Chapter – 4

MAERIALS AND METHOD

4.1 Aim and Objectives of the Research

Objective of the study is to impose the various network security measures in the network of the educational institutions to secure the sensitive data of the institutions.

Research about “Study the use of various network security measures to enforce the network security control in educational institution” it is an effort to study the various network security measures used in the educational institute as the computers are interconnected to share the personal data of the students and the staff members, information regarding the school and hardware like printer, scanner and the application softwares. It is seen that very sensitive data are kept on the network. It is seen from the research that though we are using the network security measures still the threats are found in the entire network and on the data. This research is about the threats on the data and the advantages and the limitations of the security measures. This research implies that new movements and new securing hardware or software should be developed to protect the data from the attackers. Thus we can say that all the organisations especially educational institutions need the fully secure network environment to work.

It is seen that the academic and the administrative computing systems used to be more out-of-the-way either intentionally due to the security reasons or as a result of limited interconnectivity. But today it is seen that nearly all information like administrative, personal details of the student and the teachers etc. can be obtained through a network. Course materials are presented over the network and even students are submitting their assignments. When registration, application forms,
materials and the students grades are submitted and recorded over the open network better security are needed. Therefore this paper is mainly highlights on the enforcement of the various network security measures.

**Objectives of the Research**

1) To study the importance of the various network measures in educational institutions.

2) To analyze the views of the staff members and the students in the educational institutions towards the network security.

3) To study the psychology of the users who illegally attacks on the data on the network.

4) To study the effect of the risk factors associated with the various network security measures.

5) To suggest suitable measures to secure the data on the network.

**4.2 Hypothesis of the Research**

1) Educational institutions are using various network security measures to protect their data from the intruders.
2) Network safety measures are required in order to care for the statistics of the educational institutions as almost all kinds of data like students information, grades of the students, results of the students etc. are kept on the open network.

3) Irrespective of using various network security measures; still the data is not absolutely safe.

4) There is a need to improve the network security measures depending upon the risk management strategy so that to acquire the fully secure environment.

4.3 Assumptions relating to the Research

1. Network security is essential for any organization especially for the educational institutions as very delicate data is there on the network.

2. Various Network security measures are necessary for the security of the data over the network.

3. Even though the various security measures are being used still data is not safe over the network.
4.4 Delimitations of the Research

Physical Limitation

The study has a topographical constraint that it bounds the educational institutions at Mumbai outlying zone which is at Malad (west).

4.5 Utility of the Research

1. The end result of the research will be beneficial to all the organisations at large as it will highlight that the various network security measures are important to secure the network from unauthorized access.

2. It shall focus towards ignorance and subsequent awareness regarding the security of the network from the theft.

3. Research shall create awareness regarding the use of various network security measures.

4. The statistics will be worthwhile for the new researchers.

5. The exploration shall be advantageous for the development in the networking security.

4.6 Study Area of the Research

Area of the research is all the educational institutions at Mumbai peripheral range which is at Malad (west).
Fig 4.1 Selected Area Malad
4.7 Research Method

Descriptive Survey Method can be used when the data lies in the phenomena of the moment i.e. what is happening around. This is because when the researcher uses this method, he or she observes the phenomena carefully and accurately. This method is also called the normative survey i.e. what we are observing is normal and will be available for observation again.

When the researcher cannot observe something directly, he or she too must use certain instruments like Questionnaire, tests, inventories, attitude scales, and interviews and so on.

4.8 Problem Analysis

Some of the Hacking Cases are discussed below which will clear our disbelief that the networking security is having breaches.

![Fig 4.2 Computer-generated Actuality](image-url)
Case 1 - College apprentice hacks 10th, 12th board results, make public system loopholes – without any highly trained team, a college graduate has exposed one of the biggest loopholes of the Indian education system. Debarghya Das, a college student from Cornell University hacked the ICSE and ICS results.

Case 2 – In Indian Commandments are not that strong enough for the gatecrashers who steal the important data. Swartz could have bump into over 30 years in prison, if find guilty following in India he could have contracted away with three years detention and an Rs 5 lakh fine under Section 66. From this it is clear that the Indian information technology laws are not tough enough to deal with hacking case in point. In addition it is a bailable evil doing in India, despite the fact in the other country like US it is a non-bailable. Virtual security proficient Pavan Duggal said that the present-day laws are not satisfactory to deal with data hacking. Under Indian edict, there are only two provisions but there are also not satisfactory. A lot needs to be done.

There are many such cases of the hacking of the data hence this research is being carried out to make compulsory the proper use of the networking security methods. From the surveyed data it is found that very nearly every learning fields are using the network security tools like firewalls, antivirus softwares etc. but still it is found that data is at the risk point. They should enforce the rules and code of practice which are associated with the security of the data and the networking. From these the risk upon the data can be reduced and the raiders will not get any entry point to access into the network. As a result this research is being carried out to enforce the network security control in the educational institutions by the proper use of the networking security tools. For these it is clear that both information technology
syndicates who design such measures and the network superior of the learning institutions should work jointly to at least reduce these breaches in the security. To look after our data from the persons who play with the valuable records is not an easy task, the reason being we never know which the entry is and exit point of the attackers. So it becomes the joint adventure of the institutions employees and the network manager to deal with such decisive issue. At this point the computer security plays an important role for the learning fields. Computer security is nothing but the rubrics and the techniques that are designed to safeguard the records from the unintentional and the unconstitutional users. It is reported that due to the data theft the biggest loss of the educational fields is business goes down, economy loss, loss of the takings, valuable data loss and many more.

There are abundant laws and plentiful books and the websites which are made to edify the people from the data theft. Privacy is very important term in the security point of view. One cannot share the information of the other to the third party without his or her knowledge. So it is very important to know with whom we are sharing our information and till which extent. The people who are associated with such activities are notorious as the hackers, cracker, virus programmers, breachers etc. These are the people who intrude upon computer security.

From which we can summarized that with the apposite use of the security tools one can minimize the terrorizations for the data.

From the report it is seen that most of the education college are not keeping their valuable data virtually because of the data hacked. The latest report says that the top targets of the hackers are the Educational fields, Government, industry and the organisations.
<table>
<thead>
<tr>
<th>Various Areas</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational Fields</td>
<td>15%</td>
</tr>
<tr>
<td>Government</td>
<td>23%</td>
</tr>
<tr>
<td>Industry</td>
<td>22%</td>
</tr>
<tr>
<td>Organisations</td>
<td>7%</td>
</tr>
<tr>
<td>News</td>
<td>6%</td>
</tr>
<tr>
<td>Finance</td>
<td>14%</td>
</tr>
<tr>
<td>Single Individual</td>
<td>3%</td>
</tr>
<tr>
<td>Others</td>
<td>10%</td>
</tr>
</tbody>
</table>

Fig 4.3 objectives of the Hackers
Fig 4.4 Pie Chart shows the targets of the Hackers

Following table gives the clear idea of distribution of the attacking techniques of the intruders. With 20.8% are the unknown attacks, SQLi is 14.0% DDoS with 11.3%, Targeted attacks and the malware is 10.4%, Account hacking and the Password hacking are 6.5% and 2% respectively.
<table>
<thead>
<tr>
<th>Attack techniques</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password Hacking</td>
<td>2.0%</td>
</tr>
<tr>
<td>SQLi</td>
<td>14.0%</td>
</tr>
<tr>
<td>DDoS</td>
<td>11.3%</td>
</tr>
<tr>
<td>Targeted attack</td>
<td>10.4%</td>
</tr>
<tr>
<td>Malware</td>
<td>10.4%</td>
</tr>
<tr>
<td>Account Hacking</td>
<td>6.5%</td>
</tr>
<tr>
<td>DNS Hijacking</td>
<td>2.6%</td>
</tr>
<tr>
<td>Java Vulnerability</td>
<td>1.3%</td>
</tr>
<tr>
<td>Unknown</td>
<td>19.5%</td>
</tr>
<tr>
<td>Defacement</td>
<td>20.0%</td>
</tr>
<tr>
<td>Weak security Credentials</td>
<td>2.0%</td>
</tr>
</tbody>
</table>

Fig.4.5 Distribution of the Attack techniques
Fig. 4.6 Pie-chart showing Distribution of the Attack techniques

4.9 Research Design

The researcher needs to collect, measure, organize and interpret the data. For the interpretation of the data appropriate methodology should be used.

The data we come across can be divided into following categories:

(i) **Written document**: This is called the historical data, not because are used in the subject called history but because they describe what happened in the past. This is sometimes known as literary or critical data.
(ii) **Descriptive Observations:** This is similar to the written account. The observer observes something and then writes a description. The observer is the direct observer. The difference between written accounts and descriptive observations is that while the written accounts are written by the people who have no thought of research in their minds; observations have a direct research purpose. This is sometimes called normative survey or descriptive survey. The resultant data are called normative or descriptive survey data.

(iii) **Numerical Observations:** These are observations which have been quantified and exist in the numerical form. As we have seen earlier, these observations result from the application of measurement techniques – e.g. a test and then the marks obtained by the students. To numerical observations, we can apply statistical techniques. Such surveys are sometimes called analytical surveys and data may be called statistical data.

(iv) **Comparative Observations:** These results from a careful comparison or contract of one set of observations with another set of observations. The two observations may be made under different conditions, one strictly controlled and other not controlled. These data are usually called experimental data.

**4.10 Population**

For the choice of population the researcher needs to observe a particular group of people technically called population. It must be chosen with great care. Delimitations is necessary because researcher cannot observe everyone and so it is necessary to say the conclusion is with a certain group of people, who may be representative of such groups, at a certain place and time. Statistical techniques are necessary to choose a sample. Population is the term used for the receiver. It
includes any general public. In the present research it refers to network administrator, teachers, non-academic staff members and students.

4.11 Sample Selection
Sampling means selecting a portion of the intended population in such a manner that the researcher can see all the characteristics of the total intended population. In the present research network administrator, teachers, non-academic staff members and students are selected as sample.

The sample is randomly selected. Randomization means selecting a sample from the whole population in such a way that the characteristics of each unit of the sample are as near as possible to the broad characteristics inherent in the total population.

4.12 Tools for Research Observation
Out of various techniques as a means of collecting the data in the present research questionnaire technique is used. A questionnaire is a document containing a series of questions to which the people reading it are expected to provide answers.

- **Biased in the Research Tool**

  The questionnaire type study can also be biased. For instance there may be few people who do not reply or respond to the questionnaire. There may be some people who may have a reason for not answering the questionnaire so the conclusions may be biased.

- **Reliability of the Observer, Examiner, Evaluator**

  The researcher shall observe the data as per the responses given in the questionnaire. But there may be distortion of the data which may lead to the conclusions to go wrong. In the present research the distortion may be in calculation or statistics.
Objective of Pilot Study

Pilot study means something done as a test before being introduced more widely. A pilot study is carried out as a small experiment to test the expected results so that the researcher can confirm that the conclusions are moving in the right direction.

Procedure for the Pilot Study

The prepared questionnaire is shown to 5 experts who are having the knowledge of the research work so as to know the deficiency of the questionnaire. To carry out the pilot study first the questionnaire is given to selected sample. And the responses given are examined. Based on responses the analysis is carried out that whether it is matching with the accepted results or not.

Analysis of the Pilot Study

Analysis of the Pilot Study has revealed that the questionnaire is properly prepared and the responses are matching with the accepted conclusion (Hypothesis). The researcher can narrate the relationship between the collected data and the problem. And it is analyzed that the data supports the conclusions. And so the researcher can confirm that the path proceed is appropriate and it need not be changed.
4.13 Statistical Techniques
Researchers commonly use devices like tests to arrive at numerical data. For instance test and awarding marks for the performance is a well-known way of giving a numerical form to the data regarding learning. The aim of statistics is to interpret numerical data. In the present research 500 employees and the 500 students of the ten colleges are randomly selected for the research work. Chi square test is used for testing the hypothesis.

4.14 Steps in Conducting a Research
The main phases in leading research are:

• Identity of research issue

• Study the Literature survey

• To lay down the impetus behind research

• Define particular research assumptions

• Data collecting

• Analyzing and decoding the information

• Reporting and evaluating research

• Connecting the research findings, conceivably and recommendations
4.15 Research techniques

The objective of the research method is to make new information or to develop intellectual capacity of a point.

This procedure takes three most important steps:

• Investigative research, which helps to differentiate and describe an issue.
• Productive research, which exams theories and suggests answers for an issue or inquiry.
• Experimental research, which tests the attainability of an answer employing experimental authorization.

The two major researches outline are as follows: qualitative research and quantitative research.

Qualitative research
Qualitative research is associated with the theoretical and supposed standpoint of social constructionism.

Quantitative research
The Quantitative research techniques depend on uneven examining and organized information gathering instruments that fit various encounters into foreordained reaction classes. Quantitative research is concerned with testing assumptions determined from hypothesis

Mixed-method research
Mixed method research, i.e. research that joins qualitative and quantitative modules, using both vital and uncompelled data, is coming to be more normal.
4.16 Summarizing the Investigation Technique

For the clarification of the figures **Descriptive survey technique** is used. The technique is created on observation. It is the phenomena to discover what is happening all over the place.

➢ **Source of data collection**

**Primary Source**

Primary source is collected from the different colleges of the Malad area. In the first category there are all the staff members including the teaching and the non-teaching staff members. In the second part the source were the students with the knowledge of the networking.

**Secondary Source**

The secondary data has been collected from reference books, magazines and websites.

➢ **Research Tool**

Questionnaire is used for the collection of the data.

➢ **Population**

Persons working in the educational institutions are the population selected.

➢ **Sample**

From the given population the samples of 50+50=100 (staff members and students) are randomly selected belonging to Mumbai suburban area that is from Malad (west).
Analysis of the data

1) Based on the collected data mean standard deviation is calculated.

2) Chi square test is used for testing the hypothesis.
Figure 4.7: Chart of Research Methodology

RESEARCH METHODOLOGY

RESEARCH METHOD
(Descriptive survey method)

COLLECTION OF DATA

Primary data
Questionnaire

Secondary data
Books, internet, journals

(Sample Selection)

Staff Members
Students

DATA ANALYSIS BY STATISTICAL METHOD
(Chi Square Test)

INTERPRETATION OF RESULTS
AND TESTING OF HYPOTHESIS