the paper exam	98%

From (table 2) we can conclude that the topic which refers to gets the final exam results get the highest percentage of all examinees, followed by feeling justification and time mentoring .otherwise we can see that the online exam get the lowest score than the paper exam so that means there is a still a conviction that the traditional paper is better so we can denote that there is resistance to any new situations.

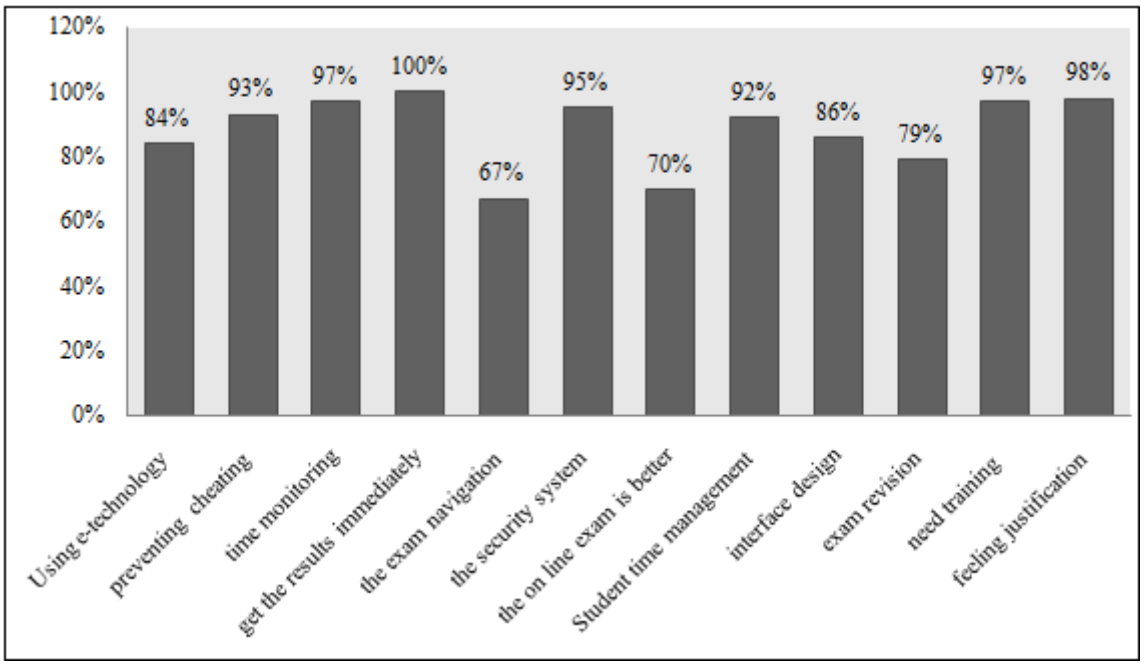


Figure 3: responses feedback for online examination and security system

7. Findings

In this section, we summarize the most relevant findings that emerge from the results and the statistical analysis.
The memberships have experimented with the online e-assessment activities. We plan to challenge this problem with alternative online
The statistical analysis shows significant findings regarding the e-examination model.
The results of the comparisons between paper exam and e-assessment
The maximum and minimum differences are between 67%-100%.
The mean difference between manual and automatic method is 33%
The percentage of assessment cases in which the difference between manual paper and e-assessment is more than 67%
The extent difference in the scale percentage of assessment cases in this range is reaching the 100 %.
The most significant finding is related to getting the results and feedback immediately and feeling justification.

8. Conclusions and Further Work

In this paper, we have presented an innovative approach for e-examination security in the context of secure learning assessment. The study shows the need to propose a mixture assessment model which combines technological security solutions for the examination.

As ongoing work, we plan to continue the methodology testing and evaluation by organizing e-assessment learning mechanisms in additional real online courses. Due to further deployments will require a large amount of data analysis, we will continue examining equivalent processing methods to manage reliability factors and indicators by improving the map reduce outline strategies that would result in improvement of an equivalent speed-up, such as a customized size of barriers. Moreover, we plan to evaluate and test it.

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