FINDINGS, CONCLUSION AND SUGGESTIONS

This chapter presents the methodology in retrospect, major findings, conclusion, tenability of hypotheses, suggestion and suggestions for further research.

METHODOLOGY IN RETROSPECT

The Problem of the Study

The present study is stated as “A STUDY OF THE INTRODUCTION, APPLICATION AND UTILIZATION OF INFORMATION TECHNOLOGY IN HIGHER EDUCATIONAL CONTEXT IN KERALA”

VARIABLES

The study variables used in the present study are:

1. Availability
2. Application
3. Utilization
4. Satisfaction
5. Barriers

The following are the classificatory variables

1. University (Kerala University, Mahatma Gandhi University and Calicut University)
2. Category of academic community (teachers, students and research scholars).

OBJECTIVES

The following are the important objectives of the study.
1. To understand the availability of Information Technology devices/services for teaching, learning and research in the universities in Kerala.

2. To examine the existing level of application of various Information Technology devices/services for teaching, learning and research process in the higher educational context in Kerala.

3. To examine the level of utilization of Information Technology devices/services for teaching, learning and research.

4. To know the levels of barriers in utilizing the existing Information Technology devices/services efficiently and effectively among the teachers, students and research scholars of the universities in Kerala.

5. To examine whether there exists significant difference among the universities in Kerala in the availability, application and utilization of Information Technology devices/services in teaching, learning and research.

HYPOTHESES

The hypotheses of the study are:

1. There is high level of availability of Information Technology devices/services for teaching, learning and research in the universities in Kerala as a result of the introduction of Information Technology.

2. The level of application of various Information Technology devices/service for teaching, learning and research process in the higher educational context in Kerala is high.

3. There is high level of utilization of Information Technology devices/services for teaching, learning and research.

4. The level of barriers of the utilization of existing Information Technology devices/services efficiently and effectively among the
teachers, students and research scholars of the universities in Kerala is high.

5. Significant difference exists among the universities in Kerala in the application and utilization of Information Technology devices/services in teaching, learning and research.

TOOLS

1. Questionnaire on Introduction, Application and Utilization of Information Technology for Teaching

2. Questionnaire on Introduction, Application and Utilization of Information Technology for Learning

3. Questionnaire on Introduction, Application and Utilization of Information Technology for Research

SAMPLE

For the present study the investigator decided to limit the size of sample to a total of 1025 respondents from three Universities (Kerala University 350, Mahatma Gandhi University 300 and Calicut University 375).

STATISTICAL TECHNIQUES

1. Percentage Analysis

2. Chi-square test

3. Arithmetic Mean

4. Analysis of Variance

MAJOR FINDINGS

The important findings of the study are the following:
1. The availability of computer, network, Internet, printer, scanner, photocopier, OHP and CD/DVD Writer is high in all the three universities. The availability of Internet is the highest in Calicut University. The availability of network, photocopier, LCD projector and CD/DVD writer is significantly high in Mahatma Gandhi University. The availability Video conferencing facility also is comparatively high in Mahatma Gandhi University.

2. The majority of students get computer, network facility, Internet, printer facility and photocopier facility for learning in all three universities taken for the study. The availability of OHP and CD/DVD writer also is high in Kerala and Mahatma Gandhi Universities. The availability of Edusat and EMMRC is high in Calicut University. The level of the availability of network, Internet, videoconferencing facility, photocopier facility, LCD projector, OHP and CD/DVD writer is comparatively high in Mahatma Gandhi University. The level of availability of printer facility is the highest in Calicut University.

3. The majority of the research scholars in all the three universities taken for the study get computer, network facility, Internet facility, printer facility, scanner, photocopier, OHP and CD/DVD writer for research purpose. The availability of network facility and videoconferencing facility is comparatively higher in Mahatma Gandhi University. The availability of LCD projector and OHP is higher in Kerala University.

4. The level of application of the IT devices/services such as computer, windows operating system, Internet, printer, scanner, photocopier and CD/DVD writer is high in all the three universities for teaching. Comparatively higher level of application of Internet, videoconferencing facility, photocopier, LCD projector and CD/DVD writer is found in Mahatma Gandhi University.
5. The level of application of the IT devices/services such as computer, windows operating system, Internet and photocopier are high in all the three universities for learning. Comparatively higher level of application of Internet, videoconferencing facility, printer, LCD projector and CD/DVD writer is found in Mahatma Gandhi University.

6. The majority of the teachers and students in all the three universities are of the opinion that IT devices/services are not integrated in the curriculum.

7. The level of application of the IT devices/services such as computer, windows operating system, Internet, photocopier, LCD Projector and CD/DVD writer is high in all the three universities for research. The availability of printer is high in Kerala and MG Universities. Comparatively higher level of application of Linux, Internet, videoconferencing facility, printer, LCD projector and CD/DVD writer is found in Mahatma Gandhi University.

8. The level of use of computer among the teachers is high for data collection and report generation/word processing and personal and home use in all the three universities. The level of utilisation of computer for preparation, demonstration and presentation is also high among teachers in Mahatma Gandhi University. The level of use is moderate to access digital information resources for teaching in all the three universities.

9. The level of use of computer among the students is not high in any of the university taken for the study.

10. University wise analysis shows moderate level of utilisation of computers to access high quality data banks, knowledge creation and dissemination and for using research management tool. High level of utilisation of computers is seen in all the universities only in the case
of interpretation of collected data and electronic presentation. The level of utilisation of computer for research in designing multimedia presentation is high in Kerala and Mahatma Gandhi University.

11. The mean scores indicate that high level of use among the teachers in all the three universities is found only in the case of e-mail. Higher level of Internet use is found among the teachers of Kerala University and Mahatma Gandhi University. The use of communication technology is high for higher studies and scholarships among the teachers of Mahatma Gandhi University.

12. The level of Internet browsing and e-mail communication is higher for learning in all the three universities taken for the study. High level of use of communication technology for higher studies and job seeking is found in Kerala University and Mahatma Gandhi University.

13. The utilization of communication technology for research is high in the case of Internet browsing and e-mail communication in all the three universities. The level of use of communication technology for research is high in Kerala and MG Universities in the case of database search as well. For higher studies and fellowship the communication technology is highly used in Mahatma Gandhi and Calicut Universities.

14. Among the teachers in all the three universities, the use of IT peripheral as an output source and photocopying service is high. High level of use of multimedia presentation tool is also seen in Mahatma Gandhi University. The use of traditional presentation tools and tools to use microforms are low.

15. The level of use of IT peripherals except the photocopying facility in Kerala and Mahatma Gandhi Universities is not high among the students in the universities in Kerala.
16. In all the three universities, the level of utilization of photocopying facility is high among the research scholars. The use of output source and multimedia presentation tool is also high in Kerala University and Mahatma Gandhi University.

17. The high level of use among the teachers in all the three universities is found only in the case of e-journals/ e-contents. The use of OPAC is high in Kerala University and Mahatma Gandhi University.

18. The high level of use among the students is found only in the case of OPAC in Kerala University and Mahatma Gandhi University.

19. A high level of use among the research scholars in all the three universities is found in the case of OPAC. It can also be seen that there is high level of utilisation among the research scholars in Kerala University and Mahatma Gandhi University in the case of e-journal/e-contents.

20. The level of satisfaction with existing IT devices / services is among the teachers in all the three universities and students and research scholars in Kerala and Mahatma Gandhi Universities.

21. Students and research scholars in Kerala and Calicut Universities are not able to meet the requirements with the existing IT devices/services. However, the majority of the teachers have the opinion that they are able to meet their requirements with the existing IT device/services. The majority students and research scholars in Mahatma Gandhi University also have the opinion that they are able to meet their requirements with existing IT devices/services.

22. The level of application of IT device/services is not optimum in the teaching, learning and research processes.

23. The lack of adequate departmental infrastructure, funding for Information Technology, shortage of trained IT human resources, lack
of integration of IT in the curriculum/course and lack of organization’s IT policy, strategy and vision are the important barriers in all the three universities in making optimum use of computer technology for teaching.

24. Lack of accessibility, lack of infrastructure facility, lack of integration of IT devices/services in curriculum, lack of trained faculty/manpower and lack of periodic revision in curricula and content are found to be the most important barriers among the students in all the three universities.

25. Lack of adequate departmental and organizational infrastructure, lack of educational resources in digital format, lack of trained faculty/manpower and lack of organizational policy and strategy are the major barriers for the utilization of the computer technology for research.

26. The accessibility, information overload, lack of infrastructure and lack of high quality digital/syllabus based contents are the important barriers among the teachers in all the three universities for optimum utilization of communication technologies.

27. Limited access to the Internet, lack of infrastructure facilities, information over load, non-availability of full text, non-availability of syllabus based resources and unauthentic information are the important barriers for the students in utilizing the communication technology for learning in all the three universities.

28. Limited/restricted access to the Internet, lack of infrastructure facilities, information over load, non availability of full text, non availability of research based resources and unauthentic information are the important barriers for research scholars in utilizing the communication technology for research.
29. Lack of upgradation and maintenance of the peripherals, shortage of trained IT staff and rapid development in the technology are the important barriers for utilizing the IT peripherals for teaching in all the three universities.

30. Lost novelty of one way communication, lack of up gradation and maintenance of the peripherals, shortage of trained IT staff and rapid development in the technology are the important barriers for utilizing the IT peripherals for learning.

31. Lack of up gradation and maintenance of the peripherals and rapid development in the technology are the important barriers for utilizing the IT peripherals for research. Lost novelty of one way communication is another important barrier in Calicut University in the optimum utilisation of IT peripherals. The barrier of shortage of trained IT staff is also high in Kerala and Calicut Universities.

32. Lack of relevant digital resources and lack of marketing IT enabled library products/services are the major barriers in all the three universities for the effective utilization of the library services for teaching. Lack of infrastructure facility is another important barrier facility is another important barrier in Kerala and Calicut Universities. Dearth of accessibility and user education is also an important barrier in Calicut University. The barriers are higher in Calicut University.

33. Lack of infrastructure facilities, dearth of accessibility / user education, lack of relevant digital resources and lack of marketing IT enabled library products/services are the major barriers in all the three universities for the effective utilization of the library services for learning.

34. Lack of infrastructure facilities, dearth of accessibility / user education and lack of relevant digital resources are the major barriers in all the
three universities in general for the effective utilization of the library services for research.
CONCLUSION

It is clear from the analysis that the availability of IT devices/services taken for the study is at high level in teaching, learning and research in the universities.

The application of IT devices/services is high in the case of more than half of the items taken for the study in all the three universities in teaching. But in the case of learning the application of only less than half of the IT devices/services is high in all the three universities taken for the study. In total the application of IT device/services for research also is high.

The mean scores of the utilization of computer in the universities in Kerala disclose that the level of utilisation is not high in more than half of the cases taken for the study in teaching except Mahatma Gandhi University. In learning and research the level of utilization is moderate in more than half of the cases taken for the study. The level of utilisation of communication technology is either low or moderate among teachers in more than half of the cases taken for the study in Kerala and Calicut Universities. However, this is high in more than half of the cases taken for the study in Mahatma Gandhi University. The level of utilization of communication technology is high among the students in more than half of the cases taken for the study in Kerala and Mahatma Gandhi Universities. However, the utilization of communication technology for learning is not high in more than half of the cases taken for the study in Calicut University. It is high in more than half of the cases in Kerala University, Mahatma Gandhi University and Calicut University in research. The level of utilisation of IT peripherals for teaching and learning is either low or moderate in more than half of the cases taken for the study in all the three universities except Mahatma Gandhi University in teaching. At the same time the level of utilisation of IT peripherals for research is high in more than half of the cases taken for the study in Kerala and Mahatma Gandhi Universities. The level of utilisation of digital library service is high for teaching in half of the
cases taken for the study in Kerala and Mahatma Gandhi Universities. In the case of learning the level of utilisation of digital library service is either low or moderate in more than half of the cases taken for the study. The utilisation of digital library services is either moderate or high in the case of research in Kerala and Mahatma Gandhi Universities.

The Lack of adequate departmental infrastructure, funding for Information Technology, shortage of trained IT human resources, lack of integration of IT in the curriculum / course and lack of organization’s IT policy, strategy and vision are the important barriers in all the three universities in making optimum use of computer technology for teaching.

Lack of accessibility, lack of infrastructure facility, lack of integration of IT devices/services in curriculum, lack of trained faculty/manpower and lack of periodic curricula and content are the most important barrier among the students in all the three universities.

Lack of adequate departmental and organizational infrastructure, lack of educational resources in digital format, lack of trained faculty/man power and lack of organizational policy and strategy are the major barriers in the optimum utilization of the computer technology for research.

The accessibility, information overload, lack of infrastructure and lack of high quality digital /syllabus based contents are the important barriers among the teachers in all the three universities for optimum utilization of communication technologies.

Limited access to the Internet, lack of infrastructure facilities, information over load, non-availability of full text, non-availability of syllabus based resources and unauthentic information are the important barriers for students in utilizing the communication technology for learning.

Limited /restricted access to the Internet, lack of infrastructure facilities, information over load, non availability of full text, non availability of research
based resources and unauthentic information are the important barriers for research scholars in utilizing the communication technology for research.

Lack of up-gradation and maintenance of the peripherals and rapid development in the technology are the important barriers for utilizing the IT peripherals common for teaching, learning and research.

The most important barrier for the optimum utilisation of library services for teaching, learning and research in common is the lack of relevant digital resources. Students face more number of barriers as compared to teachers and research scholars in the optimum utilisation of library services.

The level of application and utilisation of IT devices/services in teaching, learning and research vary greatly according to university except for the utilization of IT peripherals for teaching.

**TENABILITY OF HYPOTHESES**

The tenability of the hypotheses of the study is tested on the basis of the result obtained from the statistical analysis of the collected data.

The first hypothesis states that ‘There is high level of availability of Information Technology devices/services for teaching, learning and research in the universities in Kerala as a result of the introduction of Information Technology’. Findings numbers 1, 2 and 3 reveal that there is high level of availability of IT devices/services for teaching, learning and research.

Hence the hypothesis is fully substantiated.

The second hypothesis states that ‘The level of application of various IT devices/service for teaching, learning and research process in the higher educational context in Kerala is high’.

Findings number 4 shows high level of application of the majority of the IT devices/services taken for the study in teaching. However, finding number 5 shows high level of application of IT devices/services only in the
case of less than half of the cases taken for the study in learning. Finding number 7 shows that there is high level of application of IT devices/services in research in more than half of the cases taken for the study in Kerala and Mahatma Gandhi Universities. In Calicut University high level of application of IT devices/services is found in half of the cases.

Hence the hypothesis is partially substantiated.

The third hypothesis states that ‘There is high level of utilization of Information Technology devices/service for teaching, learning and research’.

Finding numbers 8 to 19 do not show high level of utilisation of IT devices/services in teaching learning and research in the majority of the cases in all the three universities taken for the study.

Hence the hypothesis is not substantiated.

The fourth hypothesis states that ‘The level of barriers of the utilisation of existing Information Technology devices/services efficiently and effectively among the teachers, students and research scholars of the Universities in Kerala is high’.

Finding numbers 23 to 30 and 33 to 34 reveal that the levels of the majority of the barriers taken for the study are high. Finding numbers 31 and 32 show that the levels of barriers of half of the cases taken for the study in all the three universities are high.

Hence, the hypothesis is almost fully substantiated.

The fifth hypothesis states that ‘Significant difference exists among the universities in Kerala in the application and utilization of IT devices/services in teaching learning and research’.

Table numbers 12, 13 and 15 to 27 show significant difference among the universities in the application and utilisation of IT devices/services as confirmed by the p-value against each item in the tables.
Hence the hypothesis is almost fully substantiated.

**IMPLICATIONS AND SUGGESTIONS**

The availability of the IT devices/services is high in teaching, learning and research in all the three universities taken for the study. This may be because the universities in Kerala are spending huge amount for buying the IT devices/services.

The application of IT devices/services is high in the universities in Kerala in teaching and research. But in the case of learning the application of the IT devices/services is low/moderate. This reveals that even though the university departments have invested heavily on IT devices/services, these are not properly applied in learning. The non-integration of IT devices/services may be a reason for low level of application of IT devices/services for learning.

The findings of the study do not show high level of utilisation of IT devices/services in teaching learning and research in all the universities in the majority of the cases.

A high level of utilisation of computer for teaching is seen in the case of report generation and personal and home use in general. In the case of research high level of utilisation of computer in all the universities is seen only in the case of interpretation of data and electronic presentation.

Among the communication technologies e-mail communication only is used highly by teachers, research scholars and students in all the universities. This technology is highly used for Internet browsing among the teachers in Kerala and Mahatma Gandhi Universities. Students and researchers in all the universities use Internet technology highly. The high level of utilisation of IT peripherals is limited to taking computer outputs and photocopying in the case of teaching and photocopying in research in all the universities.
The utilisation of digital library service is limited to e-journal/ e-content access in the case of teachers in all the universities and also OPAC in Kerala and Mahatma Gandhi Universities. OPAC is the only highly used digital library service used by the students although limited to Kerala and MG Universities. In the case of research scholars OPAC is the highly used services. In Kerala and MG Universities the use of e-journals/e-contents is high. All these reveal that the utilisation of existing IT devices/ services is not up to the optimum level in the universities in Kerala for teaching, learning and research.

The lack of adequate departmental infrastructure, funding for Information technology, shortage of trained IT human resources, lack of integration of IT in the curriculum/ course and lack of organization’s IT policy, strategy and vision are the important barriers in all the three universities in making optimum use of computer technology for teaching.

Lack of accessibility, lack of infrastructure facility, lack of integration of IT devices/services in curriculum, lack of trained faculty/ human resource and lack of periodic curricula revision and contents are the most important barrier among the students in all the three universities.

This calls for the attention of the authorities to provide proper departmental infrastructure, funding, trained man power and integration of IT in curriculum. The curriculum is to be re-structured and a proper re-engineering of the present and future man power is the need of the hour.

Lack of adequate departmental and organizational infrastructure, lack of educational resources in digital format, lack of trained faculty/man power and lack of organizational policy and strategy are the major barriers for the optimum utilization of the computer technology for research. Proper organisational policy is the very foundation of the application of modern technology especially in higher education institutions like university.

The accessibility, information overload, lack of infrastructure and lack of high quality digital /syllabus based contents are the important barriers
among the teachers in all the three universities for optimum utilization of communication technologies.

Limited or restricted access is one of the major barriers in utilising the communication technology for teaching, learning and research in the universities in Kerala. In the era of Right to Information and Information for all, all the restrictions on free access to digital information need to be removed.

Lack of up-gradation and maintenance of the peripherals and rapid development in the technology are the important barriers for utilizing the IT peripherals common for teaching, learning and research. This reveals that even though huge amounts are spent on acquiring IT devices/services, their proper up-gradation in tune with the technological advancement and adequate maintenance of the existing peripherals are not seriously looked upon by the university administrators in Kerala.

Lack of relevant digital resources is the most important barrier for the optimum utilisation of library services for teaching, learning and research in common. In the era of technology and information society, the pattern of acquiring information has undergone drastic changes. For generating better output from the higher education system relevant digital information resources are to be made available to the academic community comprising of teachers, students and research scholars.
SUGGESTIONS FOR FURTHER RESEARCH

The end of one research may be the starting point of another research. The investigator feels that various studies can be conducted in the related areas of the present study. Some of the areas where future studies can be conducted are suggested here.

1. A study on the application of information technology related devices/services in the higher education system in Kerala comprising of all the universities and colleges can be conducted.

2. The prospects of application of ICT on distance education can be conducted.

3. A study on the problems and prospects of utilising digital library facilities can be conducted.

4. A study on the possibility of application of ICT for the professional development of librarians can be conducted.

5. A similar study can be conducted on the professional education environment.

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