IMPROVING USER EXPERIENCE WITH ONLINE LEARNING USING ANALYTICAL COMPARASIONS BETWEEN INSTRUCTORS & STUDENTS OF QATAR UNIVERSITY

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ABSTRACT

The growing new market for online-learning has been marked by increased technology development in virtual reality and influenced by emotional intelligence. Thegrowing interest in new technology research and implementation has further been exacerbated by the development of new challenges that force educational institutions to close globally. Online-learning has proven its success throughout the past years on many different aspects and situations. However, as applies to Qatar, there is a paucity of studies that have examined the user experience with online-learning between instructor and students. So this paper aims to focus improving user experience with online-learning using analytical comparisons between instructor and students. In the light of limited studies on the topic, there was a need to undertake this review and explore the topic in efforts to create new insights on user experience with online- learning in Qatar, while exploring their process efficiency. As such, this study adds to the extant literature updated information on online-learning in Qatar while informing future academic and practitioner discourse on the topic that has received limited scholarly interest within Qatar in the last decade, despite the growing demand for online-learning in the global market.

1. INTRODUCTION

1.1. Background

In 1982, online learning at emerged Western Behavioral Sciences Institute in La Jolla California, for Management & Strategic Studies to deliver a distance educationprogram to business executive students. Following that in 1985 Connected Education launched the first fully online master degree program in Media Studies through the NewSchool of New York via computer conferencing. Then several years later in 1989 Phoenix University started offering education programs through the internet and from that point onwards the online learning began to evolve.

Likewise any emerging technology, many studies found that at the starting pointof online learning only 8% of student were enrolled in an online course in the year of 2000. By 2008 enrollment percentage had increased up to 20% following later became30% in 2013. Recently in 2020 due to the global pandemic of COVID-19, all educational institutions were forced to move towards online-learning to be able to adaptto new challenges that constrain the education journey.

Researchers commonly face lots of difficulties while conducting deep dive cross studies among distance learning, e-learning and online learning. Majority of studies done by scholarly revealed that there are lots of different expectations and perceptions of learning environments of each of those types.

Dhinaharan Nagamalai (Eds): EDU, SCMC -2023
pp. 19-44, 2023. IJCI – 2023 DOI:10.5121/ijci.2023.120402

User experience is one of the key criteria that determines the user preferences when it comes to comparing alternatives of same end product. Considering the importance of storing influence that user experience would have on the user decision based on specificfactors that are considered in the evaluation process. However, before starting with the evaluation and comparison between different factors, defining the target users sound come at the start of the process. In this paper target users are defined to be the information provider (Instructor) and the information (Students) of the online learningsystem. Once target users are well defined then influencing factors on their experience to be looked at considering different perspectives of target users. This would help understand their needs and focused more into how overall user experience could be enhanced.

1.2. Thesis Statement

The growing new market for online-learning has been marked by increased technology development in virtual reality and influenced by emotional intelligence. The growing interest in new technology research and implementation has further been exacerbated by the development of new challenges that force educational institutions to close globally. With growing economic motivation of establishing new alternatives for ensure the rolling of educational process at any circumstances, online-learning has proven its success throughout the past years on many different aspects and situations. However, as applies to Qatar, there is a paucity of studies that have examined the userexperience with online-learning between instructor and students. So this paper aims to focus improving user experience with online-learning using analytical comparisons between instructor and students.

In the light of limited studies on the topic, there was a need to undertake this review and explore the topic in efforts to create new insights on user experience with online-learning in Qatar, while exploring their process efficiency. As such, this study adds to the extant literature updated information on online-learning in Qatar while informing future academic and practitioner discourse on the topic that has received limited scholarly interest within Qatar in the last decade, despite the growing demand for online-learning in the global market.

1.3. Research Focus

The focus of this study was limited to evaluate the user experience with online-learning in Qatar and improve the process efficiency. To answer the formulated research problem, an analytical comparison technique where data was collected from past academic studies, government, and educational institution reports on online- learning in Qatar. Relevant resources for the study were identified from academic databases using different search terms and keywords related to online-learning, satisfaction rate, human factors, and cost optimization.

1.4. Research Aim and Objectives

The aim of this study was to explore updated literature on online-learning used in the state of Qatar and examine their impact on improving user experience between instructor & students.

1.5. Importance of the Studies

Undertaking this review of online-learning aiming to improve overall user experience is important for key reasons based on the identified knowledge gap in the academic literature. A review of past studies on the topic reveals that research on online-learning in Qatar has not received substantial interest from researchers and practitioners. Instead, there is a limited number of academic papers on user experience in online-learning across the academic and practitioner

literature. Therefore, undertaking this study was key to exploring updated information on improving user experience between instructor & students. Further, insights drawn from this study will help understand new technologies implemented in Qatar and the reasons for their uptake, in addition to comparing and contrasting their process efficiency. Also, the extant literature has largely not explored alternative solutions for online-learning and this study sought to evaluate potential options that may be used in the future towards improve overall user experience.

1.6. Organization of the Dissertation

The rest of this study is organized as follows: Chapter 2 presents the literature review on different criteria that are impacting the online learning focusing on the tools and devices in particular. Chapter 3 presents the methodology and strategies that were used to collect data to answer the formulated research aim and objectives including the survey results obtained from Qatar University Faculties & Students. Chapter 4 represents and details the collected results & discussion with a specific focus on improve overall user experience of online-learning in Qatar, and sold routes as potentialoptions that may be used in the future.

2. LITERATURE REVIEW

2.1. Introduction

First of all its very important to start with good understanding of the online-learningprocess and list all its features, tools, and end users. The best definition could be foundfor online-learning is: “An education that take place over the internet.” which is also well known as “eLearning” as on other term. Generally speaking any learning that takes place across distance and not in a classroom is known as online-learning. The most promising features of online-learning are listed below:

- *Better Learning Experience*
- *Convenience & Flexibility*
- *High Quality Student-Instructor Interactions*
- *More Student Enrollment At Once*
- *Growing In Popularity*
- *More Cost Effective*
- *Higher Retention Rate*

The above listed features are in comparison with conventional learning process. There are so many wonderful interactive tools available online, and many seamlessly integrate with other applications. Each one has its own unique quality to enhance learning. Some tools handle communication better than others, while games are great for increasing students' understanding of specific subjects. Each tool helps make learning easy and fun. Underwriting these considerations, the purpose of this chapter is to present the research methods and strategies that were used to identify suitable resources to answer the formulated research aim and objectives. Specifically, the chapter discusses search strategies, search criteria, inclusion and exclusion processes, study selection, and obtained results.

In a world whose complexity is rapidly growing, making the best decisions becomes an increasingly demanding task for managers of companies, governmental agencies and many other decision and policy makers. In recent years, this has gone arm-in-arm with the growth of what are now known as decision analytics methodologies. Namely, decision makers are more reluctant to make gut decisions based of feelings and hunches, and instead prefer to use analytic and quantitative tools, and base and analyze their decisions on a solid ground. Many methods

stemming from applied mathematics and operations research have proved useful to help decision makers making informed decisions, and among these methods there are also those requiring, as inputs, subjective judgments from a decision maker or an expert. It is in this context that the Analytic Hierarchy Process (AHP) becomes a useful tool for analyzing decisions. [1]

In this paper Analytical Hierarchy Process AHP used to analysis the most important factors that impact the user experience in online-learning between instructor & students across several detailed elements. But before deep diving into the factors & detailed elements, let's have a high level overview on the AHP method. The AHP looksat the problem in three parts. The first part is the issue that needs to be resolved, the second part are the alternate solutions that are available to solve the problem. The thirdand the most important part as far as the AHP method is concerned is the criteria used to evaluate the alternative solutions.

2.2. Analytic Hierarchy Process

AHP is a structured technique for organizing and analyzing complex decisions, based on mathematics and psychology. It was developed by Thomas L. Saaty in the 1970s; Saaty partnered with Ernest Forman to develop Expert Choice software in 1983, and AHP has been extensively studied and refined since then. It represents an accurate approach to quantifying the weights of decision criteria. Individual experts' experiencesare utilized to estimate the relative magnitudes of factors through pair-wise comparisons. Each of the respondents compares the relative importance each pair of items using a specially designed questionnaire. [2] The AHP consists of three steps:

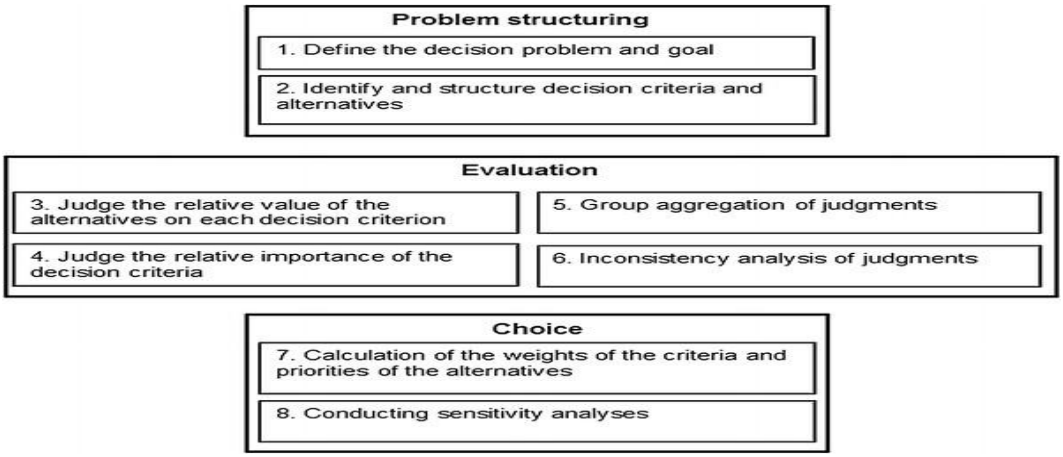

Figure 1: Steps of AHP

AHP has particular application in group decision making and is used around the world in a wide variety of decision situations, in fields such as government, business, industry healthcare and education. Rather than prescribing a "correct" decision, the AHP helps decision makers find one that best suits their goal and their understanding of the problem. It provides a comprehensive and rational framework for structuring a decision problem, for representing and quantifying its elements, for relating those elements to overall goals, and for evaluating alternative solutions.

Users of the AHP first decompose their decision problem into a hierarchy of more easily comprehended sub-problems, each of which can be analyzed independently. Theelements of the hierarchy can relate to any aspect of the decision problem—tangible or intangible, carefully measured or roughly estimated, well or poorly understood— anything at all that applies to the decision at hand. Once the hierarchy is built, the decision makers systematically evaluate its

various elements by comparing them to each other two at a time, with respect to their impact on an element above them in the hierarchy. In making the comparisons, the decision makers can use concrete data about the elements, but they typically use their judgments about the elements' relative meaning and importance. It is the essence of the AHP that human judgments, and not just the underlying information, can be used in performing the evaluations.[3]

The AHP converts these evaluations to numerical values that can be processed andcompared over the entire range of the problem. A numerical weight or priority is derived for each element of the hierarchy, allowing diverse and often incommensurable elements to be compared to one another in a rational and consistent way. This capability distinguishes the AHP from other decision-making techniques.[3] In the final step of the process, numerical priorities are calculated for each of the decision alternatives. These numbers represent the alternatives' relative ability to achieve the decision goal, so they allow a straightforward consideration of the various courses of action.

Several firms supply computer software to assist in using the process. While it can be used by individuals working on straightforward decisions, the Analytic Hierarchy Process (AHP) is most useful where teams of people are working on complex problems, especially those with high stakes, involving human perceptions and judgments, whose resolutions have long-term repercussions. It has unique advantages when important elements of the decision are difficult to quantify or compare, or where communication among team members is impeded by their different specializations, terminologies, or perspectives.[4] Decision situations to which the AHP can be applied include:

- *Choice: The selection of one alternative from a given set of alternatives, usually where there are multiple decision criteria involved.*
- *Ranking: Putting a set of alternatives in order from most to least desirable.*
- *Prioritization: Determining the relative merit of members of a set ofalternatives, as opposed to selecting a single one or merely ranking them.*
- *Resource allocation: Apportioning resources among a set of alternatives.*
- *Benchmarking: Comparing the processes in one's own organization with those of other best-of-breed organizations*
- *Quality management: Dealing with the multidimensional aspects of quality.*
- *Conflict resolution – Settling disputes between parties with apparently incompatible goals or positions.*

The applications of AHP to complex decision situations have numbered in the thousands and have produced extensive results in problems involving planning, resource allocation, priority setting, and selection among alternatives. Other areas have included forecasting, total quality management, business process reengineering, quality function deployment, and the balanced scorecard. Many AHP applications are never reported to the world at large, because they take place at high levels of large organizations where security and privacy considerations prohibit their disclosure.[5] But some uses of AHP are discussed in the literature. Recently these have included:

- *Deciding how best to reduce the impact of global climate change.*
- *Quantifying the overall quality of software systems.*
- *Selecting university faculty.*
- *Integrated evaluation of a community sustainability in terms of environment, economy, society, institution, and culture.*

- *Accelerated Bridge Construction Decision Making Tool to assist in determining the viability of accelerated bridge construction (ABC) over traditional construction methods and in selecting appropriate construction and contracting strategies on a case-by-case basis. [3]*

The weights of the AHP judgement matrix may be corrected with the onescalculated through the Entropy Method. This variant of the AHP method is called AHP-EM. The existing 1-9 scale in the Analytical Hierarchy Process (AHP) was first introduced by Saaty the originator of the AHP decision making theory in 1970's (Saaty1977, 1980). This widely used 1-9 scale and its definition could be described as in figure. (2) In about thirty years ago, Dr. Saaty tested the 1-9 scale, the index scale and about twenty other scales when he wants to choose a suitable ratio scale for the pairwisecomparisons in the AHP (Saaty 1980, 1994, 1996). Based on their testing results, the 1-9 scale was accepted by the AHP. But the index scale and many other ratio scales were rejected by Dr. Saaty. Since then, the 1-9 scale has become the most widely usedratio scale in the AHP.[6]

Along with the development of the AHP decision making theory, the 1-9 scale hasbeen used for over 30 years. Although the AHP theory has been widely used in practice,many people have raised doubts about the 1-9 scale and suggested that the index scalecould be better than the existing 1-9 scale (Wang and Ma 1993; Hou and Shen 1995; Lu 2001 etc.). The index scale and its definition could be also described as in Figure 2in a similar way.[7]

AHP Scale of Importance for comparison pair (aij)	Numeric Rating	Reciprocal (decimal)
Extreme Importance	9	1/9 (0.111)
Very strong to extremely	8	1/8 (0.125)
Very strong Importance	7	1/7 (0.143)
Strongly to to very strong	6	1/6(0.167)
Strong Importance	5	1/5(0.200)
Moderately to Strong	4	1/4(0.250)
Moderate Importance	3	1/3(0.333)
Equally to Moderately	2	1/2(0.500)
Equal Importance	1	1 (1.000)

Figure 2: 3 AHP Saaty Scale from 1 to 9

2.3. Consistency Factor

A consistency index is a measurement of stability or reliability in an analytics data set. It measures the deviation from the expected or average value of a data set. A consistency index is a useful tool to evaluate data quality and identify potentialanomalies or issues in a dataset. [12]

The consistency index is usually calculated by adding the differences between the data points and the expected or average value and then adding these numbers together. A lower consistency value means that data points are more consistent but less variable. Conversely, a higher consistency value means that data points are more inconsistent and more consistent. [12]

Practically, consistency index is used to identify outliers and errors in a dataset that could skew results or impact analysis. If a dataset has a high consistency index, for example, it might be necessary to further investigate the data to determine the source of the variability. [13]

Data scientists and data analysts need to know how consistency index works inorder to make sure that their data is accurate and reliable. Analysts can use consistencyindex to make better decisions and gain more insight from their data by understandingit. [13]

The Analytic Hierarchy Process, which is a multi-criteria decision making methodology that is used in analytics applications, is crucially dependent on consistency index. The AHP is a method of breaking down complex decision-making issues into smaller, more manageable criteria. Pairwise comparisons are used to determine the relative importance of each criteria. [14]

The AHP uses consistency index to assess the consistency of pairwise comparisons. This is because it is crucial that comparisons are accurate and consistent. The consistency index in the AHP is calculated by a formula that considersthe number of criteria to be compared as well as the degree of inconsistency. [14]

High consistency index values indicate that pairwise comparisons may be inconsistent and that decision-making processes could be compromised. It may be necessary to reevaluate the criteria and/or pairwise comparisons in these cases to ensurethey are consistent and accurate. [14]

Analytics professionals can use consistency index in AHP to ensure their decision-making processes and make informed decisions. This is especially true in high-stakes decision making situations such as government or business, where decisions could have major financial, social, and environmental consequences. [14]

Consistency index is an important tool for analytics professionals who use the AHP methodology. It is crucial to make sure that it is used correctly and effectively toensure accuracy and reliability in decision-making. This paper analyzes the user experience in online education taking into account multiple factors. [13]

2.4. Research Design and Strategy

In this paper the focus is going to be on the features that are directly effecting the users experience in online-learning. Based on the literature review communication is one of the most contributing feature on user experience considering it all types and forms. In addition to that the internet quality is a key feature when it comes to online experience. So this paper is going to be evaluating the below listed features considering4 factors for each feature:

2.4.1. Communication Tools

This criteria is a key player when it comes to the effective communication via Online-Learning. Its directly engaging all sensation receptions of human to stimulate the overall experience of the end user. Communication tools could be evaluated considering the below factors:

- Easy to Use
- Effective Display.
- Effective Discussion.
- Effective Writing.

2.4.2. Communication Devices

This criteria is also important to elevate the end user experience as it focus on the communication devices as hardware. Practically speaking hardware devices can impact the Online-learning experience significantly since they are the inputs and outputs devices between the human and the machine. Communication devices could be evaluated considering the below factors:

- Writing Devices. (Example: Keyboard)
- Talking Devices (Example: Microphone).
- Audio Devices (Example: Speaker).
- Visual Devices (Example: Monitor).

2.4.3. Communication Style

With respect to the communication style criteria, as we all agree that each individual has preferences on the way that he/she preferred to communicate. Such preferences could also influence the end user experience through Online-Learning. Communication styles could be evaluated considering the below factors:

- Verbal.
- Non-verbal.
- Visual.
- Written.

2.4.4. Internet Quality

Online-Learning is built on a foundation of the internet. So internet quality is the most critical criteria as it may result in loss of connections (offline condition). If this happens, it would stop the Online-Learning process completely. Internet quality could be evaluated considering the below factors:

- Speed.
- Stability.
- Connectivity.
- Security.

2.4.5. Virtual Platforms.

What is meant by virtual platforms criteria is the website or online application that is used for Online-Learning purposes such as Teams, WebEx, and ZOOM. Virtual Platforms could be evaluated considering the below factors:

- Easy to Register.
- Ability to Invite Other Users.
- Accessibility.
- Popularity.

2.4.6. Activities

Learning activities are many and have many dimensions, however in this paper what ismeant by Activities is that can be done via online. To limit this criteria and make it possible for evaluation consider the below factors:

- Lectures.
- Meetings.
- Labs.
- Gatherings Events.

2.4.7. Assessment

The assessment part is a key too with respect to Online-Learning process considering the faculties & students as it could simplify the testing, evaluation, and feedback process for both parties. Assessment could be evaluated considering the below factors:

- Pop-up Quizzes.
- Essays Types Questions.
- Multiple Choice Questions.
- Immediate Feedbacks.

All of the listed above features are having 4 factors that are analyzed in the AHP process to determine the most important criteria factors that are impacting the online learning process with respect to Qatar University faculties & students.

In order to do that a survey was developed to get end users feedbacks on how the above listed criteria and factors impact on the overall learning experience. Accordingly AHP process was implemented following the below listed procedures:

Step 1: Define Alternatives
Step 2: Define the Problem & Criteria
Step 3: Establishing Priority Amongst Criteria Using Pairwise Comparison
Step 4: Check Consistency
Step 5: Get the Relative Weights

The details of the survey development, questions, and AHP analysis are provided inChapter 3: Methodology.

3. METHODOLOGY

In this chapter the methodology that been used to determine the highest impacting criteria is explained in details based on survey analysis done on Qatar University Faculties & Students. To begin with let's have a look into the below AHP diagram:

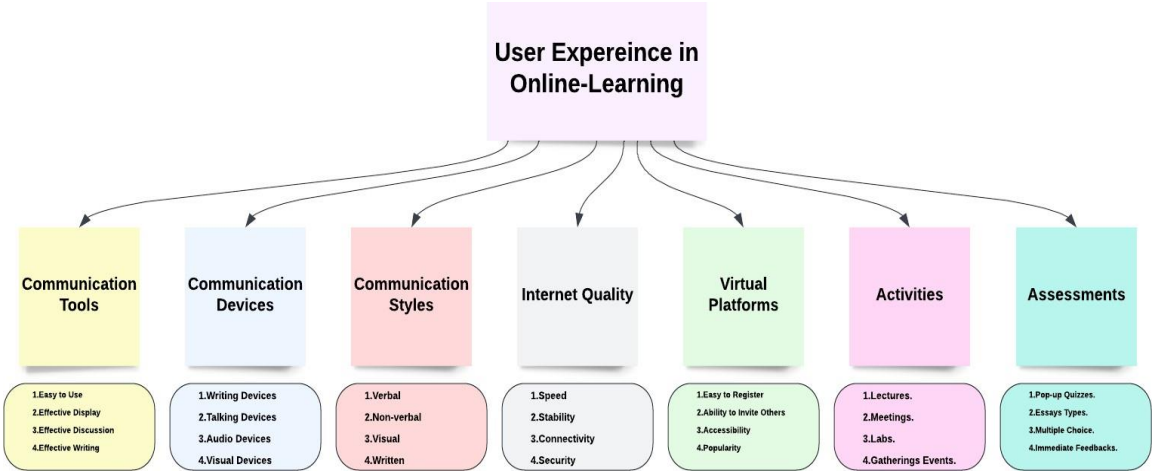

Figure 4: AHP Diagram

Having 7 criteria which are Communication Apps, Assessment, Communication Device, Communication Styles, Internet Quality, Activity and Virtual Platform. And having 4 alternatives for each criterion. Based on the above figure survey of 28 question is developed to analyze Qatar University faculties & students experience with online-Learning aiming for continuous improvement. The survey questionnaire was prepared using Survicate application. Survicate simplify surveys development as its offer lots of alternative options to develop and customize the survey. In addition to that it provides the researcher with results analysis option that is automatically generated by the application as soon as questioner is submitted by applicants.

Figure 5: User Experience Criterias

Since values were coming from survey the best method to deal with AHP is SAATY Scale. Rating each feature from 1 to 10 based on user experience with online learning through virtual platform. A survey was performed across Qatar University Students and Faculties sample to get their user experience with online-learning processconsidering the above listed criteria's along with different features. Data (Rating scales)were collected via survey having the following questions as shown in the Table 1.

Table 1: Survey Questioneer

1	Rate the importance of Easiness of the communication App. in improving your online learning experience?
2	Rate the importance of communication tool having Effective Display features to improve your online learning experience?
3	Rate the communication tool in supporting Effective Discussions among users to improve your online learning experience?
4	Rate the communication tool in supporting Effective Writing & Texting communications to improve your online learning experience?
5	Rate the communication Display Output Device (Monitors) in improving your online learning experience?
6	Rate the communication Audio Output Device (Speaker) in improving your online learning experience?
7	Rate the communication Typing Input Device (Keyboard) in improving your online learning experience?
8	Rate the communication Voice Input Device (Microphone) in improving your online learning experience?
9	Rate the importance of Verbal Communication style in improving your online learning experience?
10	Rate the importance of Non-verbal Communication style in improving your online learning experience?
11	Rate the importance of Written Communication style in improving your online learning experience?
12	Rate the importance of Visual Communication style in improving your online learning experience?
13	Rate the importance of Internet Speed in improving your online learning experience?

14	Rate the importance of Internet Stability in improving your online learning experience?
15	Rate the importance of Internet Connectivity in improving your online learning experience?
16	Rate the importance of Network Security in improving your online learning experience?
17	Rate the importance of Easiness to Register into virtual platform in improving your online learning experience?
18	Rate the importance of Ability to Invite other users into the virtual platform in improving your online learning experience?
19	Rate the importance of Accessibility to the virtual platform in improving your online learning experience?
20	Rate the importance of Popularity to the virtual platform in improving your online learning experience?
21	Rate the ability of the system to organize Lecture Type of activities in improving your online learning experience?
22	Rate the ability of the system to organize Meeting Type of activities in improving your online learning experience?
23	Rate the ability of the system to organize Lab Type of activities in improving your online learning experience?
24	Rate the ability of the system to organize Social Event Type of activities in improving your online learning experience?
25	Rate the assessment tool in enabling Pop-up quizzes option in improving your online learning experience?
26	Rate the assessment tool in supporting Essay Type of questions in improving your online learning experience?
27	Rate the assessment tool in supporting Multiple Choices Type of questions in improving your online learning experience?
28	Rate the assessment tool in providing Immediate Feedbacks for given assessments in improving your online learning experience?

3.1. 1st Criteria: Communication Tools.

This criterion has four different alternatives as shown in *Figure 6*. It is clear from figure 4 that the most important alternative is Effective Display due to it is high Eigenvector. Effective display is equally to moderated important than easy to use alternative, moderately to strong important than effective discussion and it is equallyimportant with effective writing.

3.1.1. Communication Tools & Apps

	Easy to use	Effective Display	Effective Discussion	Effective writing
Easy to use	1.00	0.50	0.33	0.50
Effective Display	2.00	1.00	4.00	1.00
Effective Discussion	3.00	0.25	1.00	2.00
Effective writing	2.00	1.00	0.50	1.00
Total Sum	**8.00**	**2.75**	**5.83**	**4.50**

	Easy to use	Effective Display	Effective Discussion	Effective writing	Eigenvector
Easy to use	0.13	0.18	0.06	0.11	**11.88%**
Effective Display	0.25	0.36	0.69	0.22	**38.04%**
Effective Discussion	0.38	0.09	0.17	0.44	**27.04%**
Effective writing	0.25	0.36	0.09	0.22	**23.04%**
Total Sum	**1.00**	**1.00**	**1.00**	**1.00**	

Figure 6: The 1st criteria: Communication Tools & Apps and it is alternatives.

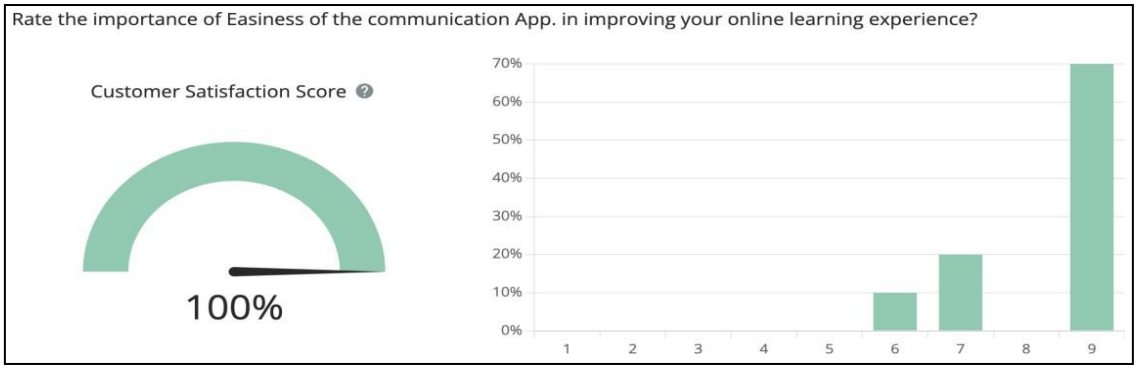

Figure 7: Survicate Survey Result for Easiness of Communication Tools & Apps

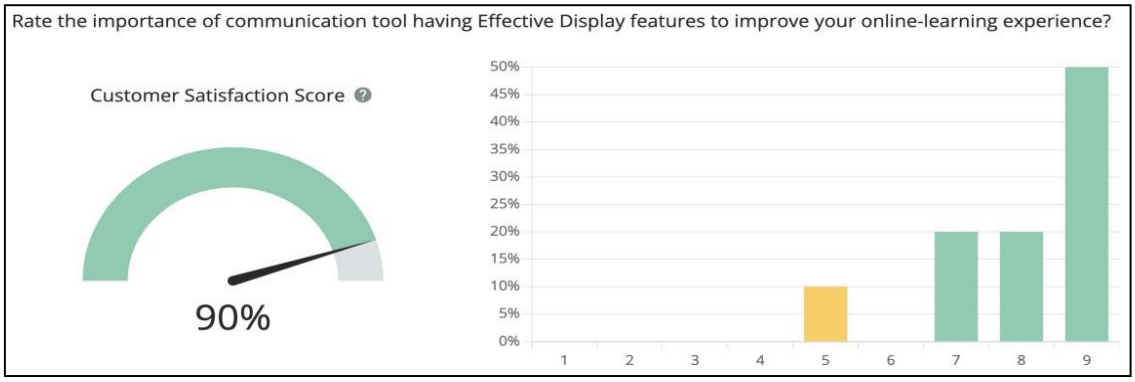

Figure 8: Survicate Survey Result for Effective Display of Communication Tools & Apps

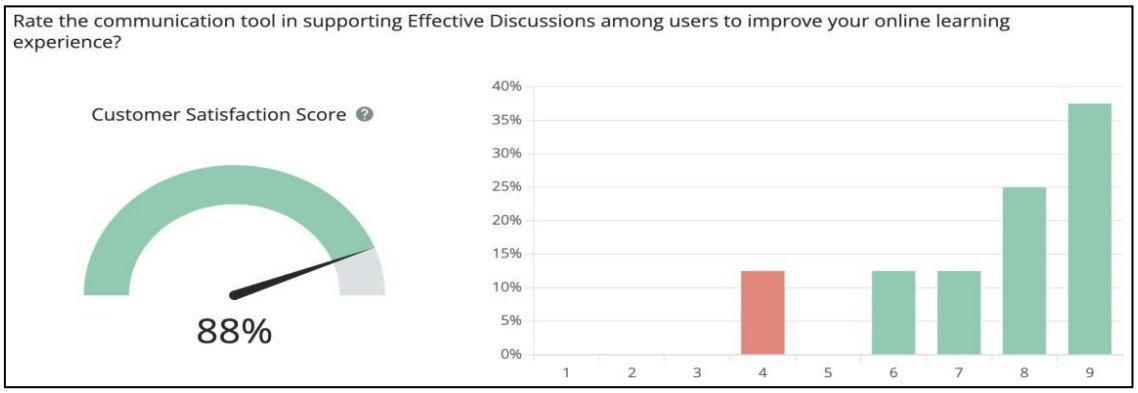

Figure 9: Survicate Survey Result for Effective Discussion of Communication Tools & Apps

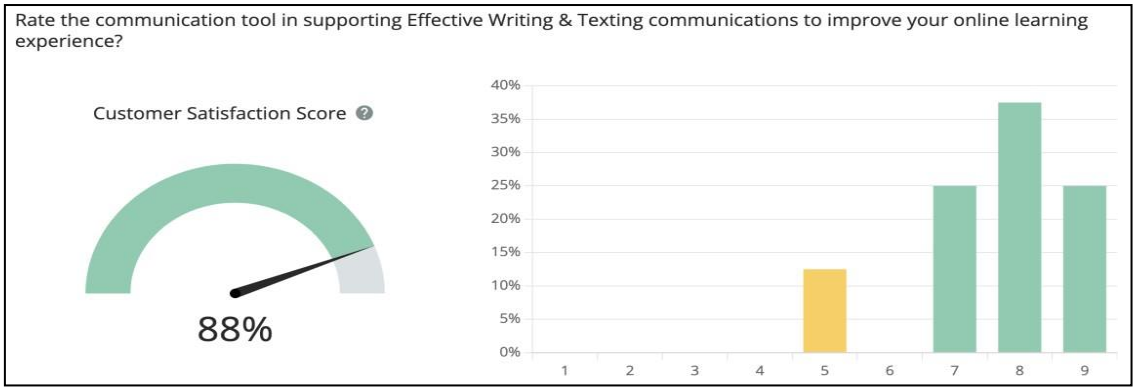

Figure 10: Survicate Survey Result for Effective Writing of Communication Tools & Apps

3.2. 2nd Criteria Communication Devices.

This criterion has four different alternatives as shown in *Figure 11*. It is clear from the figure that the most important alternative is Display since it has the highest Eigenvector.Display is equally to moderate important than writing devices, microphoneand speaker.

3.2.1. Communication Device

	Writing Devices	Microphone	Speaker	Display
Writing Devices	1.00	0.33	0.50	0.50
Microphone	3.00	1.00	1.00	0.50
Speaker	2.00	1.00	1.00	0.50
Display	2.00	2.00	2.00	1.00
Total Sum	**8.00**	**4.33**	**4.50**	**2.50**

	Writing Devices	Microphone	Speaker	Display	Eigenvector
Writing Devices	0.13	0.08	0.11	0.20	**12.83%**
Microphone	0.38	0.23	0.22	0.20	**25.70%**
Speaker	0.25	0.23	0.22	0.20	**22.57%**
Display	0.25	0.46	0.44	0.40	**38.90%**
Total Sum	**1.00**	**1.00**	**1.00**	**1.00**	

Figure 11: The 2nd criteria Communication Device and it is alternatives.

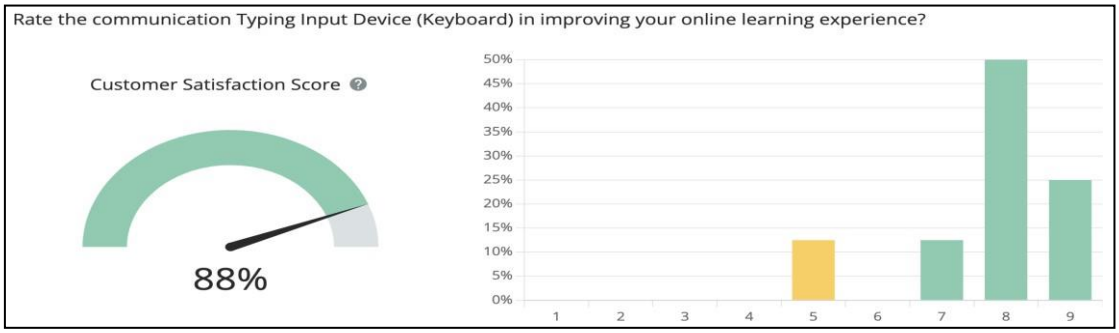

Figure 12: Survicate Survey Result for Typing Input Device (Keyboard) of Communication

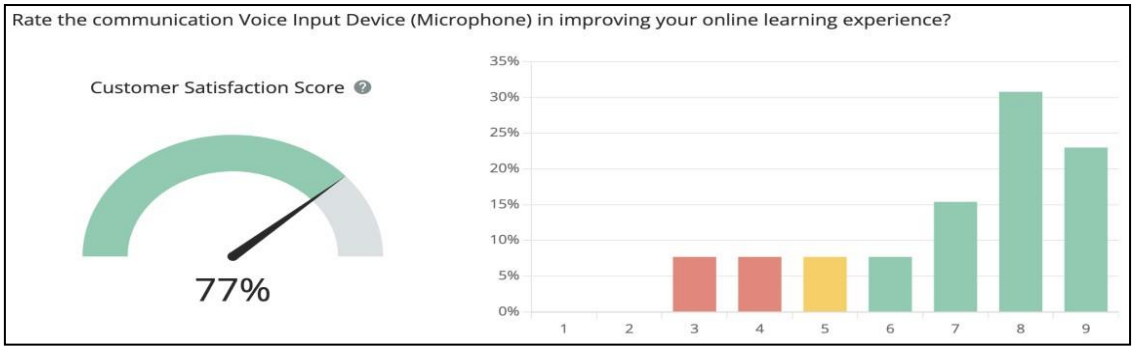

Figure 13: Survicate Survey Result for Voice Input Device (Microphone) of Communication

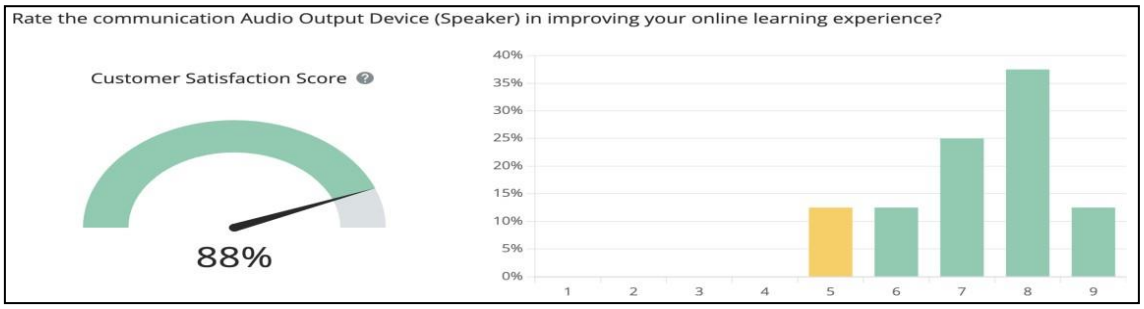

Figure 14: *Survicate Survey Result for Audio Output Device (Speaker) of Communication*

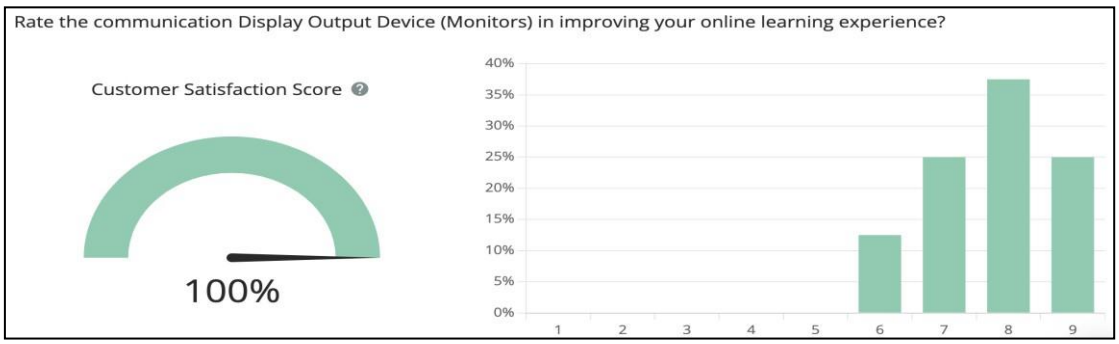

Figure 15: Survicate Survey Result for Display Output Device (Monitor) of Communication

3.3. 3rd Criteria: Communication Styles

This criterion has four different alternatives as shown in *Figure 16*. It is clear from thefigure that the most important alternative is Non-verbal since it has the highestEigenvector. Non- verbal is equally to moderately important than verbal. It ismoderately to strong important than written and it is equally important with visual. equally important with visual.[10]

3.3.1. Communication Styles

	Verbal	Non-verbal	Written	Visual
Verbal	1.00	0.50	0.33	0.50
Non-verbal	2.00	1.00	4.00	1.00
Written	3.00	0.25	1.00	2.00
Visual	2.00	1.00	0.50	1.00

Total Sum	8.00	2.75	5.83	4.50	
	Verbal	Non-verbal	Written	Visual	Eigenvector
Verbal	0.13	0.18	0.06	0.11	11.88%
Non-verbal	0.25	0.36	0.69	0.22	38.04%
Written	0.38	0.09	0.17	0.44	27.04%
Visual	0.25	0.36	0.09	0.22	23.04%
Total Sum	1.00	1.00	1.00	1.00	

Figure 16: The 3rd criteria: Communication Styles and it is alternatives.

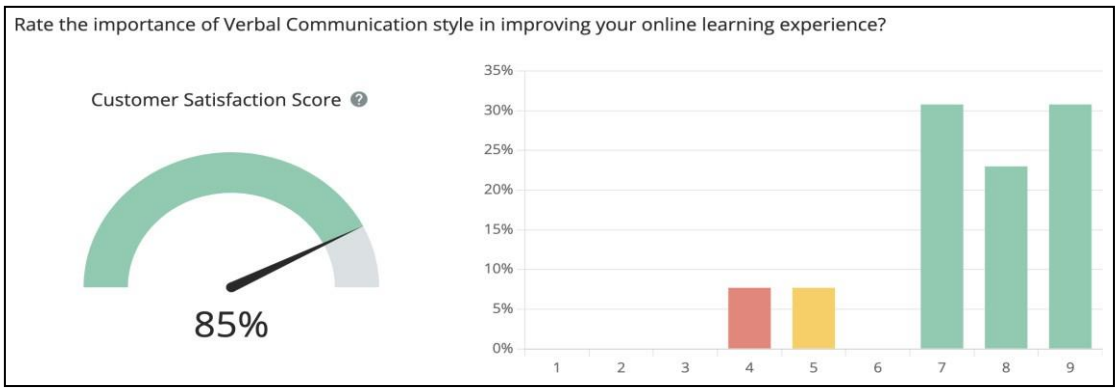

Figure 17: Survicate Survey Result for Verbal Style of Communication

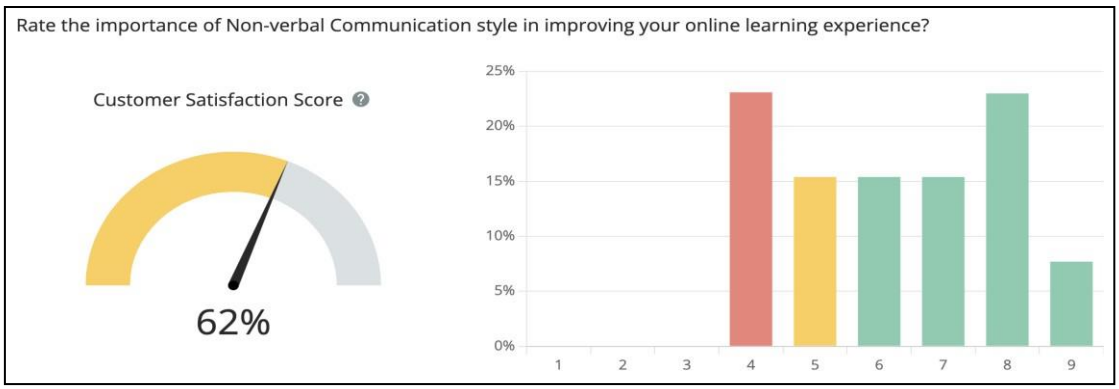

Figure 18: Survicate Survey Result for Non-Verbal Style of Communication

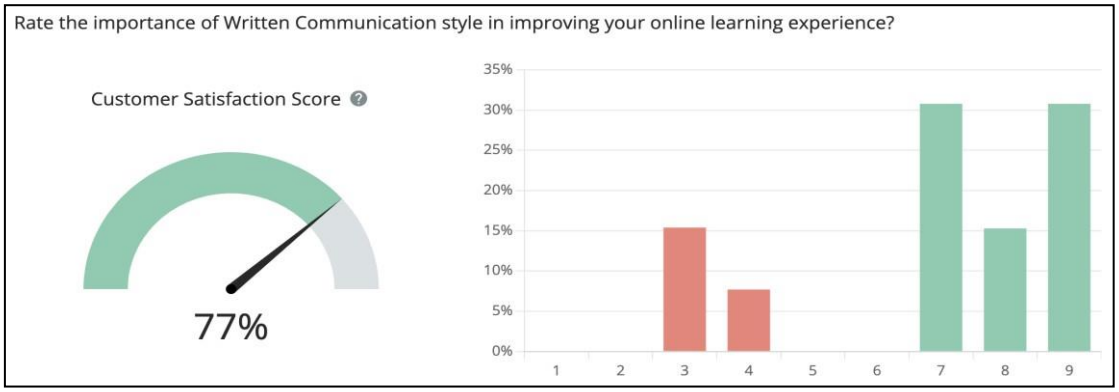

Figure 19: Survicate Survey Result for Written Style of Communication

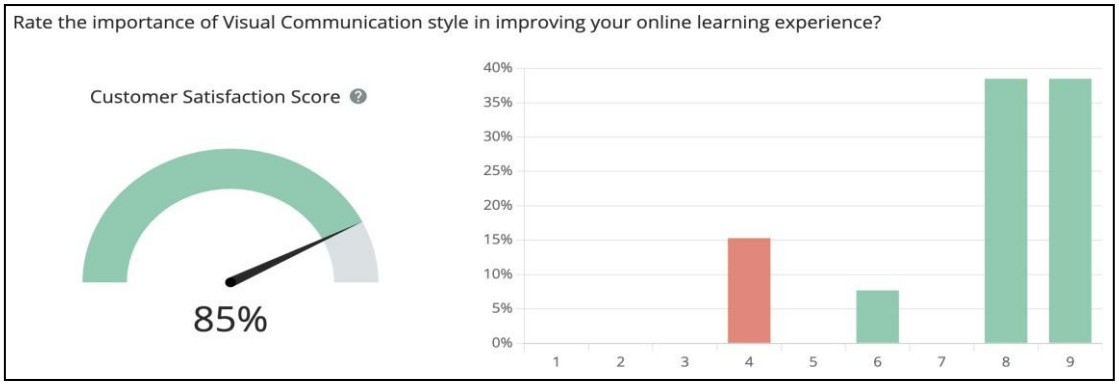

Figure 20: Survicate Survey Result for Visual Style of Communication

3.4. 4th Criteria: Internet Quality

Internet quality criteria has four different alternatives as shown in *Figure 21* The most important alternative is Security since it has the highest Eigenvector. Security is moderate important than speed. It is equal to moderate important than stability. And it is moderate to strong than connectivity.

3.4.1. Internet Quality

	Speed	Stability	Connectivity	Security
Speed	1.00	0.33	0.33	0.33
Stability	3.00	1.00	0.50	0.50
Connectivity	3.00	2.00	1.00	0.25
Security	3.00	2.00	4.00	1.00
Total Sum	**10.00**	**5.33**	**5.83**	**2.08**

	Speed	Stability	Connectivity	Security	Eigenvector
Speed	0.10	0.06	0.06	0.16	**9.49%**
Stability	0.30	0.19	0.09	0.24	**20.33%**
Connectivity	0.30	0.38	0.17	0.12	**24.16%**
Security	0.30	0.38	0.69	0.48	**46.02%**
Total Sum	**1.00**	**1.00**	**1.00**	**1.00**	

Figure 21: The 4th criteria Internet quality and it is alternatives.

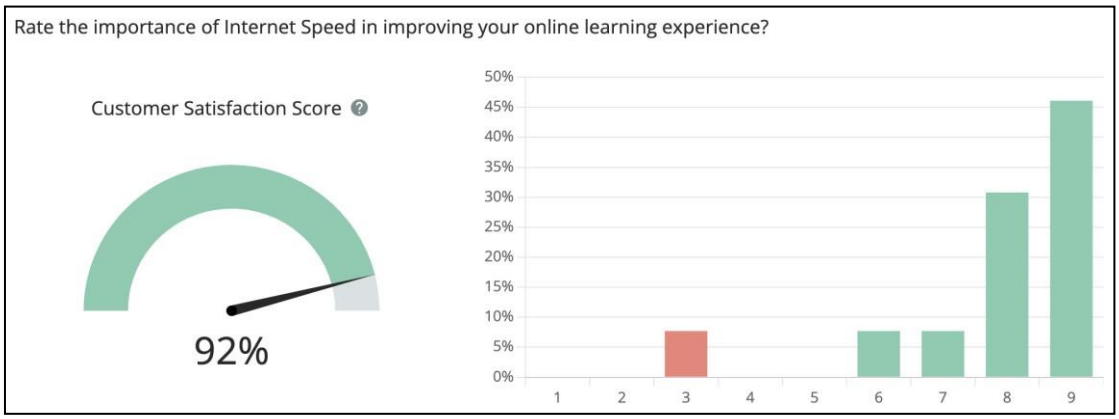

Figure 22: Survicate Survey Result for Speed Quality of Internet

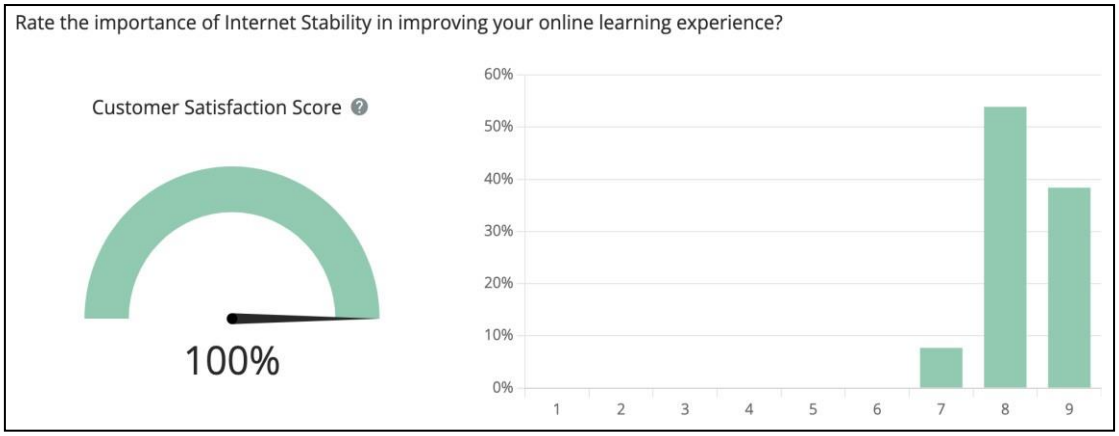

Figure 23: Survicate Survey Result for Stability Quality of Internet

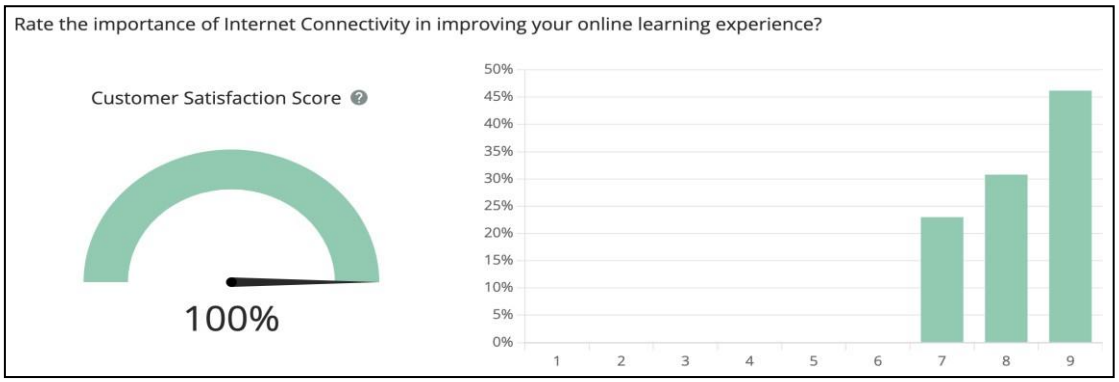

Figure 24: Survicate Survey Result for Connectivity Quality of Internet

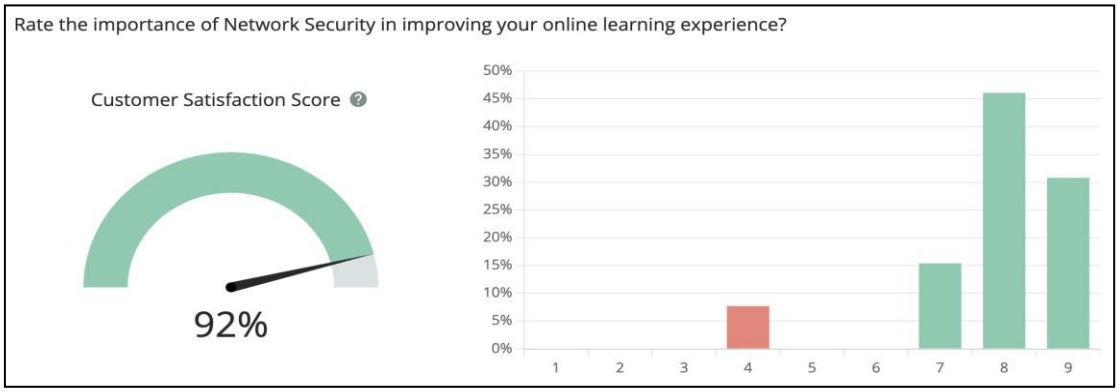

Figure 25: Survicate Survey Result for Network Security Quality of Internet

3.5. 5th Criteria: Virtual Platform

The sixth criteria has four different alternatives as shown in *Figure 31* The most important alternative one is Popularity since it has the highest Eigenvector. Popularityis extreme important than easy to register, ability to invite and accessibility.

3.5.1. Virtual Platforms

	Easy to Register	Ability to Invite	Accessibility	Popularity
Easy to Register	1.00	8.00	0.17	0.11
Ability to Invite	0.13	1.00	0.20	0.11
Accessibility	6.00	5.00	1.00	0.11
Popularity	9.00	9.00	9.00	1.00
Total Sum	**16.13**	**23.00**	**10.37**	**1.33**

	Easy to Register	Ability to Invite	Accessibility	Popularity	Eigenvector
Easy to Register	0.06	0.35	0.02	0.08	**12.73%**
Ability to Invite	0.01	0.04	0.02	0.08	**3.85%**
Accessibility	0.37	0.22	0.10	0.08	**19.23%**
Popularity	0.56	0.39	0.87	0.75	**64.19%**
Total Sum	**1.00**	**1.00**	**1.00**	**1.00**	

Figure 26: The 5th criteria Virtual Platform and it is alternatives.

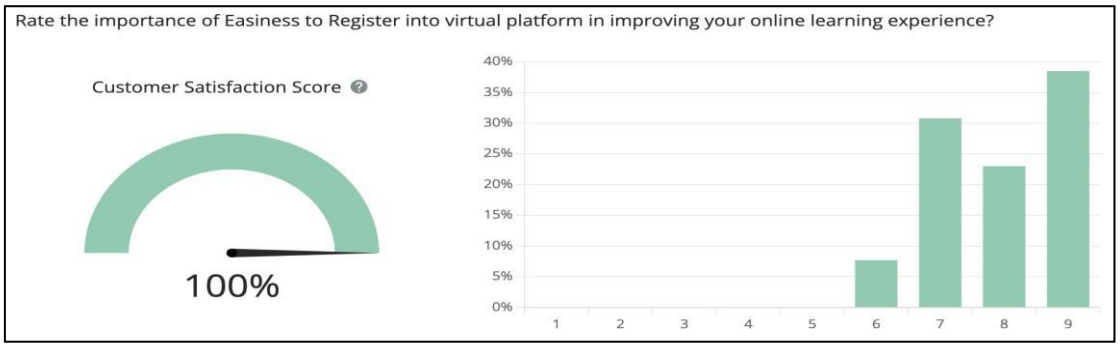

Figure 27: Survicate Survey Result for Easiness to Register into Virtual Platform

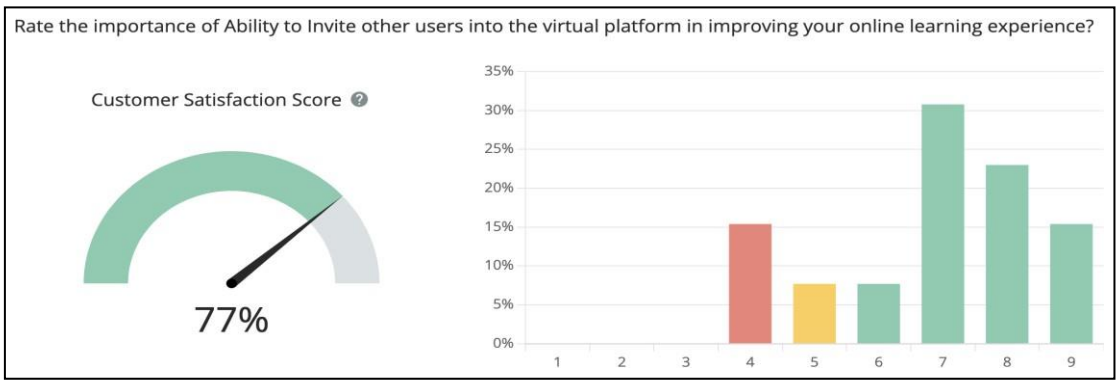

Figure 28: Survicate Survey Result for Ability to Invite Others into Virtual Platform

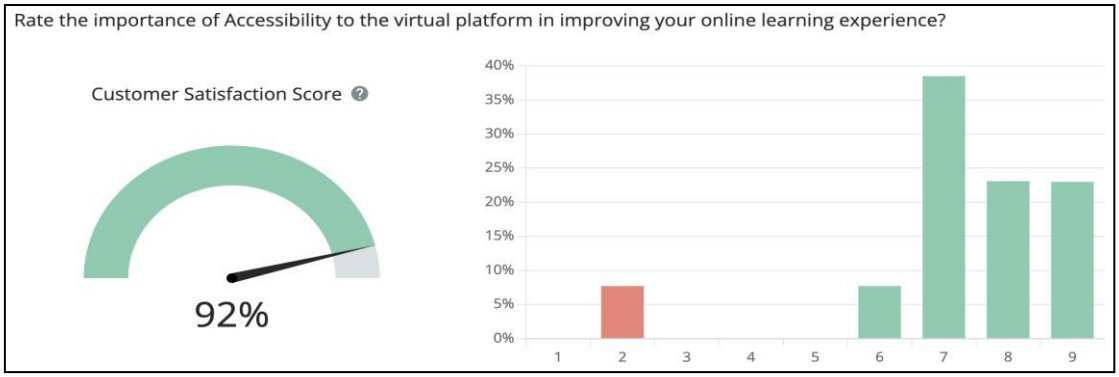

Figure 29: Survicate Survey Result for Accessability into Virtual Platform

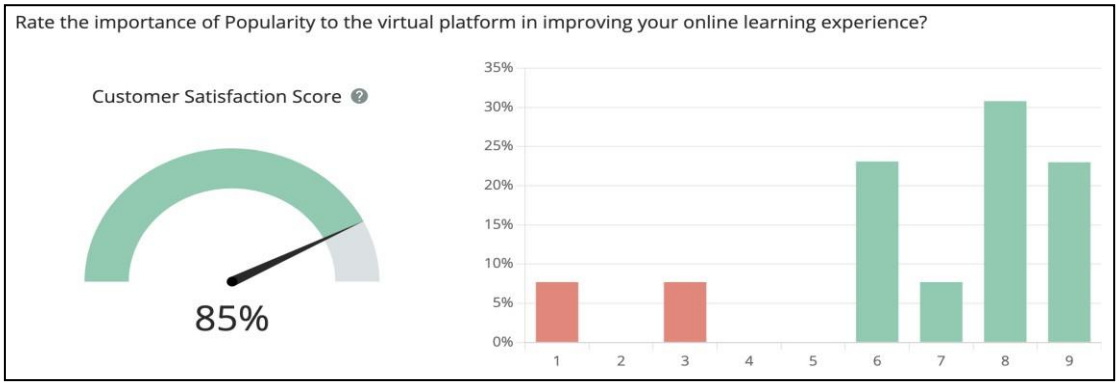

Figure 30: Survicate Survey Result for Popularity of Virtual Platform

3.6. 6th Criteria: Activities

The seventh criteria which is activities has four alternatives as shown in *Figure 26* The most important alternative is Lectures due to it has the highest Eigenvector. Lecture isstrong important than meetings. It is moderate to strong important than labs and it is moderate important than gatherings.

3.6.1. Activites

	Lectures	Meetings	Labs	Gatherings
Lectures	1.00	5.00	4.00	3.00
Meetings	0.20	1.00	3.00	6.00
Labs	0.25	0.33	1.00	4.00
Gatherings	0.33	0.17	0.25	1.00
Total Sum	**1.78**	**6.50**	**8.25**	**14.00**

	Lectures	Meetings	Labs	Gatherings	Eigenvector
Lectures	0.56	0.77	0.48	0.21	**50.73%**
Meetings	0.11	0.15	0.36	0.43	**26.46%**
Labs	0.14	0.05	0.12	0.29	**14.96%**
Gatherings	0.19	0.03	0.03	0.07	**7.86%**
Total Sum	**1.00**	**1.00**	**1.00**	**1.00**	

Figure 31: The 6th criteria Activities and it is alternatives.

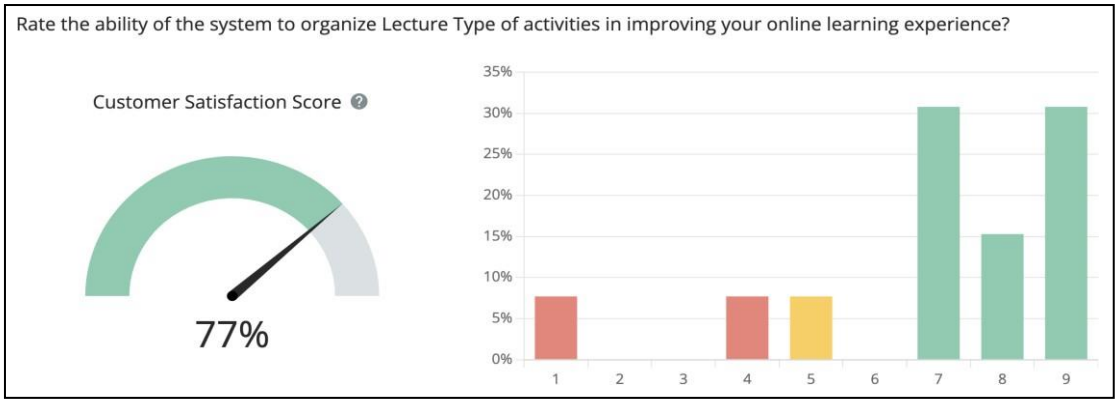

Figure 32: Survicate Survey Result for Lectures Type of Activities

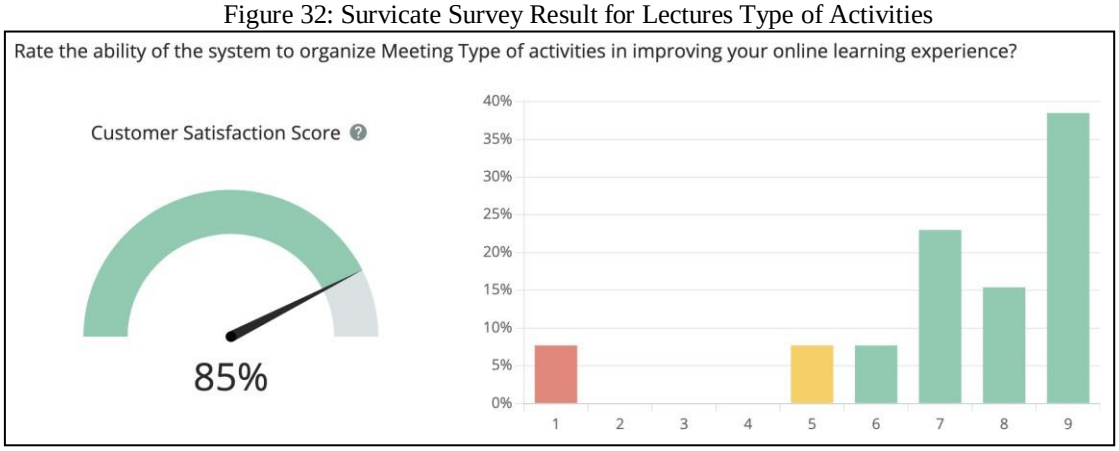

Figure 33: Survicate Survey Result for Meetings Type of Activities

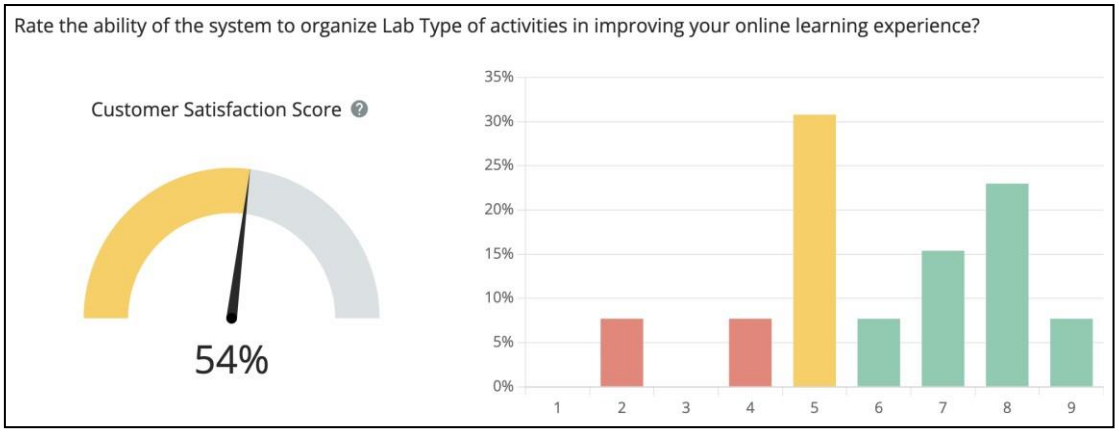

Figure 34: Survicate Survey Result for Labs Type of Activities

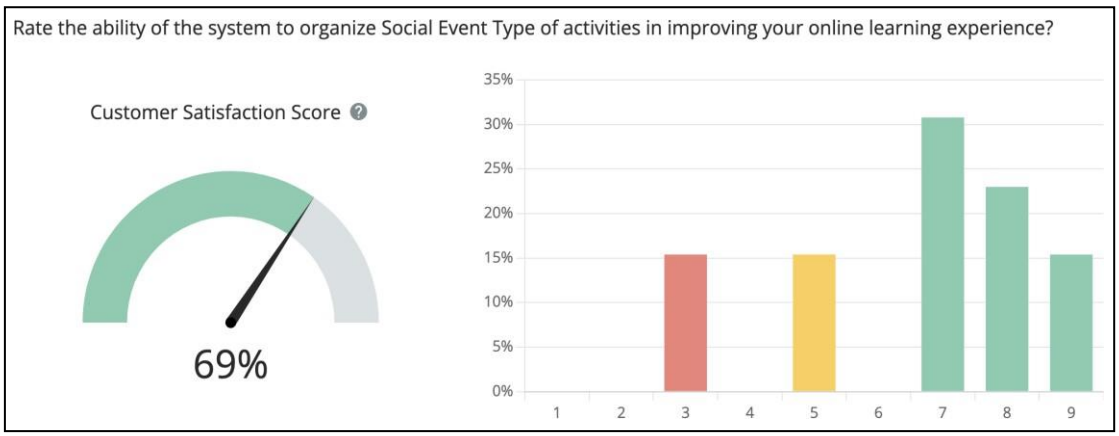

Figure 35: Survicate Survey Result for Social Events Type of Activities

3.7. 7th Criteria: Assessments

This criterion has four different alternatives as shown in *Figure 36*. It is clear from the figure that the most important alternative is immediate feedback due to it is high Eigenvector. Immediate feedback is very strong to extremely important than quizzes and essay. And it is moderate important than multiple choice.

3.7.1. Assessments

	Quizzes	Essay	Multiple Choice	Immediat Feedback
Quizzes	1.00	0.17	7.00	0.13
Essay	6.00	1.00	7.00	0.13
Multiple Choice	0.14	0.14	1.00	0.33
Immediat Feedback	8.00	8.00	3.00	1.00
Total Sum	**15.14**	**9.31**	**18.00**	**1.58**

	Quizzes	Essay	Multiple Choice	Immediat Feedback	Eigenvector
Quizzes	0.07	0.02	0.39	0.08	**13.79%**
Essay	0.40	0.11	0.39	0.08	**24.29%**
Multiple Choice	0.01	0.02	0.06	0.21	**7.27%**
Immediat Feedback	0.53	0.86	0.17	0.63	**54.65%**
Total Sum	**1.00**	**1.00**	**1.00**	**1.00**	

Figure 36: The 7th criteria Assessments and it is alternatives.

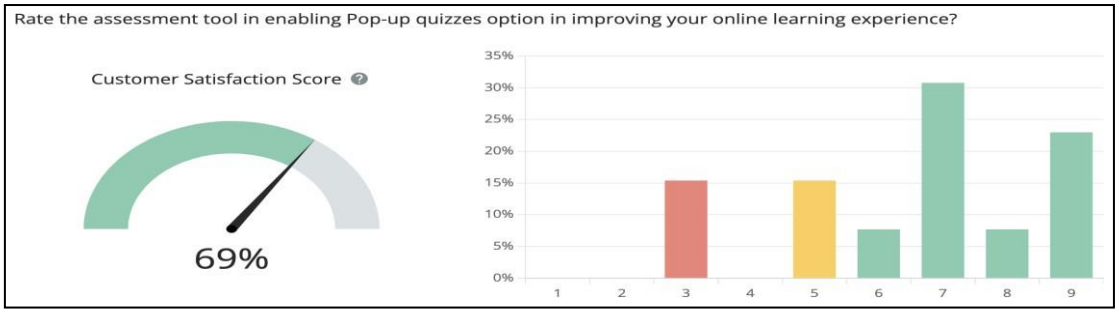

Figure 37: Survicate Survey Result for Pop-Up Quizzes Type of Assessment

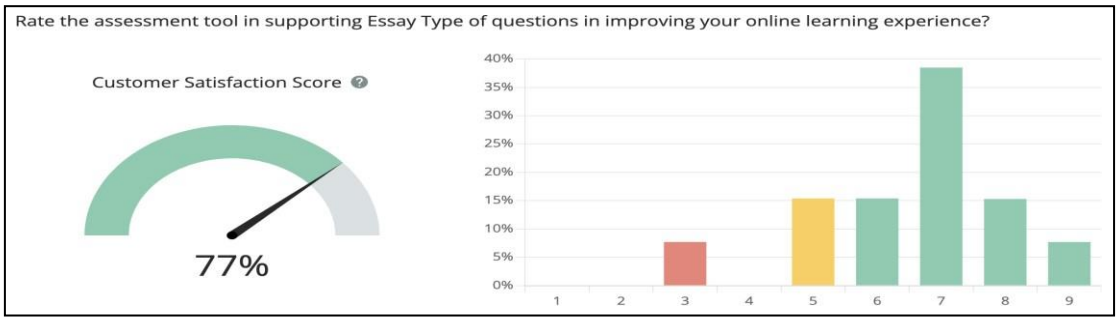

Figure 38: Survicate Survey Result for Essay Type of Assessment

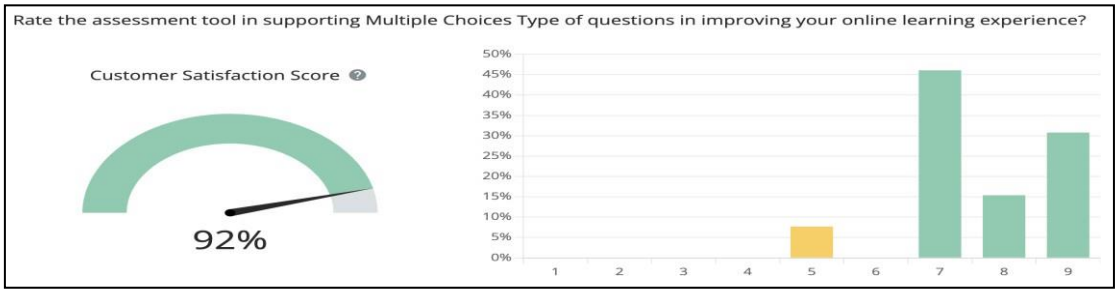

Figure 39: Survicate Survey Result for Multiple Choices Type of Assessment

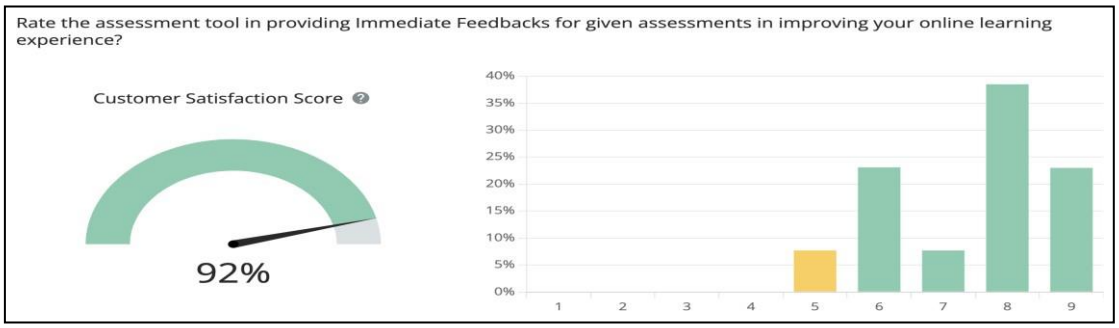

Figure 40: Survicate Survey Result for Immediate Feedbacks option of Assessment

Based on survey result done on sample of 100 (50 Instructors & 50 Students) using SAATY scale AHP analysis, the study result and discussion to be further detailed in Chapter 4.

4. RESULTS & DISCUSSION

4.1. Survey Result

Based on survey answers and rating scale and by using SAATY scale – AHP the following two tables where generated.

Table 2: Pairwise Comparasion Table

	Communication Tools/Apps	Assessment	Communication Device	Communication Styles	Internet Quality	Activity	Virtual Platform
Communication Tools/Apps	1.00	5.00	1.00	1.00	0.14	7.00	6.00
Assessment	0.20	1.00	3.00	2.00	0.13	1.00	4.00
Communication Device	1.00	0.33	1.00	1.00	0.17	8.00	5.00
Communication Styles	1.00	0.50	1.00	1.00	0.20	8.00	6.00
Internet Quality	7.00	8.00	6.00	5.00	1.00	6.00	1.00
Activity	0.14	1.00	0.13	0.13	0.17	1.00	8.00
Virtual Platform	0.17	0.25	0.20	0.17	1.00	0.13	1.00
Total Sum	**10.51**	**16.08**	**12.33**	**10.29**	**2.80**	**31.13**	**31.00**

Table 3: Pairwise comparison with corresponding Eigenvectors

	mmunication Tools/Apps	Assessment	munication Device	munication Styles	nternet Quality	Activity	Virtual Platform	Eigenvector
Communication Tools/Apps	0.10	0.31	0.08	0.10	0.05	0.22	0.19	**15.05%**
Assessment	0.02	0.06	0.24	0.19	0.04	0.03	0.13	**10.35%**
Communication Device	0.10	0.02	0.08	0.10	0.06	0.26	0.16	**11.03%**
Communication Styles	0.10	0.03	0.08	0.10	0.07	0.26	0.19	**11.81%**
Internet Quality	0.67	0.50	0.49	0.49	0.36	0.19	0.03	**38.83%**
Activity	0.01	0.06	0.01	0.01	0.06	0.03	0.26	**6.40%**
Virtual Platform	0.02	0.02	0.02	0.02	0.36	0.00	0.03	**6.53%**
Total Sum	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	

It is obvious from Table 3 that the most important criteria is number 5 since it has the highest Eigenvector which is 38.83%. By looking at Table 2 and at Internet quality row which has only integer values and no decimals; we can say it make since that internet quality is the best. For example, internet Quality is very strong important than communication tools/ app. It is very storing to extremely important than assessments. It is strong to very strong than communication device and activity as well.And it is strong important than communication style.

On other hand, Activity which is the sixth criteria has the lowest score which is6.4%, as well as Virtual Platform has scored 6.53% and both are in the lower side of

importance to the users. By looking at Table 2 and at the row of Activity & Virtual Platform we noticed that they are having decimals values means that they are less important than other criteria's.

For Communication Tools/Apps/Devices/Styles, based on the results from Table 2 its mostly equally importance in compared to each other's. Thus, they have ranking of 1 on many occasions. And their Eigenvector is relatively in the same range between 11% to 15%.

5. CONCLUSION

In this papers we study the online learning experience in Qatar University by using AHP analto select the best criteria and the best alternative. So, we find the most important alternative is Internet Quality due to it is high Eigenvector which is 38.83%.

Communication Tools/Apps/Devices/Styles are equally to moderated important with and average score of 11% to 15%. And for communication styles the most important alternative is Non-verbal since it has the highest Eigenvector which is 38.04%. The most important alternative is Security since it has the highest Eigenvector. which is 46.02% For Internet quality. The most important alternative is Lectures due toit has the highest Eigenvector. which is 50.73% For Activities

And for Assessments criteria the most important alternative is immediatefeedback due to it is high Eigenvector which is 54.65% And for communication Device the most important alternative is Display since it has the highest Eigenvector which is 38.9%. The most important alternative one is Popularity since it has the highest Eigenvector. which is 64.19% For Virtual Platform.

On other hand, we found the most important criteria the at Internet quality it has the highest Eigenvector which is 38.83% and the Activity which is the sixth criteria has thelowest score which is 6.4% at the row of activity we can noticed that nearly all values are decimals means activity criteria is less important than all others except assessments which is equally important with activity.

DEDICATION

This Thesis is dedicated to my dear Family, who has been nicely my supporter until my research was fully finished, and my beloved family who, for months past, has encouraged me attentively with her fullest and truest attention to accomplish my work with truthful self-confidence.

ACKNOWLEDGMENTS

"I would like to acknowledge the support of Qatar University for providing all the needs to achieve the requirements of this study". This project would not have been possible without the support of many supervisor Dr. Pilsung Choe, who read my numerous revisions and helped to complete this thesis. Also thanks to my committee members Prof. Shaligram Pokharel & Dr. Murat Kucukvar, who offered guidance and support.

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