An Analytical Study on user Satisfaction on Wi-Fi Services: A Case Study on Omani Undergraduate Environment

B. Sriram* and Mohammad A. Sarrayrih
Faculty Information Systems and Technology Department, Sur University College, PO: 440, PC: 411, Sur, Sultanate of Oman; srishan11@gmail.com

Abstract

Background/Objectives: Most the higher education institutions provide various internet facilities to its students to motivate them in their learning processes. This study has been conducted to identify the Omani undergraduate user's satisfaction on the various Wi-Fi services provided to them to use in their learning processes. Method/Statistical Analysis: 250 respondents were selected using quota sampling technique for this study. To identify the impact levels of the factors selected One Sample t-test, One Way ANOVA test, Spearman’s Correlation and descriptive statistics were used in this study. Results: The study showed that the factors selected for the study have significant impact on the user's satisfaction in the Omani learner's environment. The study also revealed that the factors such as easiness, security and technical aspects of the WIFI services have more impact than the generally expected factors such as coverage and supports. The learning environment shall be made pleasant and easy using such services in the higher educational sectors. The developing nations need to provide more services to motivate the learners to acquire required knowledge using the various resources. Conclusion/Application: The learners should avail these services constructively in order to achieve their required intended learning outcomes and subject knowledge.

Keywords: Learning Environment, Learner's Satisfaction, Omani Learners, Wi-Fi Services, Wi-Fi Users

1. Introduction

The wireless service created a significant development in communication and accesses. In particular, as Mathews¹ said, this wireless technology helps the students in off-site accesses to various campus learning services provided by the educational providers. Also, the students uses Wi-Fi in their learning processes through mobiles, smart phones, laptops and other personal digital assistant for accessing various online resources.

Thus, in this paper, we have studied the various factors that influences the students to use the Wi-Fi in their educational processes. Though various studies were found related to mobile services and Wi-Fi proximities in various sectors and fields, no studies could be found in particular to higher education sector of Sultanate of Oman. As Baporikar and Shah² said, Sultanate of Oman has undergone rapid development in educational field, in particular, in higher education sector. As Sultanate of Oman has tremendous development in educational sector over the decades, the government has taken numerous steps to increase the potentials of the technology in all the fields. The students are motivated towards knowledge acquisition through various teaching methodologies. One such methodology is using internet resources in learning process, which plays a vital role in knowledge acquisition, sharing and dissemination processes. These internet resources require wired and wireless internet connections. As Wi-Fi is the fast growing technology, we have studied the Wi-Fi usages by the higher education students at undergraduate level studying at different programs. Also, we studied various Wi-Fi service factors that have major influences on usages in their educational processes.

* Author for correspondence
Mathews\textsuperscript{1} said that the wireless services had made a new era in communication and in turn significant development to education community. This wireless technology had brought the benefit of mobility into traditional educational activities. Also, wireless connections are cheaper than the wired connection as wires cannot be taken to all the places. As Cavus and Al-Momani\textsuperscript{3} said, learning no longer confined to a closed environment. M-Learning, which uses Wi-Fi, has improved the education processes beyond the classroom. E-Learning is the umbrella for various programs used in the learning processes.

As Clough et. al\textsuperscript{4} said, the smartphones and other PDAs offer several communication protocols to support informal learning processes. Web forums are internet based asynchronous discussion groups share the specific topic interest to the users for their learning processes. Li et. al\textsuperscript{5}, suggested that the distributed and collaborative learning apply communication and computer technologies and allow the students and instructors in their learning and teaching activities. This distance learning are convenient for students in time and space and instructors in timely content updates. Wi-Fi facilities provide facilities to access in these interactions from anywhere and at any time.

Hwansoo et. al\textsuperscript{6} suggested an educational model using the mixed of Eclipse ADT applications. Android is the operating system that most of new generation of mobile devices uses it as operating system. Android is easy for the developer to design and maintains the mobile applications while the users and students faced difficulties for using SDK because they should know the Java programming language. In their study, they applied a course for mobile educations as a model using multi Android SDK.

According Sugaraj and Subhashini\textsuperscript{11}, information technology has become more important day-to-day. The unique main activity that happens in our life is “Learning”. The paper explained three different types of learning: knowledge-based, skill-based and attitude-based learning systems and how the new technologies facilitated the E-Learning. They examined how the E-Learning can mix aural, visual and kinesthetic forms and discussed the pros and cons for E-Learning in this stage to the users. Even the E-Learning is developed and become importance till now; still there is a series of challenges are a head for it to provide to a growing wide range of recipients. Also the paper showeda mechanism to face all of those challenges.

Kothainayaki and Gopalakrishnan\textsuperscript{7} conducted a webometric analysis on agricultural universities to identify the usages of prospectus and library catalogue by the research groups. Badri et. al\textsuperscript{9} studied the relationship between the use of ICT by the secondary school teachers in the teaching environment. Na and Kim\textsuperscript{10} studied the recent information technology trends with respect to the intersection of technology and fine arts. They suggested that the internet accelerates these trends and the information flows through the Wi-Fi networks.

According to Rao et. al\textsuperscript{11}, the main objective of Mobile-Learning is that the learners can get the knowledge from the centralized shared resources at anytime and anywhere they like to read that too at free of cost. These can be done with the help of Wi-Fi connection in the mobile device. Roschelle\textsuperscript{12} said, wireless mobile learning connects the learners and their devices in productive manners. According to the author, wireless mobile technologies for education are incredibly diverse and incompatible.

Though various studies were found in this area, no relevant literature could be found in the user satisfaction perspectives. Apart, no literature could be found in particular to the region selected. Thus, we undertook this research to measure the Omani undergraduate user satisfaction on the Wi-Fi services in their learning processes.

2. Research Methodology

The research methodology was adopted from the research methods of Sriram\textsuperscript{4,15}, Rajeev and Sriram\textsuperscript{16}, Chandy and Sriram\textsuperscript{17}, Sakkthivel and Sriram\textsuperscript{18}.

2.1 Questionnaire Construction, Reliability and Validity

A questionnaire in both English and Arabic was prepared and distributed to the respondents studying in Sur University College at various levels under different specializations. The questionnaire was prepared with different research segments that shall be applied in future. We have considered the demographic profile of the respondents, Wi-Fi usage strategies, purposes and methods, respondents’ opinion on Wi-Fi Services and their level of satisfaction in using Wi-Fi in their learning processes were considered for this research purposes.

The important aspects of Wi-Fi usage in the higher educational activities were studied from various resources (Forlano\textsuperscript{6}, 2009; Noblet\textsuperscript{10}, 2012). Some samples of students
were also asked about their opinion about the Wi-Fi usage in the campus. The major factors that contribute to Wi-Fi services in the campus are identified as follows: Quality, Density, Speed, Capacity, Coverage, Easiness, Support, Security and Technical Aspects. Initially 25 questionnaires were distributed to the respondents to check the validity of the questionnaire. Based on the feedbacks, minor changes were made in the questionnaire. The questionnaires were distributed to 260 respondents in which 250 samples were selected using quota sampling. The Cronbach’s Alpha reliability analysis produced the value 0.936 for the selected variables which shows that instrument has high validity. To measure the strength between the factors selected for the study, factors analysis was conducted. The KMO measure of sampling adequacy was 0.928 and the Bartlett’s test of significance was 0.000 which supported significance between the variables. Figure 1 shows the KMO and Bartlett’s test results.

| KMO and Bartlett’s Test |          |
|-------------------------|----------|
| Kaiser-Meyer-Oklin Measure of Sampling Adequacy | .928 |
| Approx. Chi-Square       | 1762.572 |
| Bartlett’s Test of Sphericity | df 45, Sig. .000 |

Figure 1. KMO and Bartlett’s Test.

2.2 Statistical Analyses and Results

Demographic Analysis

The respondents’ demographic profile was analyzed and the age profiles of the learners were shown in Table 1. 27% of the respondents were male and 73% were female. Out of 250 students, 84% of the respondents were studying in morning and the remaining 16% were studying in the evening. 46.4% of the respondents were from city, 42.8% of the respondents were from village and 10.8% of the respondents were from town limits. 216 students were single and 34 students were married.

Table 1. Age Profile of the Respondents

| Age       | Number of Respondents |
|-----------|-----------------------|
| Below 20  | 90                    |
| 21 – 30   | 141                   |
| 31 – 40   | 15                    |
| 41 – 50   | 3                     |
| Above 50  | 1                     |
| Total     | 250                   |

Figure 2 shows the level of study of the respondents.

Figure 2. Level of Study of Respondents.

Figure 3 shows the specialization of the respondents currently studying.

Table 2. Occupation of the Respondents

| Occupation   | No of Respondents | %   |
|--------------|-------------------|-----|
| Student Only | 126               | 50.4% |
| Government   | 89                | 35.6% |
| Private      | 15                | 6%   |
| Own Business | 20                | 8%   |
| Total        | 250               |      |

Table 3 shows the learners frequency usage strategy of Wi-Fi in their day-to-day learning processes.
Table 3. Frequency of Usage

| Frequency     | No of Respondents | %   |
|---------------|-------------------|-----|
| Daily         | 87                | 34.8% |
| Weekly        | 57                | 22.8% |
| Monthly       | 40                | 16%  |
| Hardly Sometimes | 43              | 17.2% |
| Never         | 23                | 9.2%  |
| Total         | 250               |      |

As the respondents use Wi-Fi in various places, the respondents were asked about the places of uses. The respondents were allowed to select more than one option in this regard. Table 4 shows the places of use of Wi-Fi in the learning processes.

Table 4. Places of Using Wi-Fi

| Place           | No of Respondents | %   |
|-----------------|-------------------|-----|
| Classrooms      | 25                | 10%  |
| Labs            | 34                | 13.6% |
| Library         | 90                | 36%  |
| Academic Building | 97              | 38.8% |
| Campus Open Area | 55              | 22%  |
| Admin Building  | 29                | 11.6% |
| Hostel          | 51                | 20.4% |
| Outside Campus  | 75                | 30%  |

The purposes of using Wi-Fi by the respondents were analyzed. The purposes were identified by interviewing the sample respondents and from some previous studies. 57.2% of the respondents said that they use Wi-Fi in their learning processes. 60% of the respondents said that they are using Wi-Fi in general information seeking purposes. 37.2% of the respondents agreed that they use Wi-Fi for chatting with their friends. 16.8% of the respondents said that they are using Wi-Fi in checking emails. Only 14% of the respondents said that they use Wi-Fi to read newspapers online.

2.3 Analysis of Satisfaction on Factors

The respondents were asked to give their satisfaction level on the various factors that help to provide effective and efficient Wi-Fi services. The level of satisfactions were measured with 5 point Likert's Scale (5 - Very High; 4 - High; 3 - Neutral; 2 - Low; 1 - Very Low). Table 5 shows the factors and the corresponding satisfaction of the respondents.

Table 5. Factors and Satisfaction

| Variable | Factor | 5 | 4 | 3 | 2 | 1 |
|----------|--------|---|---|---|---|---|
| X1       | Quality| 54| 96| 49| 24| 27|
| X2       | Density| 50| 103| 42| 31| 21|
| X3       | Speed  | 59| 67| 57| 39| 28|
| X4       | Capacity| 56| 83| 48| 39| 24|
| X5       | Coverage | 55| 71| 52| 37| 35|
| X6       | Easiness| 84| 78| 34| 23| 31|
| X7       | Support | 52| 87| 42| 35| 34|
| X8       | Security| 78| 77| 41| 30| 24|
| X9       | Technical Aspects | 64| 75| 61| 24| 26|
| Y        | Overall Satisfaction| 61| 93| 36| 31| 29|

These factors are identified as the vital factors that motivate the users to use Wi-Fi in their general daily uses. Though Wi-Fi is used in mobile connections by many users for different purposes, it has imperative relevance in educational processes. As the primary idea of this research is to identify the learners’ satisfaction in their learning processes, the users are asked to give their opinions with respect to their usage and application of Wi-Fi services in their learning processes. The factors were analyzed with various statistical measures such as descriptive analysis, regression analysis, and correlation.

2.4 Descriptive Analysis

Table 6 shows the descriptive analysis of the responses on the factors and the overall satisfaction of the respondents on the Wi-Fi services.

Table 6. Descriptive Analysis

| Factor    | Mean | SD  | SE  | Skewness | Kurtosis | CV    |
|-----------|------|-----|-----|----------|----------|-------|
| Quality   | 3.50 | 1.24| 0.08| -0.68    | -0.46    | 35.28%|
| Density   | 3.50 | 1.22| 0.08| -0.67    | -0.50    | 34.80%|
| Speed     | 3.36 | 1.30| 0.08| -0.73    | -0.97    | 38.73%|
| Capacity  | 3.43 | 1.26| 0.08| -0.47    | -0.83    | 36.71%|
| Coverage  | 3.30 | 1.34| 0.08| -0.35    | -1.04    | 40.61%|
| Easiness  | 3.64 | 1.36| 0.08| -0.77    | -0.63    | 37.19%|
| Support   | 3.35 | 1.32| 0.08| -0.48    | -0.94    | 39.43%|
| Security  | 3.62 | 1.30| 0.08| -0.67    | -0.67    | 35.83%|
| Technical Aspects | 3.51| 1.26| 0.08| -0.57    | -0.61    | 35.88%|
| Overall Satisfaction | 3.50| 1.30| 0.08| -0.65    | -0.71    | 37.09%|
From the above descriptive analysis, it is evident that the higher mean values have greater impacts on the user’s satisfaction. Easiness to use Wi-Fi in the learning processes ($\bar{X} = 3.64$) and security concerns ($\bar{X} = 3.62$) have the highest mean. The support provided by Wi-Fi services ($\bar{X} = 3.35$) and the coverage in and around the campus area ($\bar{X} = 3.30$) have lowest mean. The overall satisfaction $\bar{Y} = 3.50$.

### 2.5 One Sample t-Test

One sample t-test was conducted to identify the agreement of the factors with the users overall satisfaction. Table 7 shows the one sample t-test values.

From the above table as all the $p$ values are less than 0.01, it is clear that all the factors have significant impact on the overall satisfaction of the users.

### 2.6 One Way ANOVA

To check whether significance difference exists between the determinants and to check the consistency of the results, one way ANOVA test was conducted assuming that there is no significance difference between the mean values. Table 8 shows the ANOVA values.

The $p < 0.01$ shows that there are significant difference between the mean values. The impact between the factors are significantly different. Thus the higher and lower impact variables have significant differences.

### 2.7 Spearman’s Rank Correlation

To find the strength of the linear relationship between the determinants and the overall satisfaction (Ott & Longnecker), Spearman’s rank correlation ($\rho$) was calculated. Table 9 shows the Spearman rank correlation between the determinants and overall satisfaction. From the table it is evident that at the 0.01 level all the determinants have significant correlation the overall satisfaction.

### 3. Discussion and Conclusion

From the above analyses, it is evident that the Omani learners are motivated towards using Wi-Fi services in their daily learning processes. Table 10 shows the impact level of the factors on overall satisfaction of the user. The factors which have mean values higher than the mean value of overall satisfaction were considered as high impact variables.

The other statistical analyses show that all the factors selected have significant impact on the learner’s satisfaction in using Wi-Fi in their learning processes. The lesser values of standard deviations show that user’s opinion are closer to mean values. The Standard Error values are very less, which show that the sample means are closer to population mean. Thus the selected samples represent the population.
One sample t-test shows that all the factor’s p-values are lesser than 0.01 which indicates that all the selected factors have significant impact on the overall satisfaction. Thus, the learners are satisfied with the factors related to Wi-Fi services which are helpful in their learning processes. One Way ANOVA analysis shows that individual factors have significant impact on the overall satisfaction. Table 11 shows the One Factor ANOVA within the factors. The result shows that the factors have significance (p = .0291 < 0.05) at 0.05 level.

The Omani learner’s environment is dependent on various technological innovations. One such innovation is Wi-Fi connections. The learners have made to search required information for their knowledge acquisition. Though various internet services such as Dialup and Broadband ADSL are provided, the Wi-Fi plays an important role in such services. The learning resource centers, academic libraries, academicians and higher education providers should motivate the learners to use Wi-Fi services in their personal gadgets for learning purposes. The learners should avail these services constructively in order to achieve their required intended learning outcomes and subject knowledge.

### Table 8. One Way ANOVA

|                  | Sum of Squares | df | Mean Square | F     | Sig.  |
|------------------|----------------|----|-------------|-------|-------|
| **Quality**      |                |    |             |       |       |
| Between Groups   | 142.790        | 4  | 35.697      | 36.793| .000  |
| Within Groups    | 237.706        | 245| .970        |       |       |
| Total            | 380.496        | 249| .970        |       |       |
| **Density**      |                |    |             |       |       |
| Between Groups   | 150.139        | 4  | 37.535      | 42.115| .000  |
| Within Groups    | 218.357        | 245| .891        |       |       |
| Total            | 368.496        | 249| .891        |       |       |
| **Speed**        |                |    |             |       |       |
| Between Groups   | 143.750        | 4  | 35.938      | 31.689| .000  |
| Within Groups    | 277.850        | 245| 1.134       |       |       |
| Total            | 421.600        | 249| 1.134       |       |       |
| **Capacity**     |                |    |             |       |       |
| Between Groups   | 125.681        | 4  | 31.420      | 28.547| .000  |
| Within Groups    | 269.663        | 245| 1.101       |       |       |
| Total            | 395.344        | 249| 1.101       |       |       |
| **Coverage**     |                |    |             |       |       |
| Between Groups   | 146.916        | 4  | 36.729      | 30.078| .000  |
| Within Groups    | 299.180        | 245| 1.221       |       |       |
| Total            | 446.096        | 249| 1.221       |       |       |
| **Easiness**     |                |    |             |       |       |
| Between Groups   | 142.642        | 4  | 35.660      | 27.765| .000  |
| Within Groups    | 314.674        | 245| 1.284       |       |       |
| Total            | 457.316        | 249| 1.284       |       |       |
| **Support**      |                |    |             |       |       |
| Between Groups   | 121.655        | 4  | 30.414      | 23.778| .000  |
| Within Groups    | 313.369        | 245| 1.279       |       |       |
| Total            | 435.024        | 249| 1.279       |       |       |
| **Security**     |                |    |             |       |       |
| Between Groups   | 111.882        | 4  | 27.971      | 22.320| .000  |
| Within Groups    | 307.018        | 245| 1.253       |       |       |
| Total            | 418.900        | 249| 1.253       |       |       |
| **Tech Asp**     |                |    |             |       |       |
| Between Groups   | 109.593        | 4  | 27.398      | 23.562| .000  |
| Within Groups    | 284.891        | 245| 1.163       |       |       |
| Total            | 394.484        | 249| 1.163       |       |       |
Table 9. Spearman's Correlation

| Quality | Coitelations Coefficient | Density | Speed | Capa city | Coverage | Easiness | Support | Security | Tech Asp |
|---------|---------------------------|---------|-------|-----------|----------|----------|---------|----------|----------|
| Sig. (2-tailed) | 1.000 | .700** | -616** | .511** | .473** | .481** | .512** | .302** | .471** |
| N | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Density | Coitelations Coefficient | 1.000 | .632** | .653** | .556** | .548** | .593** | .434** | .459** |
| Sig. (2-tailed) | -700** | 1.000 | .632** | .653** | .556** | .548** | .593** | .434** | .459** |
| N | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Speed | Coitelations Coefficient | -616** | .632** | 1.000 | .670** | .612** | .597** | .607** | .475** |
| Sig. (2-tailed) | -616** | .632** | 1.000 | .670** | .612** | .597** | .607** | .475** | .516** |
| N | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Capa city | Coitelations Coefficient | -611** | .659** | .670** | 1.000 | .670** | 1.000 | .569** | .675** |
| Sig. (2-tailed) | -611** | .659** | .670** | 1.000 | .670** | 1.000 | .569** | .675** | .600** |
| N | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Coverage | Coitelations Coefficient | 0.473** | .556** | .612** | .569** | 1.000 | .610** | .683** | .459** |
| Sig. (2-tailed) | 0.473** | .556** | .612** | .569** | 1.000 | .610** | .683** | .459** | .479** |
| N | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Easiness | Coitelations Coefficient | -481** | .548** | .597** | .675** | .610** | 1.000 | .669** | .503** |
| Sig. (2-tailed) | -481** | .548** | .597** | .675** | .610** | 1.000 | .669** | .503** | .571** |
| N | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Support | Coitelations Coefficient | -512** | .596** | .607** | .600** | .683** | .669** | 1.000 | .593** |
| Sig. (2-tailed) | -512** | .596** | .607** | .600** | .683** | .669** | 1.000 | .593** | .523** |
| N | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Security | Coitelations Coefficient | -302** | .434** | .475** | .379** | .459** | .503 | .593** | 1.000 |
| Sig. (2-tailed) | -302** | .434** | .475** | .379** | .459** | .503 | .593** | 1.000 | .529** |
| N | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Tech Asp | Coitelations Coefficient | -471** | .459** | .516** | .524** | .479** | .571** | .523** | .529** |
| Sig. (2-tailed) | -471** | .459** | .516** | .524** | .479** | .571** | .523** | .529** | 1.000 |
| N | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |

**Correlation is significant at the 0.01 level (2-tailed)

Table 10. Impact Level on Overall Satisfaction

| Factor          | Mean | Rank | Level   |
|-----------------|------|------|---------|
| Quality         | 3.50 | 4    | Equal   |
| Density         | 3.50 | 4    | Equal   |
| Speed           | 3.36 | 7    | Low     |
| Capacity        | 3.43 | 6    | Low     |
| Coverage        | 3.30 | 9    | Low     |
| Easiness        | 3.64 | 1    | High    |
| Support         | 3.35 | 8    | Low     |
| Security        | 3.62 | 2    | High    |
| Technical Aspects | 3.51 | 3    | High    |
| Overall Satisfaction | 3.50 | |         |
4. Limitations and Scope

The study is conducted in undergraduate level environment. The results may vary in other higher education environment. The study may be further extended with respect to learners’ opinion on Wi-Fi with different dimensions.

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6. References

1. Mathews JB. Why are Wireless Services Important to State and Education Leaders? Atlanta: SREB; 2005 March. Retrieved from: http://publications.sreb.org/2005/05T02-Why_Wireless_Important.pdf.
2. Baporikar N and Shah IA. Quality of Higher Education in 21st Century - A case of Oman. Journal of Educational and Instructional Studies in the World. 2012; 2(2):9-18.
3. Cavus N and Al-Momani MM. Mobile System for Flexible Education. Procedia Computer Science. 2011; 3:1475-1479.
4. Clough Gill, Jones Ann, McAndrew Patrick and Scanlon Eileen. Informal learning evidence in online communities of mobile device enthusiasts. In: Ally, Mohamed ed. Mobile Learning: Transforming the Delivery of Education and Training. Issues in Distance Education. Athabasca University Press; 2009; p. 99-112.
5. Forlano Laura. WiFi geographies: When code meets place. The Information Society. 2009; 25(5):344-352.
6. Hwansoo Kang, Jinhyung Cho. Case Study on Efficient Android Programming Education using Multi Android Development Tools. Indian Journal of Science and Technology. 2015 Aug; 8(18). doi: 10.17485/ijst/2015/v8i19/75984.
7. Kothainayaki S, Gopalakrishnan S. Webometric Analysis of Agricultural Universities in India. Indian Journal of Science and Technology. 2011 Mar; 4(3). doi: 10.17485/ijst/2011/ v4i3/29967.
8. Li Q, Lau RWH, Shih TK and Li FWB. Technology supports for distributed and collaborative learning over the Internet. ACM Trans. Intern. Tech. 2008 February; 8(2) Article 10; 24 pages. Doi: 10.1145/1323651.1323656; Available from: http://doi.acm.org/10.1145/1323651.1323656.
9. Badri Morteza, Mousavi Tayebe, Pour Mohammad Reza, Geravand Iraj, Yeganeh Azam Karimie. Examine the Relationship between Use of the ICT and Professional Development of Secondary School Teachers in Tabriz. Indian Journal of Science and Technology. 2015 June; 8(12). doi: 10.17485/ijst/2015/v8i12/71737.
10. Noblet SB. The Whys and Hows of Deploying Large-Scale Campus-Wide Wi-Fi Networks. Aruba White Paper; Available from: http://www.arubanetworks.com/pdf/technology/whitepapers/wp_Large-scale_campus-wide_wifi.pdf.
11. Rao NM, Sasidhar C, Kumar VS. Cloud computing through mobile-learning. International Journal of Advance Computer Science Applications. 2012; 1:42-47. http://arxiv.org/abs/1204.1594.

| Table 11. One - Factor ANOVA between Factors |
| Mean | n | Std. Dev |
|------|---|---------|
| 3.5  | 250| 1.24    |
| 3.5  | 250| 1.22    |
| 3.4  | 250| 1.30    |
| 3.4  | 250| 1.26    |
| 3.3  | 250| 1.34    |
| 3.6  | 250| 1.36    |
| 3.4  | 250| 1.32    |
| 3.6  | 250| 1.30    |
| 3.5  | 250| 1.26    |
| 3.5  | 2250| 1.29  |

| ANOVA table |
| Source | SS  | df | MS  | F   | p-value |
|---------|-----|----|-----|-----|---------|
| Treatment | 28.44 | 8  | 3.555 | 2.14 | .0291   |
| Error    | 3,717.76 | 2241 | 1.659 |     |         |
| Total    | 3,746.20 | 2249 |     |     |         |
12. Roschelle S. Unlocking the Learning Value of Wireless Mobile Devices. Journal of Computer Assisted Learning. 2003; 19(3):260-272.

13. Sugaraj RS, Subhashini A. E-learning, the next Big Name in Education. Indian Journal of Science and Technology. 2011 Mar; 4(3). doi: 10.17485/ijst/2011/v4i3/29959.

14. Sriram B. Factors Influencing Internet Resource User Satisfaction: An Analytical Study on Omani Learners. Springer: Education and Information Technologies. 2014; ISSN: 1360-2357; doi: 10.1007/s10639-014-9351-7.

15. Sriram B. Specialization Impact on Internet Resource Usage: Omani Undergraduate Learner's Perspectives. International Journal of Modern Education and Computer Sciences. 2014 August; 6(8):10-17. MECS Press; ISSN: 2075-0161; doi: 10.5815/ijmecs. 2014. 08. 02.

16. Rajev MKG, Sriram B. Impact of Library Resources on User Satisfaction: An Empirical Study on Gulf Countries. BPAS Research: Library Progress (International); 2014; 33(2) pp: 307-320.

17. Chandy TP, Sriram B. Impact of Cultural Variables: An Exploratory Study on Omani Women Consumers. International Journal of Marketing and Technology. 2014; 4(4):175-188; ISSN: 2249-1058.

18. Sakkthivel AM and Sriram B. Modeling the Determinants that Impact Risk-Taking and Entrepreneurship Behavior in Emerging Economies: International Journal of Entrepreneurship and Small Business (IJESB). 2012; 15(3):376-378.

19. Ott L and Longnecker M. An Introduction to Statistical methods and Data Analysis. 2001; 5e. Wadsworth Group; ISBN: 0-534-25122-6.

20. Won-Shik Na, Seok-Hoon Kim. An Efficient Data Forwarding Scheme for Internet of Things in Wi-Fi Networks. Indian Journal of Science and Technology. 2015 Apr; 8(S8). doi: 10.17485/ijst/2015/v8iS8/64233.