CHAPTER – 3

METHODOLOGY

The present research was conducted to investigate "Usage, Opinions and Problems of web-based learning by undergraduates of The Maharaja Sayajirao University of Baroda". This chapter describes the steps followed to conduct the study. They are as follows:

3.1 Pilot Study

3.2 Population of the Study

3.3 Sample Selection of the Study

3.4 Research tool for Data collection

3.5 Description of the Research Tool

3.6 Validity of Research Tool

3.7 Reliability of the Research Tool

3.8 Pretesting of the Research Tool

3.9 Data Collection

3.10 Scoring and Categorization of Variable

3.11 Statistical Analysis of the Data

3.1 Pilot Study

"Usage, Opinions and Problems of Web-based learning by Undergraduate students of The Maharaja Sayajirao University of Baroda" a pilot study was carried out between January 2018- May 2018.

3.1.1 Objectives of the pilot study

- To study the profile of the Undergraduate students of The Maharaja Sayajirao University of Baroda.
- To study the usage of Web-based learning amongst Undergraduate students of The Maharaja Sayajirao University of Baroda with respect to their -
  - Age
  - Gender
  - Discipline

- Year of study
- Monthly Family Income

3.1.2 Sample of the Pilot Study

A Pilot study was conducted in the year 2018 in The Maharaja Sayajirao University of Baroda, Vadodara. The sample for the pilot study was selected from the following faculties:

- Arts
- Commerce
- Science

By using convenient sampling method thirty students were selected from above mentioned 3 faculties as the sample of the Pilot Study. Both boys and girls student were selected from the first year, second year and third year purposively. 10 students were selected from each group. The distribution of sample can be seen in the table below:

Table: 1 Distribution of Sample N= 30

Faculty	Male	Female	Total
Arts	5	5	10
Commerce	5	5	10
Science	5	5	10
Total	**15**	**15**	**30**

3.1.3 Description of the Tool used for Pilot Study

A structured questionnaire was constructed. The pilot study questionnaire consisted of the following sections:

Section I: Profile of the respondents

This section includes elements related to the profile of Undergraduate students, such as theirs Age, Faculty, Year of study, Gender, Discipline and Monthly family income.

This section includes elements related to the profile of Undergraduate students, such as age, year of study, year of study, gender, discipline and monthly family income.

Section II: Usage of web-based learning by Undergraduate students of the Maharaja Sayajirao University of Baroda.

This section included twenty multiple choice questions related to usage of Web-based learning related to:

- Daily use of computer
- Daily use of Internet
- Time spent for using Computer
- Time spent on Internet
- Devices used to access Internet
- Type of Internet connection
- Reason for using Web-based learning

3.1.4 Procedure of data collection

A survey method was used to collect the data. The prepared questionnaires were distributed to undergraduate students studying at the Maharaja Sayajirao University of Baroda, Vadodara.The collected data were analyzed by calculating mean scores and percentages. A tracking method was used to collect the data. The prepared questionnaires were distributed to undergraduate students studying at the Maharaja Sayajirao University of Baroda, Vadodara. The collected data were analyzed by calculating the average scores and percentages.

3.1.5 Major Findings of the Pilot Study

3.1.5.1 Background information of the respondents

There was the same number of respondents (10) for each group of faculty, for a total of 30 respondents.

- Most of the respondents were from 19 years old that is (74%)
- Equal number of participants were male and female.
- Equal number of respondents were from same Discipline that is Arts, Commerce and science
- Most of the respondents belonged from Third year i.e. is (63.30%).
- (53.3%) belonged to higher family income group.

3.1.5.2 Usage of Computer and Internet

- Daily use of the Computer by respondents (98%)

- Daily use of the Internet (88%)
- Respondents were spending 7-8 hours to use Internet and Computer facilities

3.5.1.3 Devices that the students were using to access internet

- Personal Computer (20%)
- Laptop (55%)
- Smart Phone (75%)

3.5.1.4 Type of Internet connection used by the students

- Free Wi-Fi zone of University (22%)
- Paid Wi-Fi (23%)
- Mobile network with 4G Mobile (55%)

3.5.1.6 Reasons for using Web-based learning reported by the students

- Use website to pay fees (88%)
- Use video as learning materials (78%)
- Download materials from University website (69%)
- Use internet to make plagiarism free document (55%)
- Use software to check spelling and grammar (49%)
- Use plagiarism checker (25%)
- From the results of the pilot study, it emerged that college students used computers and the Internet for their educational purposes. The study results revealed that the primary reason for using the internet was educational. A wide variety of computer and internet use has been found among college students, from paying fees, collecting study materials, using plagiarism check to reduce, etc.

This era of pervasive technology has significant implications for the use of web-based learning for higher education, not only to make education interesting, but also to provide access to education for students from any part of the country to any moment. Web-based learning can improve the learning process, increase productivity, and achieve this more effectively than the traditional approach.

The study revealed areas where a basic e-learning system can be introduced, as well as areas for improvement that need to be addressed when implementing e-learning.

This pilot study laid the foundation for conducting research on "Usage, Opinions and Problems of Web-based learning by Undergraduate Students of The Maharaja Sayajirao University of Baroda, Vadodara

3.2 Population of the study

The population of the study comprised of the Undergraduate Students of the Maharaja Sayajirao University of Baroda, Vadodara Gujarat

3.3 Sample Selection for the Study

- After deciding the population for the study, the next step was the selection of the sample. For this, purposive and convenient sampling methods were used.
- The sample of the study were selected from below mention faculties of The Maharaja Sayajirao University of Baroda. They were
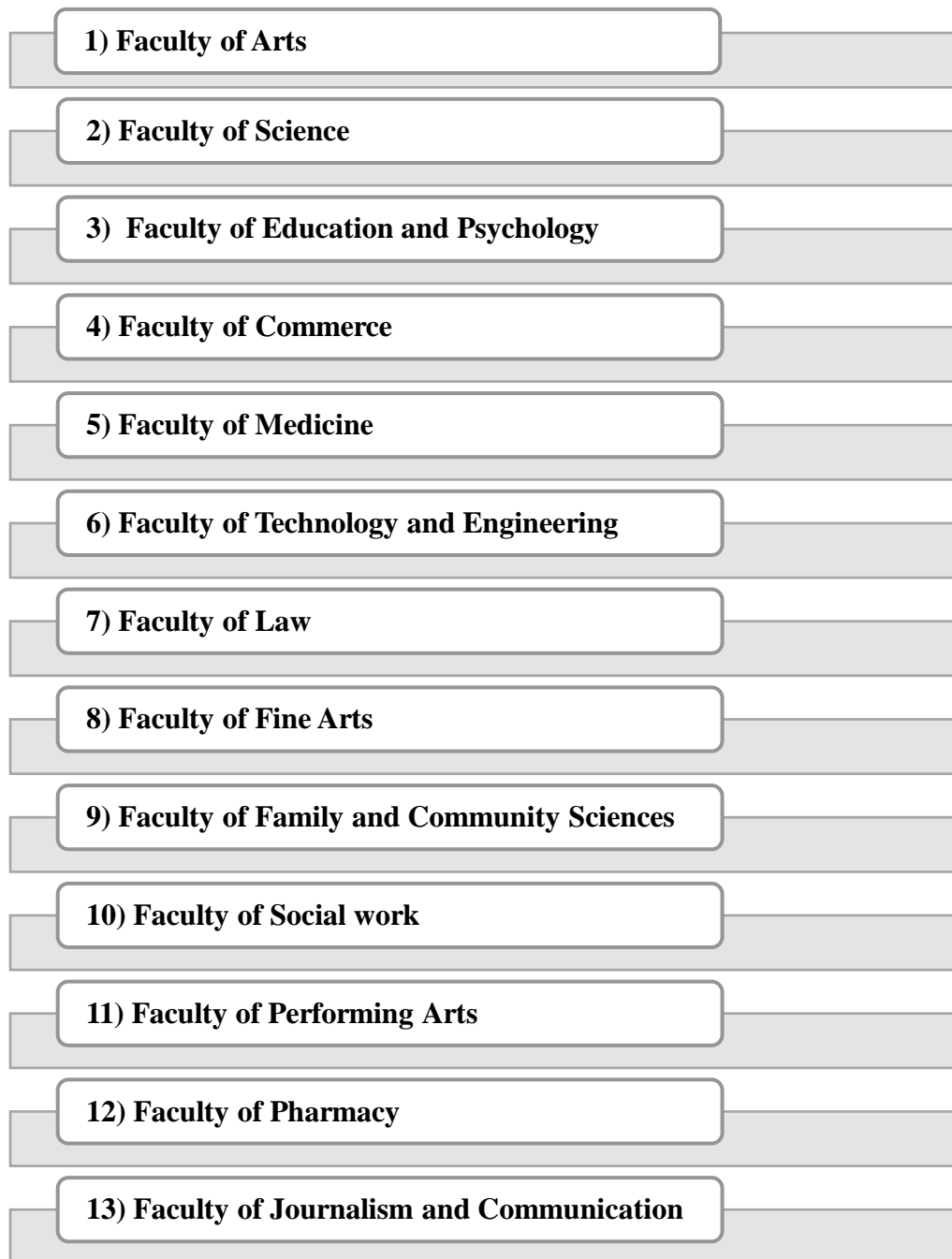
1) Faculty of Arts

2) Faculty of Science

3) Faculty of Education and Psychology

4) Faculty of Commerce

5) Faculty of Medicine

6) Faculty of Technology and Engineering

7) Faculty of Law

8) Faculty of Fine Arts

9) Faculty of Family and Community Sciences

10) Faculty of Social work

11) Faculty of Performing Arts

12) Faculty of Pharmacy

13) Faculty of Journalism and Communication

Figure: 2 Sample Selection of the study

Those faculties that offers similar Undergraduate courses were merged together. Then the faculties were further categorized as mentioned below.

Table 2 : Categorization of Faculties

Group No.	Name of Faculty Group	Faculties Merged
1.	**Arts and Commerce**	• **Faculty of Arts**, • **Faculty of Fine Arts,** • **Faculty of Performing Arts,** • **Faculty of Commerce,** • **Faculty of Education,** • **Faculty of Law**
2	**Science**	• **Faculty of Science**
3	**Technology**	• **Faculty of Technology and Engineering**
4	**Medicine**	• **Faculty of Medicine ,** • **Faculty of Pharmacy**
5	**Community and Social Sciences**	• **Faculty of Family and Community Sciences,** • **Faculty of Social work,** • **Faculty of Journalism and Communication**

- After forming these five groups of faculties, it was decided to take equal number of students from each group of faculty.
- From each faculty group, it was decided to take equal number of students from First year, Second year and Final year.

3.3.1 Selected Sample

The sample selected refers to the number of respondents selected for the study. It was decided to take seven hundred and fifty Undergraduate students from the selected faculties of The Maharaja Sayajirao University of Baroda, Vadodara. One hundred and fifty students were taken from each group of faculties.

Table 3 Number of Selected Sample

Faculty	Number of Respondents selected	Number of respondents filled incomplete questionnaire	Number of respondents filled complete questionnaire
Arts and Commerce	150	03	147
Science	150	20	130
Technology	150	26	124
Medicine	150	13	137
Community and Social Sciences	150	10	140
Total	750	72	678

After separating the completely completed questionnaire, it was decided to take a sample of 120 from each category of faculty. For this, 120 students was selected form each group.

Out of the Seven Hundred and Fifty Undergraduate students, only Six Hundred students had reply entirely in the questionnaire.

Table 4 Year wise distribution of sampling

Year of study → Faculty	First Year		Second Year		Third Year		Total
	Male	Female	Male	Female	Male	Female	
Arts and Commerce	20	20	20	20	20	20	**120**
Science	20	20	20	20	20	20	**120**
Technology	20	20	20	20	20	20	**120**
Medicine	20	20	20	20	20	20	**120**
Community and Social Sciences	20	20	20	20	20	20	**120**
	100	**100**	**100**	**100**	**100**	**100**	**600**

Thus, the final research sample comprised of 600 Undergraduate students from The Maharaja Sayajirao University of Baroda, Vadodara.

3.4 Research Tools for Data Collection

The present study was exploratory research. Therefore, the survey method was applied for studying the Usage, Opinions, and Problems of Web-based learning by Undergraduate students. A structured questionnaire used as research tool. The questionnaire was constructed in English. The relevant content for studying Usage, Opinions, and Problems was drawn by mentioning the related literature in books, journals, and also internet through the following libraries were visited the refer the available literature for the same.

- Inflibnet center, Gandhinagar

- Smt. Hansa Mehta Library, The Maharaja Sayajirao University of Baroda.
- Library of Centre of Advanced Study in Education (CASE), The Maharaja Sayajirao University of Baroda.
- Library of Department of Extension and Communication Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda. (Appendix –II)

3.5 Description of the Research Tool

A structured questionnaire used for data collection. The questionnaire contained of following seven sections:

SECTION I: Background Information

SECTION II: Usage of Web-based Learning Resources

SECTION III: ICT Competency

SECTION IV: Attitude towards ICT

SECTION V: Opinions towards Web-based learning

SECTION VI: Problems

SECTION VII: Suggestions

Section I Background Information

Section I of the research tool was designed to obtain data related to the profile of the under graduate students. It included questions related to their-
- Faculty,
- Year of Study,
- Age,
- Gender,
- Monthly family Income,
- Web-based learning Facilities,
- Web-based learning training

Section II Information regarding Usage of Web-based Learning Resources

This section deals with obtaining information regarding the usage of Web-based Learning resources. It includes questions related to

- Frequent use of computer
- Access of Computer and Internet,
- Devices to access Internet
- Type of Internet Connection,
- Use of the Web-based resources provided in computer lab by University
- Usage of Web-based resources learning of Curriculum Aspects,
- Usage of Web-based resources learning of Soft skills Purpose of using the internet:

The checklist and three-point scale were designed to take advantage of the respondents' responses. Thirty items were for the use of web-based learning resources of the curriculum aspects and the learning aspects of soft skills were listed to obtain the data. Respondents had to tick mark against the usage of Web-based learning resources according to their frequency of using the internet and computer for the same.

Section III ICT Competency

Section III was designed to collect information regarding one of the dependent variable of the present study i.e. ICT Competency. Total Twenty three point scale was designed to avail the response of the respondents from ICT Competency. A checklist was prepared wherein the students had to tick according to ICT Competency. The options provided - Great extent, Some Extent, and Less Extent.

Table 5   Number of Statement on ICT Competency

ICT Competency	No. of Statement
ICT Competency	20
Total number of statements =	20

Section IV Attitude towards ICT

Section IV It was dependent variable in study and to collect information regarding Attitude towards ICT. Both positive and negative statements related to Attitude towards ICT. Total seventeen point scale was designed to avail the response of the respondents from Attitude towards ICT. A checklist was prepared wherein the respondents had to tick mark about the Attitude towards ICT. The options provided under the same were- Great extent, Some Extent, and Less Extent.

Table 6   Number of Statement on Attitude towards ICT

Attitude towards ICT	No. of Statement
ICT Competency	17
Total number of statements =	17

Section V Opinion towards Web-based leaning

This section was created to collect responses related to the opinion on web-based learning. The response sheet use to collect three-point rating scale. Give response according to the statement. Twenty seven statements were prepared for the response.

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Section VI Problems Faced While Usage of Web-based learning

Section VI which is a three-point rating scale prepared to obtain answer. problem faced by respondents while using web-based learning resources. Seventeen problems were stated to collect the answers. Respondents agreement for the statement provided.

Section VII Suggestions of Undergraduate students for improving the usage of Web-based Learning

Section VII contained a three-point rating scale prepared to obtain data on suggestions provided by undergraduates for using web-based learning resources. The statements made were related to suggestions. Thirteen suggestions were given for compiling the responses.

Respondents were asked to provide their answers in terms of the level of agreement for the statement provided.

Table 7 Description of the Research Tool

The Description of the Research Tool which was used for data collection.

Sections	Content	Response system
I	Background Information (Faculty, Year of Study, Age, Gender, Monthly family Income, Web-based learning Facilities, Web-based learning training)	Checklist
II	Information regarding Usage of Web-based Learning Resources (Frequently use of computer, access of computer an Internet, Devices to access Internet, Types of Internet connection, Type of Internet Connection, use of the Web-based resources provided in computer lab by University, Usage of Web-based resources learning of Curriculum Aspects, Usage of Web-based resources learning of Soft skills)	• Checklist • Three Point Rating Scale
III	ICT Competency	Three Point Rating Scale
IV	Attitude towards ICT	Three Point Rating Scale
V	Opinion towards Web-based Learning (opinion on learning of Curriculum Aspects and Soft Skills)	Three Point Rating Scale
VI	Problems Faced While Using Web-based learning	Five Point Rating Scale
V	Suggestions of Undergraduate students for improving the usage of Web-based Learning	Five Point Rating Scale

3.6 Validity of the Research Tool

The developed questionnaire was delivered to experts from different fields. The content validity was checked for the developed research tool. The experts were asked to provide their valuable suggestions in terms of:

- Content,
- Appropriateness of response system and
- Language clarity

The experts approached were from the following institutions-

- Professor and Head, Department of Extension and Communication, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara.
- Professor, Department of Extension and Communication, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara.
- Assistant Professor, Department of Statistics, Faculty of Sciences The Maharaja Sayajirao University of Baroda, Vadodara.
- Professor, Department of Education (CASE), Faculty of Education and Psychology, The Maharaja Sayajirao University of Baroda, Vadodara.
- Professor, Department of Electronics *Saurashtra University* Rajkot, Gujarat
- Head, Department of English, Maharaja Krishna Kumarsinhji Bhavnagar University, Bhavnagar, Gujarat

The suggestions was given by the experts from dierent field in the research . These suggestions were related to the terminology used in the research tool. Difficult terminology were simplified as suggested by the different experts.

3.7 Reliability of the Tool

To verify the reliableness of the research tool, the test-retest technique was used. The tool was administered to twenty respondents. Respondents completed the tool doubly within the 15-day interval. The parameters statistic between the 2 sets of scores was calculated to find

out the reliability. The reliability was 0.98, it's proved that it was extremely reliable. It was calculated through the following formula:

$$r = \frac{\sum xy}{\sqrt{\Sigma x^2 \, \Sigma y^2}}$$

Where r = Coefficient of correlation

X= Score of the First test

Y= Score of the Second test

3.8 Pretesting of the Research Tool

After reliability next is, pretesting of the research tool. The tool was pre tested on twenty undergraduate students of The Maharaja Sayajirao University of Baroda, Vadodara. The students selected for pre- testing of the tool took half-hour to reply to that. The aim of the pre testing was to understand the issue faced by the students in filling the questionnaire, time required for filling up the questionnaire and to test the clarity of the language. The students didn't report any difficulty in responding to the questionnaire. After this research tool was finalized.

3.9 Data Collection

- To study the Usage, Opinions and Problems of Web-based learning by Undergraduate students, the data were collected from Undergraduate students of The Maharaja Sayajirao University of Baroda, Vadodara, from March 2019 to August 2019.
- To collect data from the selected faculties, The Deans of the respective faculty were contacted. Permission was sought for the data collection from their respective faculties, by submitting the necessary permission letter.
- Deans advised to contact the teachers nominated by them to help and guided the researcher in data collection. The schedule for the data collection was decided with the help of these teachers.

- The questionnaires were distributed in the classrooms as per the schedule to the students of various levels that is year wise according to the time slot given by the faculty in charge teachers.

- Students were also contacted at the Hostel, Canteens and Common rooms ensuring their year of study, Faculty etc. The permission of the Chief Warden and respective Hostel Wardens was also taken for the same. Contact numbers of the students contacted at the places other than classrooms were collected so as to remind about the collection of filled questionnaires.

- More than 1000 forms were distributed to the undergraduate students, out of which 678 students filled the questionnaire completely. Few of the forms were incomplete and however, they were eliminated. In order to make equal distribution of the sample it was decided to select 120 questionnaire form each faculty group. Therefore, total 600 forms were selected for final data processing.

3.9.1 Difficulties faced while data collection

The researcher faced following difficulties in data collection:

- Fixing up the schedule for data collection in the classrooms in various faculties.
- Respondents who were contacted other than classrooms needed repeated reminders to fill up the and to return questionnaires.

3.9.2 Tabulation of data

- Data were coded on the basis of pre decided scores to the responses.
- Excel sheets were prepared for the same purpose by the researcher.

3.9.3 Scoring and Categorization of the Data

The research data on Usage, Opinions and Problems of Web-based learning by Undergraduate students, were scored and categorized as follows:

3.10 Categorization and Scoring of Variables

The categorization of independent and dependent variables of the study are as follows-

Table 8 Categorization of independent variables of the study

Independent Variables	Basis	Categories
Age	16 – 18 years	Young Youth
	19-21 + Years	Youth
Gender	-	Male
		Female
Year of Study	First year	First year
	Second year	Second year
	Final Year	Final year
Monthly Family Income	Rs.25000-Rs.80000	Middle Income
	Rs. 80001-Above	High Income
Training in Web-based Learning	Attended	Trained
	Did Not attend	Untrained
ICT Competency	1.00-1.50	Low Competency
	1.60-2.59	Moderate Competency
	2.60-3.00	High Competency
Attitude towards ICT	1.00-1.50	Positive Attitude
	1.60-2.59	Neutral Attitude
	2.60-3.00	Negative Attitude

3.11 Scoring and categorization of the data

Table 9 Minimum and Maximum obtainable scores of ICT Competency

No. of Items	Maximum obtainable Score	Minimum obtainable Score
20	60	20

Table 10 Scoring and Categorization of Attitude towards ICT

No. of Items	Maximum Obtainable Score	Minimum obtainable Score
17	51	17

Table 11 Scoring a Categorization of usage of web-based learning for Overall, Soft skills and Curriculum aspects.

Response	Scores	Range of Soft skills and Curriculum Aspects of Usage of web-based Learning	Categories
Great Extent	3	2.60-3.00	High
Some Extent	2	1.60- 2.50	Moderate
Less Extent	1	1.00 – 1.50	Low

Table 12 Maximum & Minimum obtainable Scores of usage of Web based Learning

Aspects	No. of Items	Maximum Obtained Score	Minimum Obtained Score
Overall	30	90	30
Curriculum	16	48	16
Soft Skills	14	42	14

Table 13 Scoring and Categorization of opinion of Undergraduate students regarding their Overall, Soft skills and Curriculum aspects related Web-based Learning resources

Response	Scores		Range	Categories
	Positive	**Negative**		
Great Extent	3	1	2.60-3.00	More Favorable
Some Extent	2	2	1.60- 2.50	Favorable
Less Extent	1	3	1.00 – 1.50	Least favorable

Table 14 Maximum & Minimum obtainable Scores of usage of Web based Learning

Aspects	No. of Items	Maximum Obtained Score	Minimum Obtained Score
Overall	27	81	27
Curriculum	14	42	14
Soft Skills	13	39	13

Table 15 Scoring for Opinions towards Web-based learning

Response	Scores for Positive Items	Scores for Negative Items	Range of Intensity Indices	Categories
Great Extent	3	1	3.5 - 5.00	Most favourable
Some Extent	2	2	2.1-3.49	Favourable
Less Extent	1	3	1.00-2.00	Lest favourable

Table 16 Scoring and Categorization for problems faced by Undergraduate students while using Web-based learning resources

Response	Scores	Range	Categories
Strongly Agree	5	3.5 - 5.00	More Problems
Agree	4		
Neutral	3	2.51-3.49	Moderate Problems
Disagree	2	1.00-2.50	Did not had any Problem
Strongly Disagree	1		

Table 17 Maximum and Minimum obtainable scores for problems faced by Undergraduate students while using Web-based learning resources

Aspect	No. of Items	Maximum obtainable Score	Minimum obtainable Score
Problems faced while using the Web-based learning resources	17	85	17

Table 18 Scoring and Categorization for Suggestions given by Undergraduate Students for using Web-based learning resources

Response	Scores	Range	Categories
Strongly Agree	5	3.5 - 5.00	Strongly Suggested
Agree	4		
Neutral	3	2.51-3.49	Moderately Suggested
Disagree	2	1.00-2.50	Least Suggested
Strongly Disagree	1		

Table 19 Maximum and Minimum obtainable scores for Suggestions given by

Undergraduate students for using Web-based learning resources

Aspect	No. of Items	Maximum obtainable Score	Minimum obtainable Score
Suggestions for using Web-based learning resources	12	60	12

3.12 Statistical analysis of the data

Table20 Statistical Measures Used to analyze the data

Content	Statistical measures
Background Information of Students	Frequency and Percentage
Usage of Web-based Learning amongst Undergraduate Students	Frequency and Percentage, Intensity Indices, t-test, ANOVA and Posthoc test (Tukey's HSD comparison).
Opinions of Under Graduate Students regarding Web-based Learning	Frequency and Percentage, t-test, ANOVA and Posthoc test.
Problems faced by Under Graduate Students in using Web-based Learning	Frequency and Percentage, Intensity Indices, t-test, ANOVA and Posthoc test (Tukey's HSD comparison)
Suggestions of Undergraduate students for improving the usage of Web-based Learning	Intensity Indices (I.I)

Formulas Used for different Statistical Measures

Formula used for t-test was-

$$t = \frac{(x_1 - x_2)}{\sqrt{\frac{(s_1)^2}{n_1} + \frac{(s_2)^2}{n_2}}}$$

Formula used for ANOVA

$$\frac{\text{Between Group Variance}}{\text{Within Group Variance}}$$

Between group variance = Variance in the mean of each group from the total mean of all variance groups

Within group variance = Average variance of scores within groups

Formula was used for calculating Intensity Indices:

$$\frac{\text{Total Score for an Item}}{\text{Total Number of Respondents}}$$