

TECHNO PEDAGOGICAL ATTITUDE OF SECONDARY SCHOOL TEACHERS OF KERALA IN RELATION TO THEIR DIGITAL LITERACY

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DECLARATION

I, Ashna Baby., do hereby declare that this dissertation
**“TECHNO PEDAGOGICAL ATTITUDE OF SECONDARY SCHOOL
TEACHERS OF KERALA IN RELATION TO THEIR DIGITAL
LITERACY”** has not been submitted by me for the award of a Degree, Diploma,
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CERTIFICATE

I, **Mohammed Sareef. K.**, do hereby declare that this dissertation
**“TECHNO PEDAGOGICAL ATTITUDE OF SECONDARY SCHOOL
TEACHERS OF KERALA IN RELATION TO THEIR DIGITAL
LITERACY”** is a record of bonafid study and research carried out by **Ashna Baby**,
under my guidance and supervision. The report has not been submitted by her for the
award of a Degree, Diploma, Title or Recognition before.

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INTRODUCTION

- *Need and significance of the study*
- *Statement of the problem*
- *Definition of key terms*
- *Variables for the study*
- *Objectives of the study*
- *Hypotheses of the study*
- *Methodology*
- *Scope and Limitations of the study*
- *Organization of the Report*

Educational system in the world is facing major challenges as a consequence of the revolution of Information and Communication Technology (ICT). Relationships in modern societies are transformed by emerging new means of creating, processing, accessing, and transferring information. Information and communication technologies are dramatically altering many aspects of economic and social life: production systems, working methods, and relations and the way people communicate with each other are under-going changes throughout the world.

With the advent of various formats of technology, the world is shrinking at a rapid pace. Today, technology serves as a major factor in shaping new global economy and producing fast changes in the society. There is a widespread acknowledgement that technology can be used to enhance both learning and teaching. India has the capacity to become the hub of technology enabled teaching and learning with its IT prowess and strong education system. It has great potential, to transform the ways in which the teachers teach and the students learn. Technology provides an array of powerful tools that can help in transforming the present isolated, teacher-centred and text-bound classrooms into technology enriched, student-focused and interactive knowledge environments. As a learning tool, technology gives some good opportunities in terms of the learning efficiency and quality. It provides opportunities for greater flexibility, interactivity and accessibility for engaging teaching and learning at the individual, group, and societal levels. No doubt, information technology has a unique and unusual place in the classroom as an educational innovation.

New and emerging technologies challenge traditional process of teaching and learning and the way education is managed. The rapid development in Educational technology has redefined the teaching and learning process to a greater extent. The teachers to get acquaintance with the application of recent technological principles and gadgets in their teaching and hence there is an urgent need to examine the techno-pedagogical competencies possessed by the teachers .In a developing country like India, the mismatch between the techno-centric culture mindedness and the teachers' pedagogic culture results in the alienation of the teacher from the use of technology. It is a major challenge for teacher's professional development. They have to learn technical skills adequate to use technology productively, as well as to instruct and guide the students to use technology purposefully and generatively. Teachers not only have to become familiar with technology but also to acquire the pedagogical expertise needed for fruitfully working with new technology-based learning environments. New pedagogical practices have to be explored and developed to facilitate higher-level knowledge acquisition skills the learners need to constructively adapt to the knowledge society. Currently, teacher's lack of technical expertise in technology appears to significantly constrain possibilities of developing new and innovative computer-supported pedagogical practices

For effective technology integration to happen in the classrooms, teachers should have the necessary pedagogical, content and technological competencies. Content knowledge refers to the body of information that teachers teach and that students are expected to learn in a given subjects or content area such as English, Arts, Mathematics, Science and Social Studies. Content knowledge is the

“knowledge about actual subject matter that is to be learned or taught” ((Mishra& Koehler, 2006) Content knowledge and pedagogical content knowledge are key components of teacher competence that affect student’s progress. “To teach all students according to today’s standards, teacher needs to understand subject matter deeply and flexibly. So they can help students create useful cognitive maps to relate one idea to another and to address misconceptions. Teacher need to see how ideas connect across fields and to everyday life. This kind of understanding provides a foundation for pedagogical content knowledge that enables teachers to make ideas accessible to others.” (Schulman, 1987).The idea of pedagogical content knowledge (PCK) was first described by Lee Schulman. Literally ‘pedagogy’ refers to the art-science of teaching and ‘techno’ refers to art or skill in hand crafting derived from Latin ‘texere’(to weave or fabricate). Here, techno is a qualifier; it intersects or crosses the meaning of pedagogy with its own. Techno pedagogy refers to weaving the techniques of craft of teaching into the learning environment itself.

The technological revolution has prompted a fundamental shift in our understanding of pedagogy and its related practices. “Technological content knowledge refers to knowledge about how technology may be used to provide new ways of teaching content.” (Niess,2005). But today the techno-pedagogical competency is very much needed for teachers in teaching and learning process, as it facilitates effective teaching and learning. The techno pedagogical competency is nothing but the ability of the teachers to make use of technology effectively in teaching. The teachers develop techno pedagogical competencies then they may try to make use of this often in teaching and it will in turn make the learning process

simple and effective. Technological pedagogical content knowledge (TPCK) was introduced to the educational research field as a theoretical framework for understanding teacher knowledge required for effective technology integration (Mishra & Koehler, 2006). The TPCK framework acronym was renamed TPACK (pronounced “tee-pack”) for the purpose of making it easier to remember. Techno pedagogical content knowledge (TPACK) is a frame work to understand and describe the kinds of knowledge needed by a teacher for effective pedagogical practice in a technology enhanced learning environment."The TPACK frame work highlights complex relationship that exist between content, pedagogy and technology knowledge areas and may be useful organizational structure for defining what it is that teachers need to know to integrate technology effectively” (Archambault & Crippen,2009).

To integrate technology, teachers must possess requisite technology-based skills, knowledge, abilities, and attitudes (Teclehaimanot, Mentzer, & Hickman 2011). Now, techno pedagogical attitude of teachers has been going on smaller. The main reason is they are not digitally literate. “ Digital literacy is the awareness, attitude and ability of individuals to appropriately use digital tools and facilitates to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge and create media”(Casey & Bruce,2010).Digital Literacy is the combination of two terms digital and literacy. Digital information is a symbolic representation of data and literacy refers to ability to read for knowledge, write coherently and think critically about writer word.

The illiterate of the 21st century will not be those who cannot read and write but those who cannot learn, unlearn and relearn. Marc Prensky invented and popularized the terms “Digital native and Digital immigrant”. A digital native is one who was born during or after rise of digital technology and a digital immigrant refers to one who was born before rise of digital technology. These terms aid in understanding issues of digital literacy. The research evidence shows that teachers’ ability to use technology in lessons is influenced by the digital literacy they have. There is a clear distinction between teachers how choose technological resources to fit within a particular topic even though they have clear knowledge about their subject. In addition, it was revealed that middle-aged teachers, who do not have as strong skills in Information technology .Only a few teachers using subject-specific software which linked directly to the content and purpose of the curriculum. Thus, teacher education curriculum need to be redesigned to infuse technology throughout the curriculum that can bring change in preparedness of pre-service teachers to use IT in teaching, thus meeting the demands of the school system.

India recognized the importance of Information Technology in education ever since the dawn of its independence. Today, there is a growing awareness among policy makers and educators that the educational system needs to be reformed if it is to effectively equip teachers with the knowledge, technological attitudes and skills that they will need to succeed and thrive in the knowledge economy. Different policies have been formulated for IT and its integration in education. Some of these are: Computer Literacy and Studies in Schools (2004); Information and Communication Technology in Schools (2004); The Information

Technology Act (2000); The Science and Technology Policy (2001); National Task Force on Information Technology and Software Development (1998); ICT Policy in School Education (2009); IT @school(2001). Taking into account the efforts being made by the government for successful ICT-pedagogy integration, it can be said that India is heading towards the second stage, i.e. the foundation stage of ICT-pedagogy integration.

Kerala initiated in bold attempts to support schools with IT infrastructure, IT based learning resources and also provides training to teachers. In 2016 onwards IT @ school initiated training to total teachers in Kerala for enhancing IT enabled education. This has resulted in enhancing techno pedagogical attitude of teachers in varying school systems, curricular contexts and classroom practices in Kerala.

Technology by itself might not lead to change; rather it is the way in which teachers integrate technology that has the potential to bring change in the education process. Having IT in the education environment does not automatically ensure that high quality, effective teaching-learning would take place; it may change a teacher's role but perhaps not alter pedagogy. To achieve this, teachers must believe or be made to feel that IT is a valuable educational tool to boost the teaching-learning process. Thus, it becomes incumbent upon them to make a commitment to improving their IT skills, and in turn, integrate the technology into their regular classroom teaching practices. In order to integrate IT more effectively in the educational as well as environmental development, it may be worth understanding the teachers present level of digital skills and also their attitudes related to the techno

pedagogy integration syndrome to improve their digital skills and thereby, making the teaching-learning and development process more effective.

Need and Significance

Transition, transformation and revolution is the scenario of today's educational system. This tendency requires a change in knowledge competencies and skills to deal with technological advancement. Technology is the means to enhance teaching- learning quality. The profession of teaching is a challenging career and of course it's an art. A good teacher is always a gift to every students because without him, one can't learn something effectively. Now a day, the technology is playing a good role in pedagogy. It makes the teacher to express exactly what they want their students to understand. There are lot of technological tools which helps teachers in order to deliver a perfect lesson and also help students to learn the lesson efficiently. In recent reconstruction of definition of literacy in the 21st century, NCTE (2014) focused more on the technologies that are becoming imperative to literacy education. The strength of teacher's technological skills and the attitude towards technology as such seem to play a pivotal role in helping them to make use of technology in their teaching-learning process and in turn in proving themselves to be successful teachers and facilitators of technological intervention and integration of both pedagogy and technology as their principal forte.

Kerala school curriculum 2013 focused on IT enabled education. Presently most of the schools have IT @ of school, smart class, and digital class. But teachers do not try to utilize such resources for effective teaching learning process because of the stable attitude of teachers towards IT enabled teaching. In this aspect teachers

need to be trained on how to adapt on new technology and how to successfully integrate technology into his/her subject areas to make learning more meaningful.

In the 21st century, IT transforms pedagogy by providing new ways to engage learner. It leads to raise the importance of Techno Pedagogical Content knowledge. Techno pedagogical content knowledge refers to the affordances and constraints of technology as an enabled of different teaching approaches (Mishra& Koehler, 2006). The challenge for preparing 21st century teachers to use technologies effectively in their courses has led to many different approaches to using technology in teacher education programs. Most teacher education programs have redesigned their curricula to make the pre-service teachers competent in using technologies in their future teaching profession (Yildirim, 2007). While research exists to illustrate how often or the kinds of technology employed in classrooms (Pitler, 2011), there is not enough research for best practices in training teachers during pre-service programs to demonstrate how to effectively integrate 21st Century technologies into instruction. Most of the researchers found that teachers are facing lot of techno pedagogical difficulties due to their lack of digital literacy. The present study focused on examining teachers 'attitude towards technology, their level of digital skills as well as their experiences with technology and how they used technology in their current day to day educational practices. So through this study the investigator tries to find out Techno Pedagogical Attitude of Secondary school teachers in relation to their Digital Literacy and provide some suggestions for better practices.

Statement of the Problem

The progress of any country depends upon quality of education offered and its practice. Techno pedagogical attitude of teachers has gained enormous importance in present educational system. Teachers are expected to know to successfully integrate technology into their subject areas to make learning more meaningful. But now secondary school teachers are facing lot of Techno Pedagogical difficulties due to their level of digital literacy especially in Kerala. The study examining teachers’ attitude towards technology, their level of digital skills as well as their experiences with technology and how they used technology in their current day to day educational practices. The present study is entitled as **“TECHNO PEDAGOGICAL ATTITUDE OF SECONDARY SCHOOL TEACHERS OF KERALA IN RELATION TO THEIR DIGITAL LITERACY”**

Definition of Key Terms

The definition of key terms in the statement of the problem is given in the following part.

Attitude

In the present study, Attitude is operationally defined as an expression of an individual favorably or unfavorably towards an object, person or group of people, institutions or events. An attitude is “a relatively enduring organization of beliefs, feelings and behavioral tendencies towards socially significant objects, groups, events or symbols” (Hogg & Vaughan, 2005)

Techno Pedagogical Attitude

For the present study, Techno Pedagogical attitude has operationally defined as teachers' attitude towards transmission of content using technology. Techno pedagogical competency is very much needed for teachers in teaching and learning process, as it facilitates effective teaching and learning

Secondary School Teachers

In the present study the term Secondary school teachers is operationally defined as those teachers who teach any subjects for secondary school students.

Digital Literacy

For the present study the term digital literacy is operationally defined as ability of a teacher to locate, organize, understand, evaluate and analyze information using digital technology. Digital Literacy is the “ability to understand and use information in multiple formats from wide range of sources when it is presented via computers” (Gilster, 1997)

Variables for the Study

Present study is designed with two variables viz, Techno Pedagogical Attitude and Digital Literacy.

Objectives of the Study

The objectives set forth for the study are the following:

- To find out the level of Techno Pedagogical Attitude of secondary school teachers in Kerala.
- To find out the level of Digital Literacy of secondary school teachers in Kerala.
- To test whether there exist any significant difference in the level of Techno Pedagogical Attitude of secondary school teachers based on :
 - a. Gender
 - b. Locale of the schools
 - c. Type of management of schools
- To test whether there exist any significant difference in the level of Digital Literacy of secondary school teachers based on :
 - a. Gender
 - b. Locale of the schools
 - c. Type of management of schools
- To test whether there exist any significant relationship between Techno Pedagogical Attitude of secondary school teachers and their Digital Literacy.

Hypotheses of the Study

The hypotheses formulated for the study is following.

- There will be significant difference in the mean scores of Techno Pedagogical Attitude among secondary school teachers on the basis of:

- a. Gender
 - b. Locale of the schools
 - c. Type of management of schools
- There will be significant difference in the mean scores of Digital Literacy among secondary school teachers on the basis of:
 - a. Gender
 - b. Locale of the schools
 - c. Type of management of schools
 - There will be significant relationship between Techno Pedagogical Attitude of secondary school teachers and their Digital Literacy.

Methodology

The present study is intended to investigate the level of Techno Pedagogical Attitude and Digital Literacy among secondary school teachers. The investigator proposed to use survey method for the study. A precise description of sample, tool and statistical technique used for the study are given below.

Sample for the study

The present study was conducted on sample of 360 secondary school teachers from various schools in three districts of Kerala (Kozhikode, Kannur, and Malappuram) selected by stratified sampling technique giving due to the representation of characteristics like gender, locale of the schools and type of management of Schools.

Tools used for the study

To measure the variable, investigator developed Techno Pedagogical Attitude scale and Digital Literacy test with the help of supervising teacher(Sareef & Baby, 2017)

Statistical techniques used for the study

For the purpose of analysing the data, investigator carried out statistical techniques such as

- Descriptive statistics
- T-test
- Pearson's product moment co-efficient of correlation(r)

Scope and Limitation

Scope of the study

The present study is intended to investigate the Techno Pedagogical Attitude of secondary school teachers of Kerala in relation with their Digital Literacy. Appropriate and standardised tools were employed to measure the data. The investigator developed the tools with the help of supervising teacher. Emphasis was given to make the sample a true representative of the population and both Test and Scale was administrated on 360 secondary school teachers in three districts viz, Kozhikode, Kannur and Malappuram. Analysis and interpretation were made by use of authentic statistical technique and formula. Hence, the investigator hope the result yielded from the study would be reliable, valid and dependable.

Limitations of the study

Even though attention was taken to make the study dependable and reliable, certain limitations have also kept into it. These are following:

- Sample selected for the study is not a state-wide sample. Due to the time limitation it was confined into three districts ie, Kozhikode, Kannur and Malappuram.
- Teacher's digital skills are not practically measured. The skill level is indirectly assumed through the test item provided.
- All secondary schools in Kozhikode, Kannur and Malappuram were not included in the study. The investigator collected data only from 14 aided and government secondary schools based on urban and rural locale.
- Unaided schools, subjects and experience of secondary school teachers are ignored from subsamples due to the expense and time limitation.
- Even though more factors that affect techno pedagogical attitude of teachers, investigator concentrate only digital literacy among secondary school teachers.
- Due to their reputation, teachers are reluctant to express their response frankly .So investigator may get biased information through the collection of data.

In spite of these limitations the investigator has attempted to make the data more reliable and valid as possible and hopes that the findings of the study will yield fruitful results. This will be useful to teachers, School authorities, and other

concerned in the field of education. Based on the findings of the study, policy makers can be taken effective steps for its further improvement.

Organization of the Report

The whole report was presented in five chapters

Chapter 1

The first chapter presents a brief Introduction of the problem, Need and significance of the study, Statement of the problem, Definition of key terms, variables for the study , Objectives of the study, Hypotheses of the study, Methodology, Scope and limitation of the study.

Chapter 11

The second chapter gives a theoretical overview of Techno Pedagogical Attitude and Digital Literacy and a summary of related studies.

Chapter 111

The third chapter describes methodology of the study in detail with description of variables, objectives, hypotheses, tools employed for data collection, sample selected for the study, data collection procedure and statistical technique used for the analysis.

Chapter IV

The fourth chapter includes the details of the analysis of data as per the objectives of the study.

Chapter V

Chapter five contains the description regarding the major findings, conclusion, educational implications and suggestions for further research.

REVIEW OF RELATED LITERATURE

- *Theoretical overview of Techno Pedagogical Attitude*
- *Studies on Techno pedagogical Attitude*
- *Theoretical overview of Digital Literacy*
- *Studies on Digital Literacy*
- *Conclusion*

REVIEW OF RELATED LITERATURE

" Since effective research is based on the past knowledge, review of related literature helps to eliminate the duplication of what has been done and provide useful hypothesis and helpful suggestions for signified investigation"(Best & Khan,1995). Review of literature provide necessary knowledge and insight into investigator on what to start, where to start and how to start. So the realistic investigator devoted maximum time for studying the related studies and searching out the ways to explore his project. This step tell the investigator how much work has been done in a particular field, which method are used to collect and analyse data, what have been their finding suggested solutions and recommendations.

The review of literature pertaining to the study entitled as "TECHNO PEDAGOGICAL ATTITUDE OF SECONDARY SCHOOL TEACHERS OF KERALA IN RELATION TO THEIR DIGITAL LITERACY" is presented under following heads:

- Theoretical overview of Techno Pedagogical Attitude
- Studies on Techno Pedagogical Attitude
- Theoretical overview of Digital Literacy
- Studies on Digital Literacy
- Conclusion

Theoretical Overview of Techno Pedagogical Attitude

As teacher educators know, teaching is a complicated practice that requires an interweaving of many kinds of specialised knowledge. In this way teaching is an example of an ill-structured discipline, requiring teachers to apply complex knowledge structures across different cases and contexts. Teachers practice their craft in highly complex, dynamic classroom contexts that require them to constantly shift and evolve their understanding. Thus effective teaching depends on flexible access to rich, well organised and integrated knowledge from different domains including knowledge of students thinking and learning; knowledge of subject matter and increasing knowledge of technology.

At the heart of good teaching requires three core components: content, pedagogy and technology plus relationship between them. The interaction between and among the three components playing out differently across diverse context account for the wide variation in the extent and quality of educational technology integration. These three knowledge basics (content, pedagogy and technology) are the core of Technological Pedagogical and Content Knowledge (TPACK) framework. An over view of the frame work is provided in the following section, through more detail description maybe found (Mishra and Koehler,2006).This perspective is consistent with that of other researchers and approaches that have attempted to extend Schulman's Pedagogical Content Knowledge(PCK) 1987 construct to include educational technology.

Technological Pedagogical and Content Knowledge (TPACK) was introduced to the educational research field as a theoretical framework for

understanding teacher knowledge required for effective technology integration. The TPACK framework built on Schulman's (1986, 1987) descriptions of PCK to explain how teachers understanding of the education technologies and PCK interact with one another to produce effective teaching with technology. The conception of TPACK described have has developed overtime and through a series of publications with most complete descriptions of the framework found in Mishra and Koehler (2006) and Koehler and Mishra (2008).In this model there are three main components of teachers knowledge .The pictorial representation of TPACK is shown in Figure 1.

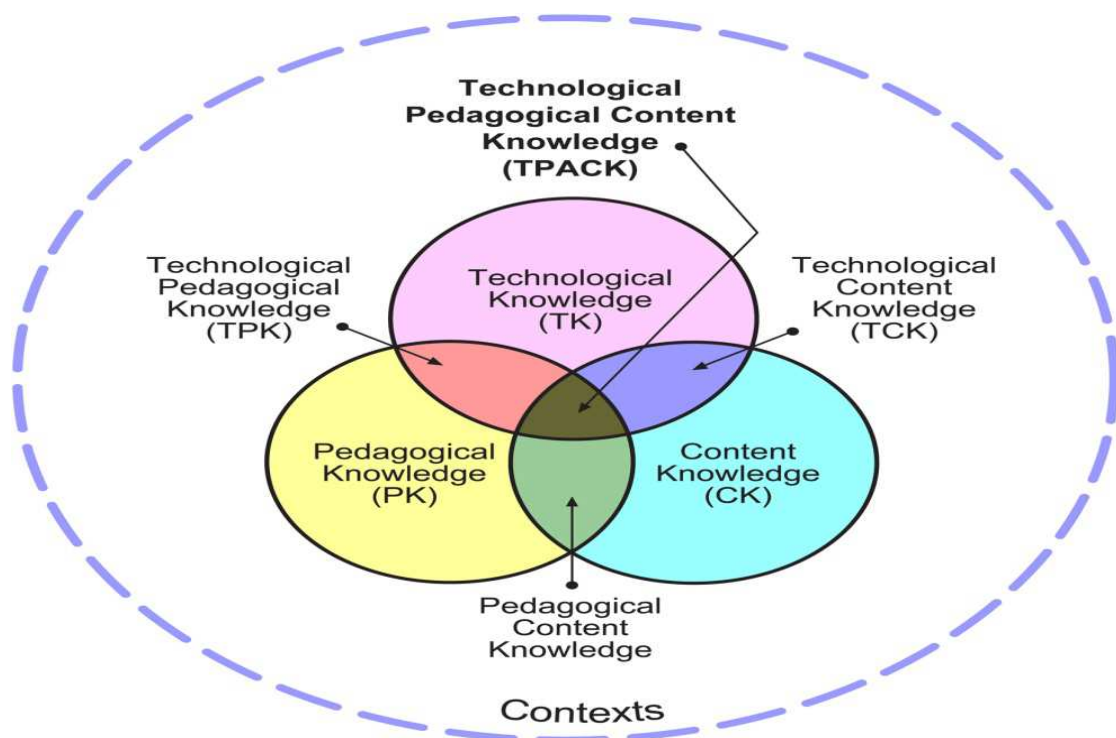


Figure 1. TPACK

At the intersection of these three knowledge types is an intuitive understanding of teaching content with appropriate pedagogical methods and technologies. Seven components are included in TPACK framework. They are defined as:

Technological knowledge (TK)

Technological knowledge refers to the knowledge about various technologies, ranging from low-technologies such as pencil and paper to digital technologies such as internet, digital video, interactive white boards and software programmes.

Content Knowledge (CK)

Content knowledge is the knowledge about actual subject matter that is to be learned or taught (Mishra & Koehler, 2006, p.1026). Teachers must know about content they are going to teach and how nature of knowledge is different for various content areas.

Pedagogical Knowledge (PK)

Pedagogical knowledge refers to the methods and process of teaching and includes knowledge in classroom management, assessment, lesson plan development and student learning.

Pedagogical Content Knowledge (PCK)

Pedagogical content knowledge refers to the content knowledge that deals with the teachers process (Schulman,1986).pedagogical content knowledge is

different for various content areas and it blends both content and pedagogy with the goal being to develop better teaching practices in the content areas.

Technological Content Knowledge (TCK)

Technological content knowledge refers to the knowledge of how technology can create new representations for specific content. It suggests that teachers understand that, by using a specific technology they can change the way learners practice and understand concepts in a specific content area.

Technological Pedagogical Knowledge (TPK)

Technological Pedagogical Knowledge refers to the knowledge of how various technologies can be used in teaching and to understanding that using technology may be the way teachers teach.

Technological Pedagogical and Content Knowledge (TPACK)

TPACK refers to the knowledge required by teachers for integrating technology into their teaching in any content area. Teachers have an intuitive understanding of the complex interplay between three basic components of knowledge (CK, PK, TK) by teaching content using appropriate pedagogical methods and technologies.

Attitude of teachers towards using new technology

Technology was perceived by most teachers as a tool that may have some potential in terms of enhancing or simplifying a task but not all saw it as a useful or necessary tool in their particular teaching context. Some did feel it could provide a

supportive role in the class room but definitely did not replace the teacher. Those who use technology did so for a variety of reasons including motivating students, providing additional sources of information and adding variety to their teaching.

Those who did not use technology cited a lack of knowledge as the primary reason. More specifically many teachers did not know how using technology could relate to teaching. Other suggested a lack of access or lack of confidence as reasons for avoiding technology use. It is also important to note that lack of proper professional development and administrative support are important factors influencing the teacher's decision to use technology. People's reaction and response towards certain things largely depend on how they perceive them in this context. Some teachers believe that using technology in teaching is necessary, they will therefore be more likely to have a positive attitude towards implementation of using new technology in teaching. Therefore attitude towards new technology is a predisposition to respond to using new technology in teaching in a generally favourable or unfavourable way.

Studies on Techno Pedagogical Attitude

Aviram and Anaron (2000) conducted a study to realise the effect of using computers in class room to mindfully radical adaptation by educational system to emerging cyber culture. The study mainly discusses about why there is so little outcome from large investments in IT on education and what must happen in order for educational systems to successfully adopt to IT revolution. The author suggests that a radical breaking of organizational structure of school preventing true

adaptations accompanied by a well formed strategy based on a clear understanding of the new emerging culture, explicit values and educational aims.

Balasubramaniam (2001) conducted a study to understand relative Effectiveness among different modes of Computer Based Instruction. An attempt was made in this study to establish the relative effectiveness among tutorial, drill & practice and simulation on different modes of computer based instruction in realising. Instructional objectives as well as enhancing retention of what has been already learn in the context of teaching modern physics at higher secondary stage. Pre-test, post test and non-equivalent group design was developed in conducting experiment. Accordingly three groups were each with 35 students, studying at Standard XI in three different higher secondary schools. The effectiveness of CAI in realising instructional objectives as an individualised instructional strategy and also support system to the teaching class room instruction has been established.

Malik (2002) conducted a study to analyse computers and schools shifting perceptions and changing models. This paper focus on changes in the role of computers and teachers in the teaching leaning process. Author emphasised that school computing gained momentum with project Computer Literacy and Studies in Schools (CLASS) and National Curriculum Framework for School Education-2000(NCFSE-2000) which discuss about integration of ICT in schools. With regard to this NCERT (2001) brought out curriculum guide and syllabus for information technology in schools within the general frame work of education. It promote new technological view and perceptions regarding IT enabled teaching.

Singh (2003) emphasised on future Classroom. The author says that the future class room will make use of the revolution in communication and utilise the computer in the process of instruction. The real world outside the class room seems to have been totally transformed under the impact of 20th and 21st century science and technology. It appears educated institutions in India adopting small scale educational technology, while the world outside has come under the impact of global and terrestrial technology.

Kukreti and Saxena (2004) examined information technology in teacher training programmes and its need and significance. Investigators describes that single largest factor affecting the use of IT in the lack of trained persons and resistance among the teachers using it. Through this article some of the suggestions given to promote ICT in education are: integrate ICT in all teacher training programmes, organise in-service orientation program and refresher courses, organize special in-service programme in summer vacation and organize collaboration programmes between teacher training institution and technical institutions.

Joy and Shaju (2005) conducted a study to understand effectiveness of Computer Assisted teaching material in history at higher secondary school level with an objective to test the effectiveness of CAI and lecture method in teaching history. A sample of 162 students of 11th standard from 3 higher secondary schools of Trivandrum district were randomly selected. Tools for the study included the development of CAI on the topic UNO in history lesson and achievement test in history. Comparison of post test scores shows that computer assisted teaching group came superior over lecture method taught group.

Nazhath (2006) conducted a study to analyse utilization of information technology in colleges affiliated to university of Calicut. For this study 200 teacher educators drawn from different training institutions affiliated to university of Calicut. Questionnaire was used as a tool. By using percentage analysis found that utilization of internet and computer is high in male teachers than female teachers and high usages of computers are seen in rural area teachers. Study revealed that lack of infrastructure facilities, lack of time, lack of networks and lack of expertise are the difficulties faced by teacher education institutions affiliated to university of Calicut.

Kumar (2007) attempted to compare the effectiveness of Three Instructional Systems for teaching IT to Secondary School Students. For the purpose of study 120 students were randomly selected from three CBSE affiliated schools. The study mentioned three instructional systems ie, Conventional Instructional System(CIS),Audio-Video Instructional System(AVIS) and Multimedia Instructional System(MIS).They are assigned three groups on the basis of their intelligence test, three groups were taught by using three different methods. Intelligence test, achievement test and animation lesson are the tools was used. ANOVA, t-test and factorial design was the statistical techniques. Findings revealed that MIS is the best method followed by AVIS and CIS for taking IT in secondary schools.

Mohammed and Harvey (2008) conducted a study to understand effects of Technology in Class room. In this study they used teacher-technology environment interaction model to explore the issue of the stress experienced by teachers whilst

using technology in the class room. The study focused on identification of causes, symptoms and coping strategies associated with techno stress in the class room.

Rastogi and Parashar (2009) conducted a study to understand effectiveness of E-content in Learning Concept and Teaching skills. In this study investigator tried on student teacher's in an experimental situation. It revealed that e-learning environment makes the students retro-active, participating in the learning process, as opposed to being passive in the traditional teaching environment and makes this perception about learning positive and encouraging. The e-content proved effective in enhancing their level of achievement and their proficiency in teaching skills.

Potchelve (2010) analysed the way of inculcating Technological know-how and integrating ICT in curriculum in the teaching-learning process. This paper discuss the utilization of ICT within teaching training programmes around the world approached in a number of different ways with varying degree of success. In order to make teacher and teacher educators aware of the technological advancement, ICT is introduced in primary teacher training course and secondary teacher training course at various levels as a compulsory subject. This paper also attempt to find at best instructional approach out of the three ie, ICT skills development approach and pedagogy approach ,subject-specific approach and practice driven approach for inculcating technological know-how and integrating ICT in curriculum in teaching learning process. For this paper 150 students from three teacher training institutes two B.Ed colleges in and around Coimbatore city were selected .They were allotted to three groups on the basis of their scores an intelligence test. After attaining raw

scores and applying different statistical techniques, it was found that practice driven approach is the best approach for taking IT.

Nair (2011) examined the integration of ICT with pedagogy on reflective practices based on E-portfolio or Digital portfolio frame work. In this study investigator describes that teaching is becoming one of the most challenging profession in our society where knowledge is expanding rapidly and modern technologies are demanding teachers to learn how to use these technologies in their teaching. ICT can provide flexible and effective ways for professional development of teachers. One of the most important ways through which ICT can be integrated with teacher education is through use of of e-portfolio.

Kaur and Yadav (2011) conducted a study to understand effectiveness of Digital board assisted Instruction over Traditional method on Students' achievement in Social sciences of class IX. In the present study an attempt has been made to study the effectiveness of Digital Board Assisted Instruction over traditional method in teaching of social science on students' achievement at secondary school level. Lottery method was used to select the samples. The sample of study consisted of 84 students of ninth class drawn from two English medium schools of Sirsa district having digital boards' facilities. Data was analysed using 't' test. The result shows that teaching through digital board can be better method of imparting and transmitting knowledge as compared to the traditional method of teaching.

Verma (2011) analysed use of communication technologies by male and female teachers of professional courses. Through this study investigator describes that communication technologies are used more by female teachers of professional

courses than male teachers. Regarding the use of computer, internet, L.C.D, ETV facilities, slide projector, audio and video conferencing facilities and CD-ROM; the numbers of male and female teachers of professional courses are almost same.

Sharma (2012) emphasised on enabling Effective On-line Pedagogy for Education. This article dwells upon the detailed system of on-line pedagogy and their effective use satisfactorily amongst teachers-students and others who ever is involved in effective teaching-learning on-line process.

Saxena and Behari (2013) conducted a study to describe educational change and teachers' pedagogical content knowledge (PCK)-Integration for professional development. Investigator try to focus on one of the variables in teacher education has been, pedagogical content knowledge (PCK).The underlying content of the present paper is whether PCK as a construct can in any way prepare our teachers to adopt and deal with educational change prevailing within their context. For this purpose the study was carried out with a sample of in-service teachers so as to know about present notions of educational change amongst our teachers. It shows that PCK of teachers became lesser in now era.

Mohalik (2013) analysed pedagogical content knowledge and class room teaching of mathematics teachers at the secondary level. The present study was focus on to compare the pedagogical content knowledge and class room teaching of mathematics teachers in relation to sex, qualification and experience and to find out relationship between pedagogical content knowledge and class room teaching .The investigator adopted descriptive method. The tools consist of self adopted test on pedagogical content knowledge of mathematics and observational schedule for

assessing class room teaching of mathematics teachers. The study found that there is no significant difference in PCK and class room teaching of male and female mathematics teachers and there is a significant difference in qualification and experience. PCK and classroom teaching of mathematics teachers are positively related.

Pathania, Surana and Sharma (2013) focused on attitude of senior secondary school teachers towards using new technology in teaching. The present study is a descriptive one conducted on 120 senior secondary school teachers working in government and private schools of Chamba district of Himachal Pradesh. The main objective of the present research is to compare the attitude of government and private senior secondary school teachers towards using new technology. Simple random sampling technique has been used by investigator for the selection of sample and for analysis and interpretation of data, mean, SD, and t-test technique have been applied. The result shows that government and private male senior secondary school teachers do not have same attitude towards using new technology while female senior secondary school teachers have same attitude.

Kaur (2013) conducted a study on attitude and practice of B.Ed trainees towards ICT in Teaching. The present study aims to find out attitude and practice of ICT in teacher education. A sample comprised of 159 B.Ed trainees of Panipat district. Data regarding to study was collected through simple random sampling technique by using survey method. Statistical techniques like mean, SD and t-test were used. Findings revealed that there is no significant difference for student in attitude and practice of use of ICT based on gender and location of school.

Sahu and Pradhan (2014) analyse the way of use of ICT in the teaching-learning process in Secondary and Senior secondary schools. In order to find out the use of ICT in the teaching-learning process in secondary and senior secondary schools of Sangrur district of Punjab. This study was carried out in 15 practice teaching schools of a teacher training college. The data was collected through self made check list and questionnaire .Result of this study indicated that all schools have basic infrastructural facility required for the use of ICT in teaching-learning process. In 88 percentage schools, 80 percentage teachers viewed that ICT has a positive impact on creating interest among students and providing various learning experiences in teaching learning process.

Gunwal (2014) conducted a study to understand attitude of school teachers towards use of ICT in teaching. The article reports on attitude of school teachers towards use of ICT in teaching which is the new and latest concept in teaching. A sample of being comprised of 100 teachers of Gurgaon district of various schools. Data has been collected by simple random sampling technique through questionnaire of normative survey method. The results indicate that there is no significant difference in attitude of teachers (both male and female) of use of ICT in teaching process.

Joshith and Renjith (2015) focused on cognitive Style in relation to Pedagogical Content Knowledge among Secondary school teachers. The aim of the study is to find out effectiveness and adjustment among secondary school teachers with regard to gender, type of school, locale of school, discipline, marital status and experience in teaching profession. The study was carried out on a sample of 300

secondary school teachers. The result revealed that majority of the secondary school teachers showed a moderate level of cognitive style and pedagogical content knowledge.

Ajeyalemi, Okafor and Yewande (2015) conducted a study on influence of mentorship-workshop on young female chemistry teachers' for professional development and Pedagogical Knowledge. Three research questions guided the study with a sample of 298 female chemistry teachers in Lagos state. It was a survey method and Intern Professional Support (IPS) and Focus Group Discussions (FGD) were used in data collection. Data were analysed using percentage, mean, SD and correlation co-efficient. The result shows that significant influence of mentorship on intern demographic variable of marital status and age such that 16.1 percentage of single female below to years had tremendous improvement on only pedagogical knowledge with 10.7 percentage.

Kumar (2015) conducted a study to understand influence of Technological Pedagogical Content Knowledge (TPACK) and utilization of web technology on technology anxiety of student teachers of colleges of teacher education affiliated to University of Calicut. The main objective of the study is to find out level of Technological Pedagogical Content Knowledge (TPACK) and utilization of web technology on technology anxiety of student teachers of colleges of teacher education affiliated to University of Calicut. A sample of 620 student teachers selected by using stratified random sampling method. Technological Pedagogical Content Knowledge Inventory, questionnaire on utilization of web technology and technology anxiety scale were used as tool. Statistical technique used for the study

are preliminary analysis, percentage analysis Karl Pearson's product moment coefficient of correlation scheffe's test of multiple comparison test of significant difference between mean of large independent sample and two way analysis of variance. The study revealed that there is a satisfactory level of Technological Pedagogical Content Knowledge (TPACK) and utilization of web technology among student teachers of colleges of teacher education affiliated to University of Calicut.

Noufina (2015) conducted a study on techno- Pedagogical awareness of Teacher educators of kannur district. Main objective of the study to find out Techno- Pedagogical awareness of Teacher educators in class room teaching. Questionnaire was used to collect data from teacher educators about their familiarity in using technological devices and other e- facilities. Check list was used to collect data about ICT facilities available in each institution. Percentage analysis and critical ratio was done. The result indicate that all teacher educators agree that ICT can improve quality of teaching .so authorities should take appropriate steps for equipping the teacher educators with adequate techno pedagogical competency.

Sujatha and Gowri(2016) focused on teaching strategies for the Digi-generation. In this study investigator conclude that education today must include technology strategy for classroom and school wide learning environment as technology provides the means for keeping students engaged ,fosters appositve learning environment and provide more personal attention besides improving class room management and mitigating digital divide.

Thomas and Verghis (2017) emphasised on techno Pedagogy and Knowledge Management on the basis of Web 2.0 for education and knowledge management. The main aim of the article is to introduce some of the most useful web2.0 tools for teaching English as a foreign language determined after a rigorous selection based on practical experiment and experience. Such an approach is useful for language teachers to be knowledgeable about possible uses of web2.0 tools to enrich their teaching environment.

Surana and Sharma (2017) conducted a study to understand interactive White Board enhancing classroom instruction and learning. The present study investigator describes new interactive technology of Interactive Whiteboard (IWB) in the class room bring lot of opportunities for teaching. Compared with other information technology tools, the uniqueness and 'boon' of IWB technology lies in the possibility for an intersection between technological and pedagogical interactivity. Teacher must understand nature of interactive teaching and decide which kind of pedagogical strategies and teaching methods and design to adopt in teaching activities.

Jasrai, Khan, Goel and Goel (2017) focused on Techno-Pedagogic Skills Interwoven in a Film 'Safar Ghar Se School Tak'. The present study has made an attempt to techno-pedagogically analyse a film- 'Safar Ghar Se School Tak' for parents and teachers for facilitating first transition of a child from home to pre-school. The techno-pedagogic analysis of the film has been done in terms of various techno-pedagogic elements such as medium is message, temporal and spatial contiguity of various message forms, message credibility and media fidelity,

technological feasibility and technological fidelity, pedagogic suitability ,aspect ratio of picture and text, self contained status and speed of delivery of film, content and quality of film in terms of various elements such as audio,video,frames and communication elements.

Theoretical Overview of Digital Literacy

The invention of the future has been a relentless and continuous work of man from time immemorial. The union of education with technology of future has been celebrated as a great leap in the Indian educational scenario. It is high time that India's educational approach is re directed. Digital India is a project launched by the government that has big dreams in this direction. Some commendable changes being made in the past but high tech educational system being accessible to each and every citizen in India seemed to be far from reality. IT@school is a project for integration of IT in education introduced by govt. of Kerala in 2002-2003 academic years.

Traditional education focuses on teaching, not learning. It incorrectly assumes that for every ounce of teaching there is an ounce of learning by those who are taught .Information and communication technologies have recently gained grounds well of interest. It is a significant research area for many scholars' around the globe. Their nature has highly changed the face of education over the last few decades. Now the question arises that ICT is only for the learner or it has equal value for the teacher also. Investigator found that it is the tool for teacher first. Now, before moving towards teaching with ICT, teachers must learn. Software, Hardware, Memory devices, Programming, Network and Internet awareness are essential components in assessing digital literacy of teachers.

At present, digital divide is a big challenge for using ICT equally well in all aspects. Because of the high technology, the adoptability of the older teachers is a tough task and the most of the time they avoid to use such technology. Digital divide describe the inequality or disparity between people who have access knowledge, skills, ability and resources to use new information and communication tools such as internet and other computer facilities and people who do not have them. Therefore it must for the teachers to get acquaintance with application of recent technological principles and gadgets in their teaching.

Studies on Digital Literacy

Kalia, Levine and Vij (2000) conducted a study on computer self confidence and computer experience in relation to computer related attitudes and commitments to learning. The main objective of the study is to identify computer self confidence and computer related attitude among students. A sample of 50 subjects (male &female) who were receiving training in computer applications at NIIT computer centre, Rohtak(Haryana) were selected as sample for the present study. Questionnaire was used for collection of data. Study found out that there exist inter correlation among computer confidence, computer related attitudes and computer experience .

Ravichandran and Sasikala (2001) described computer Based Advanced Technologies in Education on the basis of Developments, Challenges and Opportunities. It concentrate on the need and challenges occurring due to the development in computer based technology in an education system. The introduction of interactive video, online discussions has improved and developed

student creative thinking, analytical skills, collaborative approaches and integrative approaches. One of the main challenges faced today are the supply of quality course wares. In future, education will be dramatically enhanced by multimedia, computer simulation etc .A global education system will give opportunity to students and faculties to join together and help to enhance effective teaching –learning process.

Azeez (2002) focused on teachers awareness of Educational Informatics .The main objective objective of the study was to find out level of awareness of educational informatics between sample of 256 higher secondary teachers. The study revealed that 67 percentage of higher secondary teachers are aware about educational informatics and also found that government teachers are more aware than private higher secondary teachers.

Moiduser , Nachimia and Tubin (2003) conducted a study to analyse schema for the study of domains and levels of pedagogical innovations in schools using ICT. It focus the systematic transformation process in school that embraced use of IT. The result found that the change resulting from technology adaptation will develop from a preliminary level of alternation to schools routine, to achieve initial assimilation of IT. It create a new technological advancements in schools.

Rajashekar (2004) conducted a study for understanding girls' achievements in computer science in the digital age. The main objective of the study is to find out significant difference in achievement in computer science based on gender, locale and type of schools. A sample of 410 plus one students were selected from higher secondary schools of Tamilnadu using cluster sampling technique. Achievement test and test of significance were used as a statistical technique. Findings revealed

that girls have relatively higher level of academic achievement than boys. There is no significant difference exist locale and type of schools in the achievement of computer science.

Biswal and Chauhan (2005) conducted a study on academic achievement of Computer Education students with respect to their age, academic stream and educational qualification. Sample selected from 60 students studying computer software course in computer education institution in vadodara city. Tools employed included periodical achievement test, teachers rating scale prepared on 14 different dimension of computer education and analysed using ANOVA. The study revealed that academic stream, educational qualification and age are not significantly associated with computer education performance.

Sherin (2006) examined the use of computers among secondary school students with the help of 600 secondary school students of CBSE school. Questionnaire was used as a tool. Percentage analysis and test of significance were the statistical technique. Findings of the study reveal that computer facility is available to very high majority of students in schools, but all are not able to in access. 90% of students opined that computer helps to understand and learn subjects easily.

Page and Thorsteinsson (2007) emphasised on technology Enhanced Learning in Design and Technology Education. Through this study investigates how new approaches analyzing and understanding new media and ICT enrich every day pedagogical practices in design and technology education. It identifies 5 learning scenarios which employ recent advances in technology and media to enhance

learning. These are student controlled learning, lecture delivered learning, use of wiki technology, dynamic information and digi design technology.

Joshi (2008) conducted a study to understand integrating ICT in M.Ed programme based on experience. The investigator describes his experience of integrating technology in the M.Ed programme at Bharnagar university based on a teach to future programme sponsored by a software company. A total of 46 students have enrolled in this programme. It contains 12 modules which included course content, evaluation scheme and scheduling. The overall effect was that the company has created positive approach towards use of computers in their teaching.

Kumar (2009) focused on E-education in the Quality Era. The investigator emphasises that society needs quality teachers in the 21st century digital age that requires digital skills like e-learning and e-literacy consisting of functional literacy, visual literacy, scientific literacy, technological literacy, information literacy, cultural literacy and global awareness.

Mishra (2010) conducted a study on preparing E-Excellent teachers for the world of E-Education and its potential strategies. This paper takes about the world of E-education and key challenges before teachers and desired competencies for becoming E-excellent teacher. After wards, it presents six innovative strategies to prepare E-excellent teachers for the world of E-education. The proposed strategies are learning e-based operations and concepts, creating e-supported learning environment, practicing e-mediated teaching, making e-enabled assessment and evaluation, supporting e-enhanced professional development and offering e-empowered learner support.

Baig (2010) conducted a critical study of effect of web based software tools in finding and sharing digital resources. The main objective of the study is to review the effect of web based tools and enlist web based tools for sharing and finding digital resources using web2.0 technologies. Open Educational Resources were used to study the effect of web2.0 tools for finding and sharing digital resources. From this study it is found that web 2.0 tools were versatile and effective because of feature like use centre, uses central & communication and making teaching learning process learner centric.

Deswal and Rani (2011) conducted a study to analyse attitude of Teacher Educators towards E-learning. In this study an attempt has been made to study the attitude of teacher educators towards e-learning. For this purpose 300 teacher educators were randomly selected and attitude towards e-learning scale was administered to them. To study the significance difference between various groups 't' test was applied. The over all result indicate that teacher educators possess highly favourable attitude towards e-learning.

Raj and Mary (2011) conducted a study on computer literacy of B.Ed trainees in Pudukkotai district. The main objective of the study is to assess computer literacy of B.Ed trainees in Pudukkotai district. Normative survey method was employed in this research. Random sampling method was adopted to collected data. The study was undertaken among 300 B.Ed trainees from six self financing institutions of Pudukkotai district. The tool was closed type of questionnaire containing 36 items. Mean, SD and t-test were statistical techniques used in the

study. The study revealed that B.Ed trainees in Pudukkottai district possess a moderate level of computer literacy.

Kacharayil (2011) focused on the functioning of IT Enabled Education programmes at secondary school level in Kozhikode district. The main aim of the present study highlights the functioning of IT enabled education programmes at secondary school level in Kerala. Survey method was used for the study. Data was collected through a questionnaire and interview. Percentage analysis was used to analyse the collected data. The study was conducted on a representative sample of 200 teachers selected randomly from 20 schools in Kozhikode district. The results revealed that information technology related infrastructural facilities of secondary schools are not sufficient as per ICT in school scheme. Teachers are not effectively utilizing available IT resources in class rooms and training programmes are not adequate for integrating IT with the subject concerned.

Sahni (2012) conducted a study to understand the knowledge of computers among prospective teachers. The purpose of the present investigation was to assess the level of knowledge of computers among prospective teachers and to study the influence of type of college, gender, attitudes towards computers and their various interactions on knowledge of computers among prospective teachers. The sample comprised 320 prospective teachers selected randomly from six B.Ed colleges affiliated to M.D.U. Rahtale. Data were analysed by adopting the criterion mean, SD, three way ANOVA and t-test. Results indicated that most of the prospective teachers got a comparatively moderate level of knowledge of computers. There is

significant independent effect of variable viz, type of college, gender and attitude towards knowledge of computers among prospective teachers.

Quinlisk(2012) focused on teaching language and culture in a Digital age. This article examines part of the complex relationship between linguistic and cultural diversity and the digital technologies that shape on social worlds. The author first discuss digital media as powerful story tellers about culture and language issues. Then author addresses the theoretical dimensions of media effects an audience. Finally presents the way in which we can challenge all students to problematic their cultural and linguistic identities by using digital media in our class rooms.

Saleem (2012) conducted a study on IT@ School project in Kozhikode district. It is mainly focused on assessment on Instructional and Infrastructural facilities in schools. The present study is to assess the instructional facilities of IT@ School project as perceived by teachers and students and also assess the infrastructural facilities. Prevailing in schools with regard to the implementation of IT @ school project. In this study survey method is used to collect data. Tools used are a questionnaire on IT instructional facilities for high school teachers and high school students also a checklist on IT infrastructural facilities. Study was conducted on representative sample of 252 high school teachers and 850 high school students. Nearly 64 percentage of the schools succeeded in the systematic planning and implementation of IT@ school project objectives in their schools. Rural school perform better in IT@ School project than urban schools and aided schools perform

better than government schools. The study reveals that effective planning and proper monitoring should be done for better improvement of this project.

Bhalla (2012) described factors affecting use of computers by school teachers in teaching-learning processes. The present study was conducted to systematically investigate various factors and corresponding relevance thereof, affecting use of computers by school teachers in teaching-learning process such as to aid effective policy and strategy formulation in this direction. In this study use of computers was studied in terms of following components: Computer Aided Learning (CAL), Computer Managed Instruction (CMI) and Computer Assisted Instruction (CAI). Factors affecting use of computers by teachers are attitude of teachers towards use of computers (cognitive, affective and behavioural domain), access to computer resources, support to teachers provided by the school, training of teachers in use of computers and competence of teachers in computer use.

Kaur and Mehdiratte (2013) analysed use and practice of Audio-Visual aids in teaching of science at high school level. The investigator used descriptive survey method for the present study. The sample of the study includes all science teachers of the 10th class of 25 schools in panipat city. For analysing data questionnaire, interview and checklist technique were used. The result on the basis of questionnaire was that schools are either sufficiently or moderately equipped with audio-visual aids. It was also observed that science teachers are facing problems in using of audio visual aids .The reason are lack of teachers training, head master cooperation and problems of technical handling and mechanical defects.

Nath and Sarabi (2013) Conducted an exploration on computer literacy among M.Ed students of Calicut university. Main objective of the study is to assess the computer literacy of M.Ed students in the total sample and identify the area of computer literacy where student teachers have higher rate of difficulties. The present study was using normative survey method conducted on a representative sample of 50 M.Ed students of Calicut University. The tool was used for this study is computer literacy assessment test. Mean, Percentage analysis, One way analysis of variance and test of significant difference between mean are statistical technique used for analysis. The findings revealed that extend of computer literacy among M.Ed students is ranging from 26 percentage to 77 percentage. An average M.Ed student has acquired 63 percentage of computer literacy in total.

Roy and Paul (2013) conducted a study on gendered digital divide in Library and Information system .This article focus on gender division in LIS profession in the perspective of ICT environment. It addressed three sets of relationships like profession and technology, profession and gender and technology and gender to evaluate women's participation in LIS profession in the current day's perspectives.

Divya (2013) emphasised on digital literacy of Higher Secondary School Teachers. The main objective of the study is to assess level and extend of digital literacy among higher secondary school teachers. The present study was using survey method and a sample selected from 300 higher secondary school teachers of Malappuram, Thrissur, Palakkad and Kozhikode district by using stratified random sampling technique. Digital literacy test was a tool used for this study. Preliminary analysis, t-test and ANOVA were used as a statistical technique. From the study it is

clear that level and extend of digital literacy among higher secondary school teachers is satisfactory.

Mehra and Far (2014) focused on university Teachers' attitude towards Information and Communication Technology. The present study was conducted on 200 university teachers of different faculties to compare their attitude towards ICT use. No major difference was found with regard to attitude towards ICT use of university teachers of different faculties viz Arts/Education and Science/Engineering and Technology.

Ananthula (2014) conducted a study to understand relationship of secondary School teachers' application and usage of computers with their computer knowledge and their attitude towards computer. The main objective of the study is to find out the relationship between computer knowledge of teachers and their application and usage of computers by the teacher. The investigator has followed normative survey method and stratified random sampling technique for the present study. A sample of 320 secondary school teachers was selected from different schools. The study found that teachers with High Computer knowledge Group (HCG) are using computers with high frequency then counter part of teachers with Average Computer Group (ACG) and Low Computer knowledge Group (LCG).

Mehra and Far (2015) emphasised on attitude towards Information and Communication Technology use among University Teachers of different faculties in relation to Computer Anxiety. The present study was conducted on 200 university teachers attitude towards ICT use belonging to different faculties and at different levels of Computer Anxiety. Two tools were used for data collection viz, scale of

attitude towards information and communication technology use and computer anxiety scale. The main findings of the study were there was no difference between attitude towards ICT use among University Teachers of different faculties. Teachers with low, moderate and high computer anxiety exhibited difference in their attitude towards ICT use.

Sharma (2015) conducted a study on collaborative platform for in-service teachers based on Open Educational Resources. This study is an attempt to understand the process of using OER by teachers, identify the various problems they encounter and provide some possible solutions to these problems. It explores upon the possibilities of OER as a tool for collaborative learning in teacher education. The study was conducted in a participatory action research mode. The study built up around OER which has collaboratively developed by the researchers and a sample of school teachers. An online interactive platform was created among this group using wiki site. The major findings provide insight to the processes that could help in promoting Continuing Professional Development (CPD) in teacher education with the help of OER.

Parmar (2015) focused on Post Basic School Teachers' attitude towards ICT in the context of their sex, age and Educational Qualification. This research is conducted on post basic schools teacher of Gujarat state. The research has been done by survey method. In this research researcher has found out attitude of post basic school teachers towards ICT. The present research finding is only significant difference way found in the mean of scores obtained at ASTITT scale by teachers of

PB school having age more than 40 years and less than 40 years. This shows that age is the variable affecting the ICT attitude.

Nayak (2015) conducted a study to analyse attitude of secondary school teachers of Mayurbhanj district of Odisha towards ICT. Descriptive method using survey as a technique was employed in this study. A sample of 60 secondary school teachers was randomly selected with equal number of male and female and science and arts teachers from 15 number of secondary level government schools of Odisha district. Mean, SD, and 't' test were used to analyse data. The study revealed that most of the secondary level teachers bear strong positive attitude towards ICT and attitude of male and female and science and arts teachers towards ICT uses do not differ significantly.

Bhatt (2015) conducted a study on effect of Information and Communication Skills development program on technology integration beliefs of prospective teachers. The main purpose of the study was to investigate the effect of Information and Communication Skills development program on technology integration beliefs of prospective teachers. Participant were 102 perspective teachers who responded to pre-test and post-test scales which taking on ICT skills development program. The results revealed that effectiveness of ICT skill development programme is not only improving beliefs but also teaching integration in class rooms.

Ganasoundari (2015) focused on ICT usage and teacher effectiveness of the teacher educators in relation to their qualification and working in government and private institutions. The main objective of the study is to find out any significant

difference in usage of IT among teacher educators based on their qualification and based on government and private institutions. The study was conducted with sample of 300 teacher educators in Chennai metropolitan city for data collection. It was conducted through normative survey method. Teacher effectiveness tool was used in the study. The result of the study revealed that there is no significant difference in usage of ICT among teacher educators based on qualification and working in government and private.

Gupta and Sharma (2016) conducted a study to understand satisfaction in use of digital information resources services among students of IIT Madras. Present study aim to provide an over view about user's awareness, importance, purpose and satisfaction of using digital information resources services among students of IIT Madras central library. The study shows that majority of respondents' visits the library. 64 percentage of respondents prefer to use print as well as digital information resources and services.

Iqbal (2016) focused on guidelines for in-service training program for need-based integration of ICT in schools. For the purpose of quality education in primary schools, municipal corporation of Delhi had initiated 'sharda' project for computer aided learning programme(CALP). Besides in order to empower primary teacher of MCD schools with ICT skills, MCD initiated 'Shiksha' project in collaboration with micro soft corporation (India)Ltd under its programme named 'partners in learning'. A 12 days In- service training programme on ICT and its six science teachers centre under the ICT trainees of micro soft corporation (India)Ltd (CALP-MCD,2006) was

organized under this programme. Investigator studied the extend of training in ICT and availability of ICT to the teachers in MCD school.

Ettaniyil and Nair (2016) focused on information Literacy skills of secondary level teacher trainees. Present study aim to find out Information Literacy skills of secondary level teacher trainees. Sample used for the study was 400 secondary teacher trainees of kottayam district. The study reveals that most of the secondary level teacher trainees of the sample population possess average information literacy skills.

Bansode and Viswe (2016) analysed ICT Litercy of library professionals working in Jayakar Library, Savithribhai Phule Pune University, Pune . Purpose of the study is to find out ICT Literacy of library professionals working in Jayakar Library, Savithribhai Phule Pune University. A structured questionnaire based survey was conducted to analyse ICT literacy among library professionals working in Jayakar Library. The paper suggest that ICT literacy among library professionals working in Jayakar Library is satisfied but still many library professionals' need training and orientation in ICT based resources, services and tools.

Ahmad and Muneebulla (2017) conducted a study to describe approach of B.Ed students towards use of ICT and web resources. The present study carried out colleges of education of Bandipora district, Jammu and Kashmir with the objective of assessing the pattern of computer and internet use among B.Ed students of teacher training college,Bandipora district. An attempt has been made to determine awareness of computer and use of different electronic information resources by B.Ed student in the colleges under study. It was observed that use of computer and digital

resources of information is not sufficient as most of the students are not trained enough for the use of such resources in the colleges of education in Jammu and Kashmir.

Conclusion

The review of related studies enabled the investigator to gather extensive information and gave wide perception on the present problem. For the above literature review, it is evident that studies on Techno Pedagogical Attitude and Digital Literacy have wide scope for further research. Most of the studies related to techno-pedagogical attitude are carried out among teacher educators. Some studies are tried to focus on attitude of teachers towards E-learning, ICT awareness, IT enabled education, Open Educational Resources and confidence of using computers in class room. Most of the studies related to digital literacy is concentrated on prospective teachers, library professionals and students. The investigator realised that no one had dealt to study on Techno Pedagogical Attitude of secondary school teachers of Kerala in relation to their Digital Literacy. Hence the investigator feels that it is worthwhile to undertake study.

METHODOLOGY

- *Variables of the study*
- *Objectives of the study*
- *Hypotheses of the study*
- *Tools used for data collection*
- *Sample selected for the study*
- *Data collection procedure*
- *Scoring and consolidation of data*
- *Statistical techniques used for analysis of data*

METHODOLOGY

Research is the systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions. The success of any research work depends upon the suitability of the method and also on the techniques used for the collection of data. It helps the researcher to carryout work in scientific and valid manner.

The present study entitled “Techno pedagogical attitude of secondary school teachers of Kerala in relation to their Digital Literacy” mainly attempts to find out the relationship between Techno Pedagogical Attitude and Digital Literacy of secondary school teachers in Kerala.

This chapter contains a description of methodology adopted by the investigator, which is presented under the following headings.

- Variables of the study
- Objectives of the study
- Hypotheses of the study
- Tools used for data collection
- Sample selected for the study
- Data collection procedure
- Scoring and consolidation of data
- Statistical techniques used for analysis of data

The details of each of above is given below

Variables of the Study

As the intention of the study is to find out the level of Techno Pedagogical attitude and Digital Literacy of secondary school teachers in Kerala . Variables of the present study are Digital Literacy and Techno Pedagogical Attitude.

Objectives of the Study

The objectives set forth for the study are the following:

- To find out the level of Techno Pedagogical Attitude of secondary school teachers in Kerala.
- To find out the level of Digital Literacy of secondary school teachers in Kerala.
- To test whether there exist any significant difference in the level of Techno Pedagogical Attitude of secondary school teachers based on :
 - a. Gender
 - b. Locale of the schools
 - c. Type of management of schools
- To test whether there exist any significant difference in the level of Digital Literacy of secondary school teachers based on :
 - a. Gender
 - b. Locale of the schools
 - c. Type of management of schools

- To test whether there exist any significant relationship between Techno Pedagogical Attitude of secondary school teachers and their Digital Literacy.

Hypotheses of the Study

The hypotheses formulated for the study is following.

- There will be significant difference in the mean scores of Techno Pedagogical Attitude among secondary school teachers on the basis of:
 - a. Gender
 - b. Locale of the schools
 - c. Type of management of schools
- There will be significant difference in the mean scores of Digital Literacy among secondary school teachers on the basis of:
 - a. Gender
 - b. Locale of the schools
 - c. Type of management of schools
- There will be significant relationship between Techno Pedagogical Attitude of secondary school teachers and their Digital Literacy.

Tools Used for Data Collection

The sources of research depend on the availability of relevant data. So the investigation needs certain methods and instruments to gather necessary information.

The investigator employed following tools for collecting data.

1. Techno Pedagogical Attitude Scale (Sareef & Baby,2017)
2. Digital Literacy Test (Sareef & Baby, 2017)

To measure Techno Pedagogical Attitude a comprehensive scale was constructed and standardized by the investigator with the help of her supervising teacher and variable Digital Literacy was a test developed by the investigator with the help of her supervising teacher. Techno pedagogical attitude scale consists of 42 items and Digital Literacy Test consists of 40 items.

Techno Pedagogical Attitude Scale

For the present study, the investigator assessed Techno Pedagogical Attitude of secondary school teachers using the scale for Techno Pedagogical Attitude constructed by the investigator herself with the help of supervising teacher. The procedure undertaken for the construction and standardization of scale of Techno Pedagogical Attitude is described in the following sections.

Planning of the scale

After a thorough analysis of the available literature, the investigator prepared items for the scale in collaboration with supervising teacher based on four components of techno pedagogical attitude; the investigator utilized different sources of information for preparing appropriate items.

The investigator prepared an initial tool consisting of 60 items on the basis of four components . Out of these 38 items were positive statements and 22 items were

negative statements. The items were so framed that 3 responses such as Agree, Undecided and Disagree are possible for the statements of each item. Components of techno pedagogical attitude included in the scale are mentioned with appropriate examples in the following section.

- i. **Technology:** Technology is the application of scientific knowledge for practical purposes.

Example of the item

- Technology poorly affects my reading habits

- ii. **Pedagogy** : It is the method and practice of teaching especially as an academic subject or theoretical concept.

Example of the item

- I take feedback on my teaching and try to modify accordingly.

- iii. **Techno pedagogy:** techno pedagogy is the electronically mediated courses that integrate sound pedagogic principles of teaching /learning with the use of technology.

Example of the item

- ICT enabled classroom makes me confident.

- iv. **Technological Pedagogical and Content Knowledge (TPACK):** It is a framework to understand and describe the kinds of knowledge needed by a teacher for effective pedagogical practice in a technology enhanced learning environment.

Example of the item

- Even though I can identify teaching method suitable to the content I find it difficult in choosing apt technology.

Components wise distribution of items in the techno pedagogical attitude scale is shown in table 1.

Table 1

Components wise distribution of items in the Techno Pedagogical Attitude scale

| Sl. No | Components | Items | Total |
|--------|---|--|-------|
| 1 | Technology | 1,5,9,13,24,27,28,29,30, 34,36,46,53,56,57 | 15 |
| 2 | Pedagogy | 2,6,10,14,17,22,31,37,41, 42,43,50 | 12 |
| 3 | Techno pedagogy | 3,7,11,15,18,20,21,25,26, 32,35,38,39,40,44,45,47,51,52, 54,58,59,60 | 23 |
| 4 | Technological pedagogical and content knowledge (TPACK) | 4,8,12,16,19,23,33,48,49,55 | 10 |

The draft copy of Techno Pedagogical Attitude scale (English and Malayalam version) is given in Appendix III and IV.

Preparation of the scale

The tool Techno Pedagogical Attitude scale was prepared for measuring the Techno Pedagogical Attitude among secondary school teachers. This is Three point Likert type scale.

The draft scale consisted of 60 items of which 38 are positive and 22 are negative was prepared by the investigator. The items are so framed that, a subject has to respond to each of the statements by choosing any one of the 3 responses viz, Agree, Undecided and Disagree. Each statement of the scale has three possible responses viz Agree(A),Undecided(U) and Disagree(D).For positive items ,the scores 3,2,1 were given for the responses 'A', 'U' and 'D' respectively. For negative responses 1, 2, 3 were given for the responses 'A', 'U' and 'D' respectively.

Tryout

The purpose of the tryout of the scale is to select the item for final scale by empirically testing the item characteristic.Try out of the draft scale was done in order to select valid items in the final scale by testing t- value of each item in the draft. The scale was administered on the sample of 360 secondary school teachers selected using stratified random sampling technique giving due to the representation of gender (male, female), locale of the schools (urban, rural) and type of management of schools (government and aided).Response sheets were scored according to the scoring procedure.

Item Analysis

Item Analysis was done in order to select items that are acceptable. The following stages were involved in Item Analysis.

For determining the highest 27 percent and lowest 27 percent of the sample 100 response sheets obtained after preliminary test were scored and the total score for each sheet was noticed. The scripts were arranged in the descending order of the

total score and highest 27 percent and the lowest 27 percent with respect to the total score were separated.

As the total number is 100, its 27 percent is 27 and hence topmost and lowest 27 scripts.

The average of score obtained for each items by the upper group as well as lower group were calculated separately. The critical ratio calculated using the formula:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

Where:

\bar{X}_1 = mean of sample 1

\bar{X}_2 = mean of sample 2

N_1 = number of subjects in sample 1

N_2 = number of subjects in sample 2

σ_1 = Standard Deviation of sample 1

σ_2 = Standard Deviation of sample 2.

Items with t – value greater than 1.96, cut off value for significance at 0.05 level, were selected for the final scale.

The critical ratios ('t' value) obtained for each item together with means and standard deviations of the scores are given in table 2.

Table 2

The critical ratios ('t' value) obtained for items

| Slno. | X1 | X2 | σ_1 | σ_2 | t-value |
|-------|------|------|------------|------------|---------|
| 1 | 2.48 | 1.92 | 0.89 | 0.90 | 2.54 |
| 2 | 2.3 | 1.85 | 0.78 | 0.81 | 2.25 |
| 3 | 2.70 | 2.22 | 0.60 | 0.93 | 2.4 |
| 4 | 2.91 | 2.11 | 0.60 | 0.84 | 4.70 |
| 5 | 2.11 | 2.14 | 0.64 | 0.53 | -0.21 * |
| 6 | 3 | 3 | 0 | 0 | 0 * |
| 7 | 2.88 | 2.07 | 0.32 | 0.82 | 5.78 |
| 8 | 2.96 | 2.55 | 0.19 | 0.64 | 4.1 |
| 9 | 2.14 | 1.44 | 0.81 | 0.75 | 3.5 |
| 10 | 2.92 | 2.85 | 0.26 | 0.45 | 0.7 * |
| 11 | 2.07 | 1.40 | 0.95 | 0.69 | 3.35 |
| 12 | 2.48 | 1.92 | 0.7 | 0.82 | 3.29 |
| 13 | 3 | 2.44 | 0 | 0.75 | 4 |
| 14 | 2.88 | 2.37 | 0.32 | 0.74 | 3.6 |
| 15 | 2.51 | 1.81 | 0.80 | 0.96 | 3.18 |
| 16 | 2.51 | 2.33 | 0.75 | 0.87 | 0.9 * |
| 17 | 2.62 | 2.51 | 0.56 | 0.57 | 0.78 * |
| 18 | 2.03 | 2.07 | 0.75 | 0.78 | -0.2 * |
| 19 | 2.51 | 1.85 | 0.80 | 0.86 | 3.3 |
| 20 | 2.96 | 2.62 | 0.19 | 0.62 | 3.4 |
| 21 | 2.85 | 2.48 | 0.53 | 0.80 | 2.17 |
| 22 | 2.6 | 2.1 | 0.73 | 0.87 | 2.94 |
| 23 | 2.25 | 1.55 | 0.85 | 0.75 | 3.5 |
| 24 | 2.6 | 2.4 | 0.55 | 0.63 | 1.42 * |
| 25 | 2.59 | 2.03 | 0.74 | 0.75 | 2.8 |
| 26 | 2.48 | 1.55 | 0.75 | 0.69 | 5.4 |
| 27 | 2.77 | 2.22 | 0.57 | 0.84 | 3.23 |
| 28 | 2.96 | 2.55 | 0.19 | 0.75 | 2.92 |
| 29 | 2.51 | 1.92 | 0.84 | 0.87 | 2.95 |
| 30 | 2.85 | 2 | 0.53 | 1 | 4.25 |
| 31 | 2.18 | 2.18 | 0.92 | 0.87 | 0 * |

| Slno. | X1 | X2 | σ_1 | σ_2 | t-value |
|-------|------|------|------------|------------|---------|
| 32 | 2.85 | 2.11 | 0.53 | 0.97 | 3.7 |
| 33 | 3 | 2.22 | 0 | 0.84 | 5.57 |
| 34 | 2.96 | 2.4 | 0.19 | 0.84 | 4 |
| 35 | 2.29 | 2.3 | 0.77 | 0.79 | -0.05 * |
| 36 | 2.62 | 1.70 | 0.62 | 0.77 | 5.4 |
| 37 | 2.81 | 2.33 | 0.48 | 0.83 | 3.42 |
| 38 | 2 | 2.03 | 0.91 | 0.80 | -0.03 * |
| 39 | 2.40 | 1.77 | 0.84 | 0.84 | 3.15 |
| 40 | 2.77 | 2.18 | 0.50 | 0.83 | 4.21 |
| 41 | 2 | 1.77 | 0.78 | 0.80 | 1.15 * |
| 42 | 2.74 | 2 | 0.59 | 0.80 | 4.3 |
| 43 | 2.96 | 2.92 | 0.19 | 0.26 | 0.8 * |
| 44 | 2.85 | 2.59 | 0.45 | 0.57 | 2 |
| 45 | 2.96 | 2.70 | 0.19 | 0.46 | 3.25 |
| 46 | 2.11 | 1.48 | 0.80 | 0.70 | 3.7 |
| 47 | 2.48 | 2.03 | 0.80 | 0.97 | 2.04 |
| 48 | 2.48 | 1.88 | 0.75 | 0.64 | 3.52 |
| 49 | 2.70 | 2.18 | 0.66 | 0.87 | 3.05 |
| 50 | 2.81 | 2.74 | 0.48 | 0.59 | 0.53 * |
| 51 | 2.44 | 2.22 | 0.84 | 0.80 | 0.19 * |
| 52 | 2.85 | 2.37 | 0.36 | 0.79 | 3.42 |
| 53 | 2.74 | 2.40 | 0.65 | 0.84 | 2 |
| 54 | 2.90 | 2.17 | 0.45 | 0.56 | 7.3 |
| 55 | 2.33 | 2.11 | 0.78 | 0.84 | 1.1 * |
| 56 | 2.77 | 2.81 | 0.57 | 0.39 | -0.04* |
| 57 | 2.92 | 2.85 | 0.26 | 0.36 | 1.16 * |
| 58 | 2.92 | 2.55 | 0.38 | 0.75 | 2.46 |
| 59 | 2.92 | 2.29 | 0.26 | 0.72 | 6.3 |
| 60 | 1.96 | 1.88 | 0.80 | 0.69 | 0.47 * |

*Rejected Items

Preparation of the final scale

As per the critical ratio obtained for 42 items are greater than 1.96, the required values for significance at 0.05 level those items were selected for the final scale.

The final copy of Techno Pedagogical Attitude scale (English and Malayalam version) is given in Appendix I and II and model of response sheet of Techno Pedagogical Attitude scale is given in Appendix IX

Reliability

Reliability of a test refers to its consistency; otherwise, reliability ensures degree to which a test agrees with itself. Reliability is usually expressed as coefficient, but sometimes, it is expressed as standard of measurement. According to Best (1996) "Reliability is the degree of consistency that the instrument or procedure demonstrates, whatever it is measuring it does so consistency". Hence Reliability is the overall consistency of a measure. For measuring reliability of the tool investigator followed Cronbach's Alpha. The value of Cronbach's Alpha for the items are 0.72. Hence, the tool consisting of 42 items are highly reliable.

Validity

Garret (1981)"A test is valid when the performance which it measures corresponds to some performances as otherwise independently measured or objectively defined." selection of satisfactory validation criterion and demonstration of an appropriate degree of validity are fundamental in psychological and educational testing.

The validity of the scale is ensured using face and content validity.”A Test is said to have face validity when it appears to measure whatever the author had in mind namely what the thought he was measuring.”(Garret, 1973).For this investigator consulted two experts in the field of education and psychology, discussed with principles, teachers and directors of different institution. Thus the items in the scale were prepared in the least ambiguous way. So the subjects respond to the items without difficulty and misunderstanding. Hence the investigator claimed the face validity of the scale as per the items in the scale.

Digital Literacy Test

For the present study, the investigator assessed Digital Literacy of secondary school teachers using the test for Digital Literacy constructed by the investigator herself with the help of supervising teacher. The procedure undertaken for the construction of Digital Literacy is described in the following sections.

Planning of the test

On different components of digital literacy the investigator developed the items of digital literacy test. The list was prepared in consultation with supervising teacher and after the review of related studies. The test items are formulated using IT text books for classes VIII, IX and X of Kerala syllabus, teacher’s handbook for these classes, Thozhilvartha and Thozhilvedhi supplements .All the items were multiple choice items with 4 alternative responses

The content of the test are of the area like basic hardware, software, memory devices, networking and internet and programming of computers. Components of Digital literacy included in the test are mentioned with appropriate examples in the following section.

- i. **Hardware:** In information technology, hardware is the physical aspect of computers, telecommunications and other devices. Computer hardware is the collection of physical part of computer system or what you can physically touch. This includes the computer case, monitor, keyboard and mouse.

Example of item

- Which is known as brain of computer?

a)LLU b) CPU c)RAM d) LAN

- ii. **Software:** computer software is programming code executed on a computer processor. The code can be machine –level code or code written for an operating system. It is the part of computer system that consists of data or computer instructions.

Example of item

- In GNU/LINUX which programme can be need to draw pictures?

a) Writer b) ms paint c) GIMP d) power point

- iii. **Memory devices:** A memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in computer

where data is to be processed and instructions required for processing are stored.

Example of item

- Which of the following is unit of memory storage of computer?

a) Site b) Bit c) Kbps d) Hertz (Hz)

- iv. **Networking and Internet:** A network is defined as a group of two or more computer systems linked together. Internet is a global computer network providing a variety of information and communication facilities, consisting of interconnected networks using standardized communication protocols.

Example of item

- Which one of the following is a 'Search Engine'?

a) Flash b) Internet explorer c) Google d) USB

- v. **Programming:** computer programming is the process of developing and implementing various sets of instructions to enable a computer to do a certain task. These instructions are considered computer programmes and help the computer to operate smoothly.

Example of item

- Group of instruction that directs a computer is called.....

a) Storage b) memory c) programme d) logic

Preparation of Digital Literacy Test

The test was intended to know the level of Digital Literacy of secondary school teachers. The test contains 40 objective test items to assess the level of literacy. The 40 objective type questions arranged in the way of easy, average and difficulty level. The response sheets were scored according to the scoring scheme prepared. The teachers were instructed to respond each item by putting (✓) mark under the response final suitable for them against the option is A, B, C and D. For the correct answers gave '1' marks and wrong answers gave '0' marks. Finally, for finding out and assess the Digital Literacy the investigator added the scores.

(The final copy of Digital Literacy (English and Malayalam version) is given in Appendix V and VI .The model of response sheet of Digital Literacy Test is given in Appendix VII .Scoring Key of Digital Literacy Test is given in Appendix VIII.)

The components wise distribution of items in the Digital Literacy Test is given in Table 3

Table 3

Components wise distribution of items in the Digital Literacy Test

| Sl.No | Components | Items | Total |
|-------|--------------------------|-----------------------------------|-------|
| 1 | Hardware | 2,3,4,7,10,11,14,21,24,30,39 | 11 |
| 2 | Software | 5,9,12,13,15,16,27,28,29,32,36,40 | 12 |
| 3 | Memory devices | 17,18,22,23,35,37,38 | 7 |
| 4 | Net working and internet | 1,6,8,20,25,26 | 6 |
| 5 | programming | 19,31,33,34 | 4 |

Reliability of the Test

Reliability is the degree to which an assessment produces stable and consistent results. For measuring reliability of the tool investigator followed Cronbach's Alpha. The value of Cronbach's Alpha for the items are 0.78. Hence the tool consisting of 40 items are reliable.

Validity of the Test

The validity of the Test is ensured using face and content validity. For this investigator consulted two experts in the field of Information Technology, discussed with principals, teachers and directors of different institutions. Thus the items in the test were prepared in the least ambiguous way. So the subjects respond to the items without difficulty and misunderstanding. Hence the investigator claimed the face validity of the Test as per the items in the Test.

Sample Selected for the Study

A sample may be defined as "infinite number of observations or cases, selected from all areas in particular universe, often assumed to be representative of that total group or universe of which it is part" (Good, 1973).

The population of the study is the secondary teachers working in schools recognised by Kerala government. The sample for the present study constituted 360 teachers drawn from 14 high schools of Kozhikode, Malappuram and Kannur districts of Kerala. (The list of schools are given in table 4)

Table 4

List of schools visited

| NO | Name of schools |
|----|--------------------------------|
| 1 | G.G.V.H.S.S, Feroke |
| 2 | Farook H.S.S, Farook college |
| 3 | G.V.H.S.S , Thamarassery |
| 4 | St.Joseph's H.S.S , Kodenchery |
| 5 | St. John's H.S , Nellipoyil |
| 6 | G.G.H.S.S , Malappuram |
| 7 | S.P.B.H.S.S , Ramanattukara |
| 8 | A.M.M.H.S , Pulikal |
| 9 | P.M.S.A.P.T , H.S.S , Kakkove |
| 10 | G.H.S.S ,Kottapuram |
| 11 | G.H.S.S , Kuthuparambu |
| 12 | P.R.M.H.S.S , panoor |
| 13 | R.G.M.H.S.S , Mokeri |
| 14 | G.H.S.S , Pattiam |

The different strata considered in the population are;

- Gender
- Locale of the schools
- Type of management of schools

Gender

The investigator divided the population into two on the basis of gender. That is, male and female secondary school teachers. In many studies it has been found

that Gender difference exists in many of the variables. So the investigator gave due representation to both male and female.

Locale of the schools

Rural and urban schools are much different when it comes to resources and learning environments while selecting the sample, proper representation was given to the locale of institution.

Type of management of schools

The investigator gave importance to two types of management secondary schools viz, Government and Aided schools

The study was administered on the sample of 360 secondary school teachers was obtained. The answer sheets of the final sample were consolidated for further analysis and all entries were coded using numbers for facilitating computer feeding. The Break up of the final sample are given in figure 2.

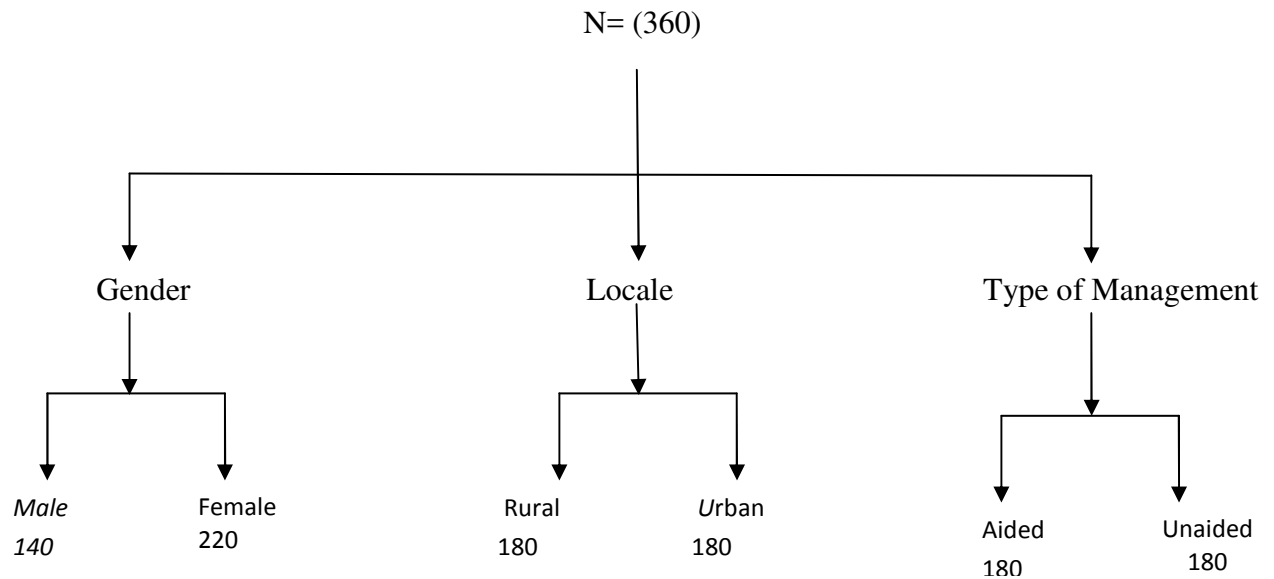


Figure 2. Breakup of the final sample

Data Collection Procedure

After deciding the sample size and the tools to be used, the investigator prepared a list of schools from where the data to be collected. Then investigator contacted heads of high schools with a letter of recommendation to obtain permission for collecting data from that institution. The investigator met secondary school teachers and necessary arrangements were made to collect data.

While administering the scale and test, the method of responding was explained clearly. Necessary clarifications of doubts were given whenever required. No time limit was enforced to respond the items. Then the response sheet along with tools were collected and sorted for analysis.

Scoring and Consolidation of Data

Soon after the collection of data, the investigator valued the data sheets of Techno Pedagogical Attitude and Digital Literacy. About 720 tools were distributed and returned among secondary school teachers after responding.. All the response sheets were scored as per the scoring scheme of the tools prepared. Total score of each item was calculated in the scale of Techno Pedagogical Attitude and test of Digital Literacy.

Techno Pedagogical Attitude scale consists of 42 items. A respondent has to respond to 42 items by choosing any one of the three alternatives given i.e., Agree, Undecided and Disagree. The respondents have to mark their responses to each item in the appropriate columns corresponding to the three alternatives. For positive items the respective scores to the three responses are 3, 2, and 1. For negative items scoring was done in the reverse order. The total score was calculated for each item and further analysis was done after consolidation.

The Digital Literacy Test consists of 40 objective type questions arranged in easy, average and difficulty level. The response sheets were scored according to the scoring scheme prepared. The teachers were instructed to respond each item by putting (√) mark under the response final suitable for them against the option is A, B, C and D. For the correct answers gave '1' marks and wrong answers gave '0' marks. Finally, for finding out and assess the Digital Literacy the investigator added the scores.

Statistical Techniques Used for Analysis of Data

Preliminary Analysis

As the part of preliminary analysis, the following statistical properties of the variables were computed for the total sample and relevant subsamples such as mean, median, mode, Standard Deviation, Skewness and Kurtosis.

Major Analysis

- a. Test of significant of difference between means for different Categories –‘t’ test for large independent sample.

The statistical technique, test of significance difference between means for different categories is used to find out if there exists any significant difference in techno pedagogical attitude and Digital literacy between relevant sub samples.

The formula is:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}} \quad \text{--(Garrette 1981)}$$

Where:

\bar{X}_1 = mean of sample 1

\bar{X}_2 = mean of sample 2

N_1 = number of subjects in sample 1

N_2 = number of subjects in sample 2

σ_1 = Standard Deviation of sample 1

σ_2 = Standard Deviation of sample 2.

b. Pearson's product moment co-efficient of correlation(r)

The most precise coefficient of correlation is known as the Pearson's product moment co-efficient of correlation(r). The degree of relationship measured and represented by the co-efficient of correlation.

Through this study the method was used to find out the extent of relationship between the variables Techno Pedagogical Attitude and Digital Literacy.

The formula for calculating 'r' is

$$r_{xy} = \frac{N\sum XY - (\sum X \sum Y)}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}}$$

Where:

N = number of pairs of scores

\sum = denotes the summation of items

$\sum XY$ = sum of the product of paired scores

$\sum X$ = sum of X scores

$\sum Y$ = sum of Y scores

$\sum X^2$ = sum of squared X scores

$\sum Y^2$ = sum of squared Y scores

ANALYSIS AND INTERPRETATION

- *Objectives of the study*
- *Hypotheses of the study*
- *Preliminary analysis*
- *Major analysis*
- *Tenability of Hypotheses*

ANALYSIS AND INTERPRETATION

The present study is stated as “TECHNO PEDAGOGICAL ATTITUDE OF SECONDARY SCHOOL TEACHERS OF KERALA IN RELATION TO THEIR DIGITAL LITERACY”. This chapter describe the details of the statistical analysis and discussion of results obtained. The data collected has been analysed statistically with reference to the objectives and the hypotheses of the study. The objectives and hypotheses of the study restated below.

Objectives of the Study

The objectives set forth for the study are the following:

- To find out the level of Techno Pedagogical Attitude of secondary school teachers in Kerala.
- To find out the level of Digital Literacy of secondary school teachers in Kerala.
- To test whether there exist any significant difference in the level of Techno Pedagogical Attitude of secondary school teachers based on :
 - a. Gender
 - b. Locale of the schools
 - c. Type of management of schools
- To test whether there exist any significant difference in the level of Digital Literacy of secondary school teachers based on :

- a. Gender
 - b. Locale of the schools
 - c. Type of management of schools
- To test whether there exist any significant relationship between Techno Pedagogical Attitude of secondary school teachers and their Digital Literacy.

Hypotheses of the Study

The hypotheses formulated for the study are following.

- There will be significant difference in the mean scores of Techno Pedagogical Attitude among secondary school teachers on the basis of:
 - a. Gender
 - b. Locale of the schools
 - c. Type of management of schools
- There will be significant difference in the mean scores of Digital Literacy among secondary school teachers on the basis of:
 - a. Gender
 - b. Locale of the schools
 - c. Type of management of schools
- There will be significant relationship between Techno Pedagogical Attitude of secondary school teachers and their Digital Literacy.

The analysis and discussion of results with regard to the above objectives are described in section ie, Preliminary analysis and Major analysis

Preliminary Analysis

To know the nature of distribution of the variables, Techno_Pedagogical Attitude and Digital Literacy, the descriptive statistics like mean, median, mode, standard deviation, skewness and kurtosis of the variable are computed. This is worked out for the sub samples like Male-Female, Rural-Urban and Govt-Aided.

Table 5

Descriptive statistics of the variable Techno Pedagogical Attitude of secondary school teachers for total sample and sub samples based on gender, locale of the schools and type of management of schools

| Variable | Category | N | Mean | Median | Mode | SD | Skewness | Kurtosis |
|-----------------------------|----------|-----|--------|--------|------|------|----------|----------|
| Techno Pedagogical Attitude | Total | 360 | 102.67 | 103 | 103 | 8.31 | -0.36 | -0.43 |
| | Male | 140 | 102.52 | 103 | 103 | 8.82 | -0.35 | -0.43 |
| | Female | 220 | 102.76 | 103 | 101 | 7.98 | -0.36 | -0.47 |
| | Urban | 180 | 103.05 | 103.5 | 110 | 8.27 | -0.37 | -0.69 |
| | Rural | 180 | 102.29 | 103 | 106 | 8.35 | -0.36 | -0.17 |
| | Govt | 180 | 101.84 | 103 | 101 | 8.54 | -0.23 | -0.47 |
| | Aided | 180 | 103.5 | 103.5 | 100 | 8.01 | -0.49 | -0.32 |

The table 5 shows that the values of mean, median and mode for total sample of secondary school teachers are 102.67,103 and 103 which is approximately equal. The co-efficient of skewness is -0.36 suggesting that the distribution is slightly negatively skewed. The measure of kurtosis is - 0.43 that is, the curve is leptokurtic.

For the subsample mean median and mode are approximately equal. It can be concluded that the distribution of the variable Techno Pedagogical Attitude for the total sample is approximately normal. The graphical representation of descriptive statistics for total sample of the variable Techno Pedagogical Attitude is given in Figure 3

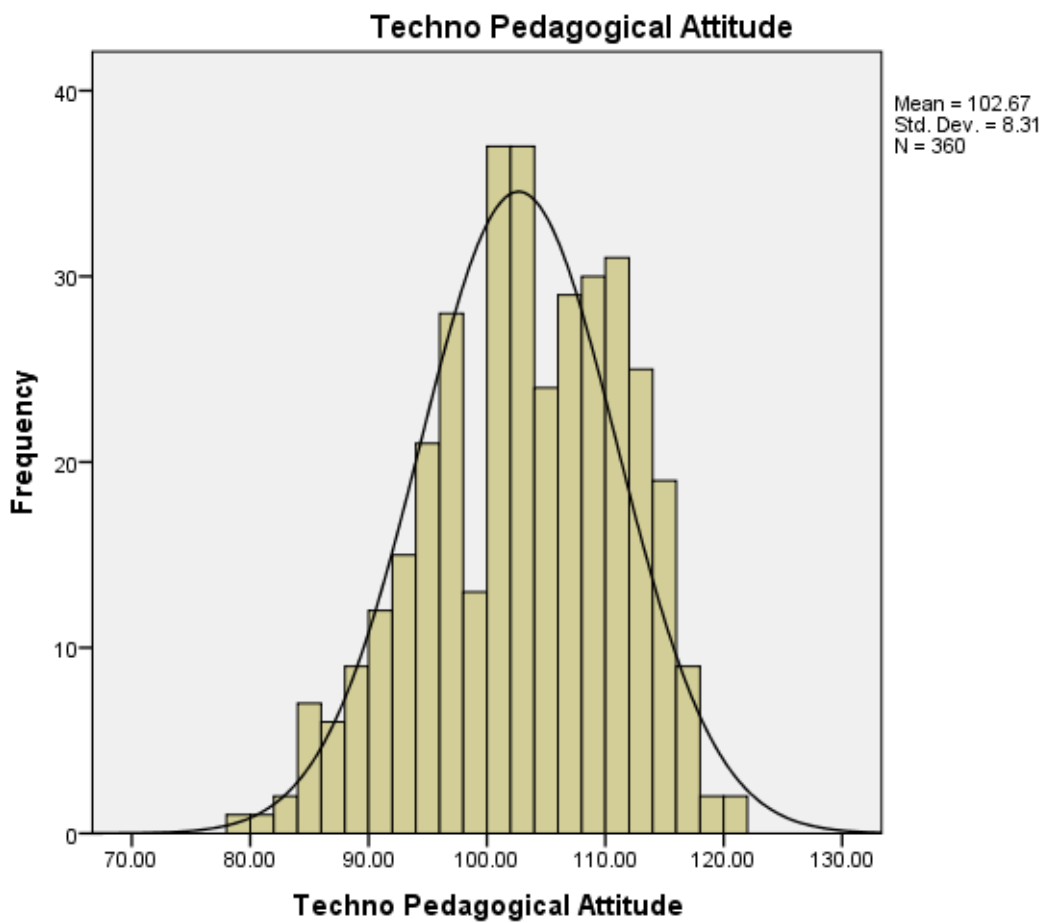


Figure 3: Descriptive statistics for total sample of the variable Techno Pedagogical Attitude

Table 6

Descriptive statistics of the variable Digital Literacy of secondary school teachers for total sample and sub samples based on gender, locale of the schools and type of management of schools

| Variable | Category | N | Mean | Median | Mode | SD | Skewness | Kurtosis |
|------------------|----------|-----|-------|--------|------|------|----------|----------|
| Digital Literacy | Total | 360 | 30.86 | 31 | 32 | 4.07 | -0.92 | 2.75 |
| | Male | 218 | 31.05 | 31 | 31 | 4.55 | -1.13 | 4.08 |
| | Female | 142 | 30.73 | 31 | 32 | 3.73 | -0.72 | 0.73 |
| | Urban | 180 | 31.31 | 32 | 34 | 3.73 | -0.32 | 0.06 |
| | Rural | 180 | 30.41 | 31 | 32 | 4.34 | -1.24 | 3.76 |
| | Govt | 180 | 30.89 | 31 | 32 | 3.94 | -1.06 | 5.42 |
| | Aided | 180 | 30.82 | 31.5 | 34 | 4.20 | -0.81 | 0.74 |

The table 6 shows that the values of mean, median and mode for total sample of secondary school teachers are 30.86, 31 and 32 which is approximately equal. The co-efficient of skewness is -0.92 suggesting that the distribution is slightly negatively skewed. The measure of kurtosis is 2.75 that is, the curve is slightly platykurtic. For the subsample mean median and mode are approximately equal. It can be concluded that the distribution of the variable Digital Literacy for the total sample is approximately normal. The graphical representation of descriptive statistics for the total sample of variable Digital Literacy is given in Figure 4

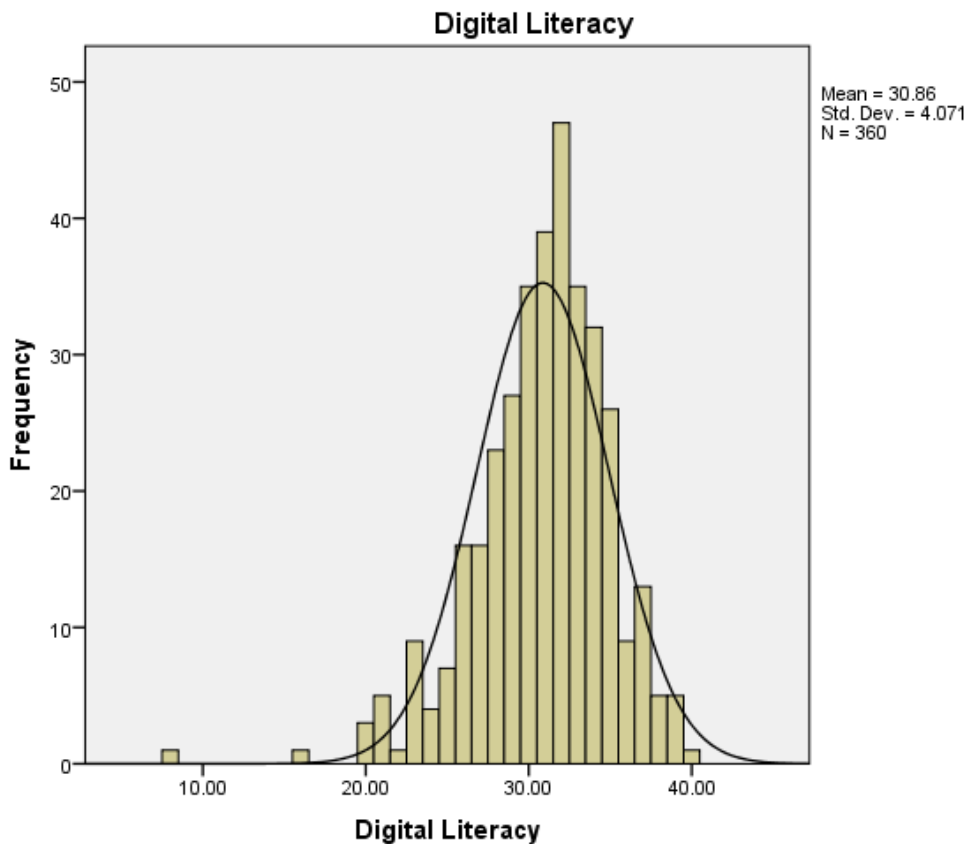


Figure 4: Descriptive Statistics for the Total sample of Variable Digital Literacy

Level of Techno Pedagogical Attitude among secondary school teachers.

The different levels of Techno Pedagogical Attitude among secondary school teachers was determined by classifying the whole sample into three groups- low ,average and high in the conventional procedure of finding σ distance from mean \bar{X} . The standard deviation and means of the score of Techno Pedagogical Attitude for total sample are found to be 8.31 and 102.67 respectively. Secondary school teachers who obtained scores above or equal to the value of $\bar{X} + \sigma$ were considered as high group and secondary school teachers who obtained scores below or equal to the value of $\bar{X} - \sigma$ were considered as low group. The secondary school teachers who

score lie between the values of $\bar{X} + \sigma$ and $\bar{X} - \sigma$ were considered as average group. The percentage of total sample falling into three groups (low, average and high) is given in Table no 7.

Table 7

Number and percentage of secondary school teachers falling into three groups of Techno Pedagogical Attitude (High, Average and Low)

| Variable | Group | Score | n | % |
|-----------------------------|---------|---------------|-----|-------|
| Techno Pedagogical Attitude | High | ≥ 110.98 | 82 | 22.78 |
| | Average | 110.98-94 | 224 | 62.22 |
| | Low | ≤ 94.36 | 54 | 15 |

Table 7 shows that the level of Techno Pedagogical Attitude of secondary school teachers for the total sample. From table 7 it is evident that 22.78 percentage of the total sample has high level of Techno Pedagogical Attitude, 62.22 percentage has average level of Techno Pedagogical Attitude and 15 percentage has low level of techno pedagogical attitude. The graphical representation of the distribution of total sample in different levels of Techno Pedagogical Attitude is given in figure 5

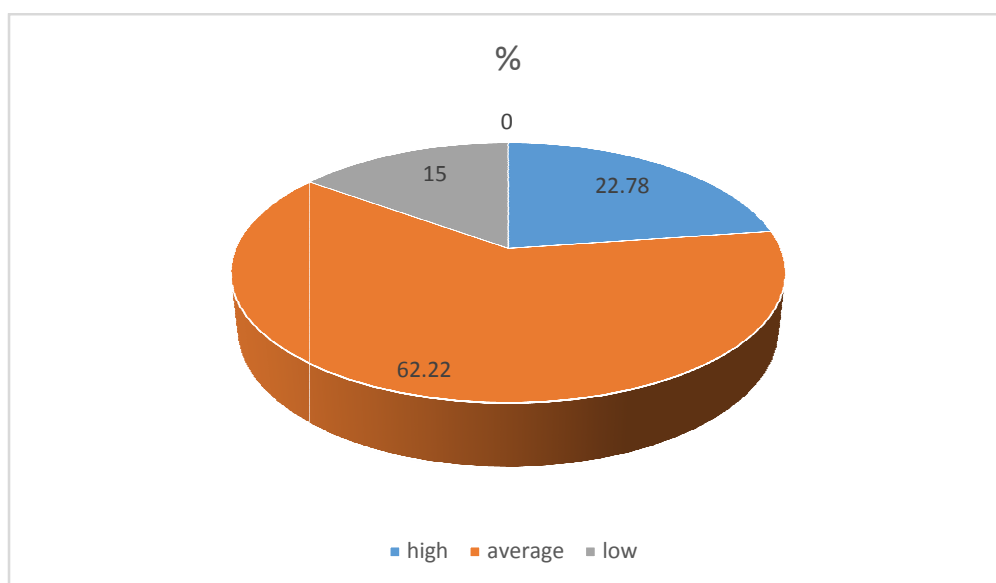


Figure 5: Distribution of total sample in different levels of Techno Pedagogical Attitude

Level of Digital Literacy among secondary school teachers.

The different levels of Digital Literacy among secondary school teachers was determined by classifying the whole sample into three groups-low ,average and high in the conventional procedure of finding σ distance from mean \bar{X} . The standard deviation and means of the scores of Digital Literacy of secondary school teachers for the total sample are found to be 4.07 and 30.86 respectively. Secondary school Teachers who obtained scores above or equal the value of $\bar{X} + \sigma$ were considered as high group and secondary school teachers who obtained scores below or equal the value of $\bar{X} - \sigma$ were considered as low group. The secondary school teachers who scores lie between the values of $\bar{X} + \sigma$ and $\bar{X} - \sigma$ were considered as average group. The percentage of total sample falling into three groups (low, average and high) is given in Table no 8.

Table 8

Number and percentage of secondary school teachers falling into three groups of Digital Literacy (High, Average and Low)

| Variable | Group | Score | n | % |
|------------------|---------|--------------|-----|-------|
| Digital Literacy | High | ≥ 34.93 | 72 | 20 |
| | Average | 34.93-26.79 | 225 | 70.83 |
| | Low | ≤ 26.79 | 33 | 9.17 |

Table 8 shows that the level of Digital Literacy of secondary school teachers for the total sample. From table 8 it is evident that 20 percentage of the total sample has high level of Digital Literacy, 70.83 percentages has average level of Digital Literacy and 9.17 percentage has low level of Digital Literacy. The graphical representation of the distribution of total sample in different levels of Digital Literacy is given in Figure 6.

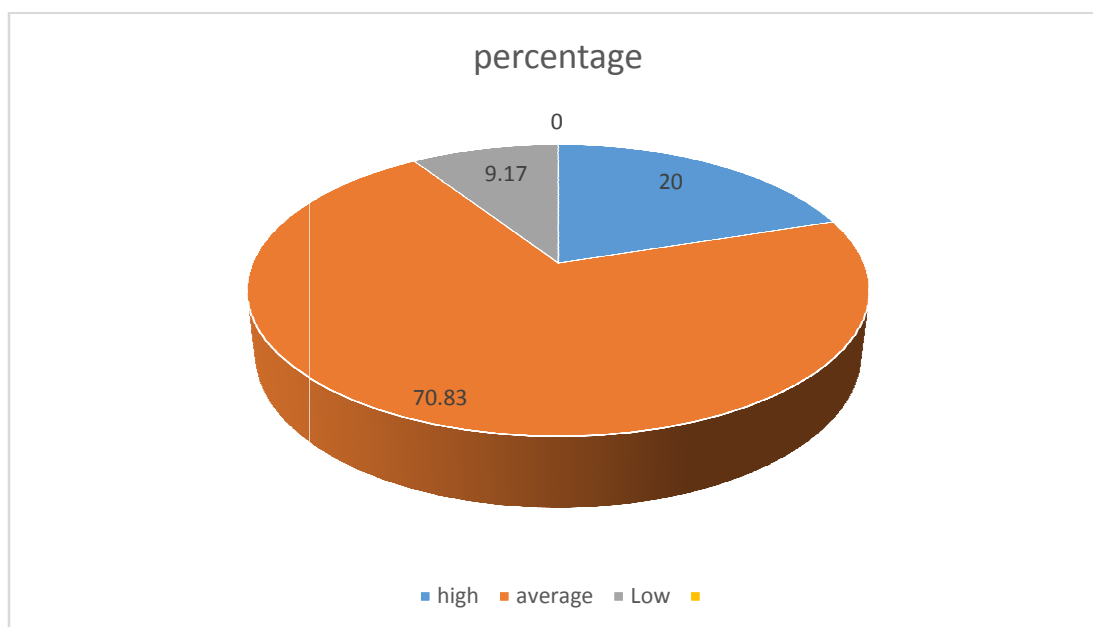


Figure 6: Distribution of total sample in different levels of Digital Literacy

Major Analysis

Under the major analysis section significant difference in the level of Techno Pedagogical Attitude and Digital Literacy of secondary school teachers based on sub samples gender, locale of the schools and type of management of schools were analysed. In the major analysis also seek to explore significant relationship between Techno Pedagogical Attitude and Digital Literacy of secondary school teachers.

Test of significant difference in the level of Techno Pedagogical Attitude of secondary school teachers based on the subsample

Comparison of the mean scores of Techno Pedagogical Attitude based on subsamples such as Gender, Locale of the schools and Type of management of schools were analysed in the following section.

Comparison of mean scores of Techno Pedagogical Attitude between male and female secondary school teachers

Table 9

Data and results of the test of mean scores of Techno Pedagogical Attitude between male and female secondary school teachers

| Gender | N | Mean | SD | t-value | Level of Significance |
|--------|-----|--------|------|---------|-----------------------|
| Female | 220 | 103 | 7.98 | 0.52 | NS |
| Male | 140 | 102.52 | 8.82 | | |

Table 9 indicates that the mean scores obtained for the male secondary school teachers on Techno Pedagogical Attitude is 102.52 and mean scores of obtained for the female secondary school teachers on Techno Pedagogical Attitude

is 103 . Standard deviation obtained for male secondary school teachers is 8.82 and female secondary school teachers is 7.98. The ‘t’ value obtained is 0.52, which is less than the table value at 0.05 level (1.96). Since the obtained value of ‘t’ is less than table value, it can be concluded that there exists no significant difference in the level of Techno Pedagogical Attitude of male and female secondary school teachers.

Discussion

The mean scores of Techno Pedagogical Attitude of male and female secondary school teachers were analysed. It is found that there is no significant difference in the level of Techno Pedagogical Attitude of male and female teachers. So it can be concluded that male and female secondary school teachers not differ in their Techno Pedagogical Attitude.

Comparison of mean scores of Techno Pedagogical Attitude between urban and rural secondary school teachers

Table 10

Data and results of the test of mean scores of Techno Pedagogical Attitude between urban and rural secondary school teachers

| Locale of the schools | N | Mean | SD | t-value | Level of Significance |
|-----------------------|-----|--------|------|---------|-----------------------|
| Urban | 180 | 103.05 | 8.27 | 0.88 | NS |
| Rural | 180 | 102.29 | 8.35 | | |

Table 10 indicates that the mean scores obtained for the urban secondary school teachers on Techno Pedagogical Attitude is 103.05 and mean scores of obtained for the rural secondary school teachers on Techno Pedagogical Attitude is 102.29 .

Standard deviation obtained for urban secondary school teachers is 8.27 and rural secondary school teachers is 8.35. The ‘t’ value obtained is 0.88, which is less than the table value at 0.05 level (1.96). Since the obtained value of ‘t’ is less than table value, it can be concluded that there exists no significant difference in the level of Techno Pedagogical Attitude of urban and rural secondary school teachers.

Discussion

The mean scores of Techno Pedagogical Attitude of urban and rural secondary school teachers were analysed. It is found that there is no significant difference in the level of Techno Pedagogical Attitude of urban and rural teachers. So it can be inferred that Techno Pedagogical Attitude of urban and rural secondary school teachers are almost equal.

Comparison of mean scores of Techno Pedagogical Attitude between aided and government secondary school teachers

Table 11

Data and results of the test of mean scores of Techno Pedagogical Attitude between Aided and Government secondary school teachers

| Type of management of schools | N | Mean | SD | t-value | Level of Significance |
|-------------------------------|-----|--------|------|---------|-----------------------|
| Aided | 180 | 103.05 | 8.01 | 1.93 | NS |
| Government | 180 | 101.84 | 8.54 | | |

Table 11 indicates that the mean scores obtained for the aided secondary school teachers on Techno Pedagogical Attitude is 103.05 and mean scores of obtained for

the government secondary school teachers on Techno Pedagogical Attitude is 101.84 . Standard deviation obtained for aided secondary school teachers is 8.01 and government secondary school teachers is 8.54. The 't' value obtained is 1.93, which is less than the table value at 0.05 level (1.96). Since the obtained value of 't' is less than table value, it can be concluded that there exists no significant difference in the level of Techno Pedagogical Attitude of aided and government secondary school teachers.

Discussion

The analysis of the data shows that there is no significant difference in the level of Techno Pedagogical Attitude of govt and aided secondary school teachers. Hence it can be inferred that secondary school teachers from govt and aided schools are not differ in their Techno Pedagogical Attitude.

Test of significant difference in the level of Digital Literacy of secondary school teachers based on sub samples

Comparison of the mean scores of Digital Literacy based on sub samples such as Gender, Type of management of schools and locale of the schools were analysed in the following section.

Comparison of mean scores of Digital Literacy between male and female secondary school teachers

Table 12

Data and results of the test of mean scores of Digital Literacy between male and female secondary school teachers

| Gender | N | Mean | S.D | t-value | Level of Significance |
|--------|-----|-------|------|---------|-----------------------|
| Female | 218 | 30.71 | 3.73 | 2.28* | 0.05 |
| Male | 142 | 31.05 | 4.55 | | |

Significant at 0.05 level

Table 12 indicates that the mean scores obtained for the male secondary school teachers on Digital Literacy is 31.05 and mean scores of obtained for the female secondary school teachers on Digital Literacy is 30.71 . Standard deviation obtained for male secondary school teachers is 4.55 and female secondary school teachers is 3.73. The 't' value obtained is 2.28, which is greater than the table value at 0.05 level (1.96). Since the obtained value of 't' is greater than table value, it can be concluded that there exists significant difference in the level of Digital Literacy of male and female secondary school teachers.

Discussion

The analysis of the mean scores of Digital Literacy of male and female secondary school teachers revealed that there exist significant difference in the level of Digital Literacy of male and female teachers. The mean score of Digital Literacy of male secondary school teachers is 31.05 which is higher than mean score of female secondary school teachers (30.73) . This indicates that male secondary school

teachers are having higher Digital Literacy than female. So it can be inferred that Digital Literacy of male and female secondary school teachers are not equal.

Comparison of mean scores of Digital Literacy between urban and rural secondary school teachers

Table 13

Data and results of the test of mean scores of Digital Literacy between urban and rural secondary school teachers

| Locale of the schools | N | Mean | S.D | t-value | Level of Significance |
|-----------------------|-----|-------|------|---------|-----------------------|
| Urban | 180 | 31.31 | 3.73 | 2.19* | 0.05 |
| Rural | 180 | 30.41 | 4.34 | | |

Significant at 0.05 level

Table 13 indicates that the mean scores obtained for the urban secondary school teachers on Digital Literacy is 31.31 and mean scores of obtained for the rural secondary school teachers on Digital Literacy is 30.41 . Standard deviation obtained for urban secondary school teachers is 3.73 and rural secondary school teachers is 4.34. The ‘t’ value obtained is 2.19, which is greater than the table value at 0.05 level (1.96). Since the obtained value of ‘t’ is greater than table value, it can be concluded that there exists significant difference in the level of Digital Literacy of urban and rural secondary school teachers.

Discussion

The analysis of the mean scores of Digital Literacy of urban and rural secondary school teachers revealed that there exist significant difference in the level of Digital Literacy of urban and rural teachers. The mean score of Digital Literacy

of urban secondary school teachers is 31.31 which is higher than mean score of rural secondary school teachers (30.41) .This indicate that urban secondary school teachers are having higher digital literacy than rural. So it can be inferred that Digital Literacy of urban and rural secondary school teachers are not equal.

Comparison of mean scores of Techno Pedagogical Attitude between aided and government secondary school teachers

Table 14

Data and results of the test of mean scores of Digital Literacy between Government and Aided secondary school teachers

| Type of Management of Schools | N | Mean | S.D | t-value | Level of Significance |
|-------------------------------|-----|-------|------|---------|-----------------------|
| Aided | 180 | 30.82 | 4.20 | 0.17 | NS |
| Government | 180 | 30.89 | 3.94 | | |

Table 14 indicates that the mean scores obtained for the aided secondary school teachers on Digital Literacy is 30.82 and mean scores of obtained for the government secondary school teachers on Digital Literacy is 30.89 . Standard deviation obtained for aided secondary school teachers is 4.20 and government secondary school teachers is 3.94. The ‘t’ value obtained is 0.17, which is less than the table value at 0.05 level (1.96).Since the obtained value of ‘t’ is less than table value, it can be concluded that there exists no significant difference in the level of Digital Literacy of aided and government secondary school teachers.

Discussion

The analysis of the data shows that there is no significant difference in the level of Digital Literacy of government and aided secondary school teachers. Hence it can be inferred that government and aided secondary school teachers not differ in their Digital Literacy.

Test of significant relationship between Techno pedagogical Attitude of secondary school teachers and their Digital Literacy

The collected data has been analysed to find out the correlation coefficient for variable Digital Literacy with the variable Techno Pedagogical Attitude. The coefficient of correlation was calculated using Pearson's product moment method. The coefficient of correlation for the variables are presented in Table 15.

Table 15

Pearson's 'r' for the variables Techno Pedagogical Attitude and Digital Literacy for the total sample

| Sl.No | variables | Coefficient of correlation |
|-------|-----------------------------|----------------------------|
| 1 | Techno Pedagogical Attitude | 0.487 |
| 2 | Digital Literacy | |

Discussion of Results

From table 15 shows that, the coefficient of correlation for the variable Digital Literacy with the variable Techno Pedagogical Attitude in the case of total sample is 0.487. The magnitude and direction of 'r' indicates moderate positive correlation between the variables Techno Pedagogical Attitude and Digital Literacy.

It means that there is a moderate increase in Techno Pedagogical Attitude results into moderate increase in Digital Literacy and moderate decrease in Techno Pedagogical Attitude results into moderate decrease in Digital Literacy.

Tenability of Hypotheses

Based on findings, the tenability of hypothesis of the study was reviewed.

The first hypothesis states that “there will be significant difference in the Techno Pedagogical Attitude of secondary school teachers on the basis of Gender, Type of management of schools and locale of the schools”. In this study, it was found that all the relevant sub samples based on Gender, Locale of the schools and Type of management of schools are not differed significantly in the Techno Pedagogical Attitude. Hence the first hypothesis is not accepted.

The second hypothesis states that “there will be significant difference in the digital literacy of secondary school teachers based on Gender, Type of management of schools and locale of the schools”. In this study, it was found there exist significant difference in the mean scores of Digital Literacy for the subsample based on Gender and Locale of the schools. But in the case of type of management of schools, there exist no significant difference in Digital Literacy among secondary school teachers. Hence the second hypothesis is partially accepted.

The third hypothesis states that “there will be a significant relationship between Techno Pedagogical Attitude of secondary school teachers and their Digital Literacy”. The findings revealed that there exist is moderate positive correlation between Techno Pedagogical Attitude and Digital Literacy. Hence the third hypothesis is fully accepted.

**SUMMARY, FINDINGS, CONCLUSION AND
SUGGESTIONS**

- *Study In Retrospect*
- *Variables of the study*
- *Objectives of the study*
- *Hypotheses of the study*
- *Methodology of the study*
- *Sample for the study*
- *Tools used for the study*
- *Statistical techniques used for the study*
- *Major Findings*
- *Conclusion*
- *Tenability of Hypotheses*
- *Educational Implications of the study*
- *Suggestions for Further Research*

SUMMARY, FINDINGS, CONCLUSION AND SUGGESTIONS

This chapter provides an overview of the significant aspects of the various stages of the study. This includes study in retrospect, major findings emerged from the study, conclusion arrived, educational implications of the findings and suggestions for further research.

Study in Retrospect

This section tries to make a retrospective study of the title, variables, objectives, hypothesis, methodology, tools and statistical techniques used for the study.

Restatement of the Problem

The present study entitled as Techno Pedagogical Attitude of secondary school teachers of kerala in relation to their Digital Literacy.

Variables of the Study

Present study is designed with two variables viz, Techno Pedagogical Attitude and Digital Literacy.

Objectives of the Study

The objectives set forth for the study are the following:

- To find out the level of Techno Pedagogical Attitude of secondary school teachers in Kerala.
- To find out the level of Digital Literacy of secondary school teachers in Kerala.
- To test whether there exist any significant difference in the level of Techno Pedagogical Attitude of secondary school teachers based on :
 - a. Gender
 - b. Locale of the schools
 - c. Type of management of schools
- To test whether there exist any significant difference in the level of Digital Literacy of secondary school teachers based on :
 - a. Gender
 - b. Locale of the schools
 - c. Type of management of schools
- To test whether there exist any significant relationship between Techno Pedagogical Attitude of secondary school teachers and their Digital Literacy.

Hypotheses of the Study

The hypotheses formulated for the study is following.

- There will be significant difference in the mean scores of Techno Pedagogical Attitude among secondary school teachers on the basis of:
 - a. Gender
 - b. Locale of the schools
 - c. Type of management of schools

- There will be significant difference in the mean scores of Digital Literacy among secondary school teachers on the basis of:
 - a. Gender
 - b. Locale of the schools
 - c. Type of management of schools

- There will be significant relationship between Techno Pedagogical Attitude of secondary school teachers and their Digital Literacy.

Methodology

The present study is intended to investigate the level of Techno Pedagogical Attitude and Digital Literacy among secondary school teachers. The investigator proposed to use survey method for the study. A precise description of sample, tool and statistical technique used for the study are given below.

Sample for the Study

The present study was conducted on sample of 360 secondary school teachers from various schools in three districts Kerala (Kozhikode, Kannur, and Malappuram) selected by stratified sampling technique giving due to the representation of characteristics like gender, locale of the schools and type of management of Schools.

Tool used for the Study

To measure the variable, investigator developed Techno Pedagogical Attitude scale and Digital Literacy test with the help of supervising teacher (sareef & Baby, 2017)

Statistical Techniques used for the Study

For the purpose of analysing the data, investigator carried out statistical techniques such as

- Descriptive statistics
- T-test
- Pearson's product moment co-efficient of correlation(r)

Major Findings of the Study

Major findings of the study are as following:

➤ From the study it is clear that ,the values of mean, median and mode for Techno Pedagogical Attitude of total sample of secondary school teachers are

102.67, 103 and 103 which is approximately equal. The co-efficient of skewness is -0.36 suggesting that the distribution is slightly negatively skewed. The measure of kurtosis is -0.43 that is, the curve is leptokurtic. For the subsample mean, median and mode are approximately equal. It can be concluded that the distribution of the variable Techno Pedagogical Attitude for the total sample is approximately normal.

➤ From the study it is evident that, the values of mean, median and mode for Digital Literacy of total sample of secondary school teachers are 30.86, 31 and 32 which is approximately equal. The co-efficient of skewness is -0.92 suggesting that the distribution is slightly negatively skewed. The measure of kurtosis is 2.75 that is, the curve is slightly platykurtic. For the subsample mean, median and mode are approximately equal. It can be concluded that the distribution of the variable Digital Literacy for the total sample is approximately normal.

➤ It is evident that 22.78 percentage of the total sample has high level of Techno Pedagogical Attitude, 62.22 percentage has average level of Techno Pedagogical Attitude and 15 percentage has low level of techno pedagogical attitude.

➤ It is evident that 20 percentage of the total sample has high level of Digital Literacy, 70.83 percentages has average level of Digital Literacy and 9.17 percentage has low level of Digital Literacy.

➤ The mean scores obtained for the male secondary school teachers on Techno Pedagogical Attitude is 102.52 and mean scores of obtained for the female secondary school teachers on Techno Pedagogical Attitude is 103 . Standard

deviation obtained for male secondary school teachers is 8.82 and female secondary school teachers is 7.98. The 't' value obtained is 0.52, which is less than the table value at 0.05 level (1.96). Since the obtained value of 't' is less than table value, it can be concluded that there exists no significant difference in the level of Techno Pedagogical Attitude of male and female secondary school teachers.

➤ The mean scores obtained for the urban secondary school teachers on Techno Pedagogical Attitude is 103.05 and mean scores of obtained for the rural secondary school teachers on Techno Pedagogical Attitude is 102.29 . Standard deviation obtained for urban secondary school teachers is 8.27 and rural secondary school teachers is 8.35. The 't' value obtained is 0.88, which is less than the table value at 0.05 level (1.96). Since the obtained value of 't' is less than table value, it can be concluded that there exists no significant difference in the level of Techno Pedagogical Attitude of urban and rural secondary school teachers.

➤ The mean scores obtained for the aided secondary school teachers on Techno Pedagogical Attitude is 103.05 and mean scores of obtained for the govt. secondary school teachers on Techno Pedagogical Attitude is 101.84 . Standard deviation obtained for aided secondary school teachers is 8.01 and government secondary school teachers is 8.54. The 't' value obtained is 1.93, which is less than the table value at 0.05 level (1.96). Since the obtained value of 't' is less than table value, it can be concluded that there exists no significant difference in the level of Techno Pedagogical Attitude of aided and government secondary school teachers.

➤ The mean scores obtained for the male secondary school teachers on Digital Literacy is 31.05 and mean scores of obtained for the female secondary school

teachers on Digital Literacy is 30.73 . Standard deviation obtained for male secondary school teachers is 4.55 and female secondary school teachers is 3.73. The 't' value obtained is 2.28, which is greater than the table value at 0.05 level (1.96). Since the obtained value of 't' is greater than table value, it can be concluded that there exists significant difference in the level of Digital Literacy of male and female secondary school teachers.

➤ The mean scores obtained for the urban secondary school teachers on Digital Literacy is 31.31 and mean scores of obtained for the rural secondary school teachers on Digital Literacy is 30.41 . Standard deviation obtained for urban secondary school teachers is 3.73 and rural secondary school teachers is 4.34. The 't' value obtained is 2.19, which is greater than the table value at 0.05 level (1.96). Since the obtained value of 't' is greater than table value, it can be concluded that there exists significant difference in the level of Digital Literacy of urban and rural secondary school teachers.

➤ The mean scores obtained for the aided secondary school teachers on Digital Literacy is 30.82 and mean scores of obtained for the govt. secondary school teachers on Digital Literacy is 30.89 . Standard deviation obtained for aided secondary school teachers is 4.20 and government secondary school teachers is 3.94. The 't' value obtained is 0.17, which is less than the table value at 0.05 level (1.96). Since the obtained value of 't' is less than table value, it can be concluded that there exists no significant difference in the level of Digital Literacy of aided and government secondary school teachers.

➤ The coefficient of correlation for the variable Digital Literacy with the variable Techno Pedagogical Attitude in the case of total sample is 0.487. The magnitude and direction of 'r' indicates moderate positive correlation between the variables Techno Pedagogical Attitude and Digital Literacy. It means that there is a moderate increase in Techno Pedagogical Attitude results into moderate increase in Digital Literacy and moderate decrease in Techno Pedagogical Attitude Results into moderate decrease in Digital Literacy.

Conclusion

The study can inferred that distribution of the variables Techno Pedagogical Attitude and Digital Literacy for the total sample are approximately normal. The study evident that secondary school teachers possess high, average and low level of Techno Pedagogical Attitude and Digital Literacy. From the findings it is clear that Techno Pedagogical Attitude of secondary school teachers are not differ on the subsamples of gender, locale of the schools and type of management of schools. In the case of Digital Literacy ,secondary school teachers based on gender and locale of the schools are differ. This indicate that male secondary school teachers are having higher Digital Literacy than female and urban secondary school teachers are having higher digital literacy than rural. But Digital Literacy of secondary school teachers on the subsample of type of management of schools are not differ. The study reveals that there exist moderate positive correlation between the variables of Techno Pedagogical Attitude and Digital Literacy. It means that there is a moderate increase in Techno Pedagogical Attitude results into moderate increase in Digital

Literacy and moderate decrease in Techno Pedagogical Attitude results into moderate decrease in Digital Literacy.

Tenability of Hypotheses

Based on findings, the tenability of hypothesis of the study was reviewed.

- The first hypothesis states that “there will be significant difference in the Techno Pedagogical Attitude of secondary school teachers on the basis of Gender, Type of management of schools and locale of the schools”. In this study, it was found that all the relevant sub samples based on Gender, Locale of the schools and Type of management of schools are not differed significantly in the Techno Pedagogical Attitude. Hence the first hypothesis is not accepted.
- The second hypothesis states that “there will be significant difference in the Digital Literacy of secondary school teachers based on Gender, Type of management of schools and locale of the schools”. In this study, it was found there exist significant difference in the mean scores of Digital Literacy for the subsample based on Gender and Locale of the schools. But in the case of type of management of schools, there exist no significant difference in Digital Literacy among secondary school teachers. Hence the second hypothesis is partially accepted.
- The third hypothesis states that “there will be a significant relationship between Techno Pedagogical Attitude of secondary school teachers and their Digital Literacy”. The findings revealed that there exist is moderate positive correlation between Techno Pedagogical Attitude and Digital Literacy. Hence the third hypothesis is fully accepted.

Educational Implications of the Study

The present study conducted with a view to find out Techno Pedagogical Attitude of secondary school teachers of Kerala in relation to their Digital Literacy. The result of the present study has various implications in educational field which may help policy makers and educationalist in their attempt to enhance quality of education in Kerala.

❖ Proper in-service IT training programme should be organized for teachers which may provide sufficient knowledge and skill in IT. Teacher training should be equipped with latest TPACK strategy and opportunities must be provided for hands in experience .Developing countries should as a matter of urgency provide all essential facilities to train teachers in application of ICT in education and management. So orientation programme is must for the experienced and non-experienced teachers, so that teachers can get exposed to the field of educational technology.

❖ Lack of infrastructure in most of the schools is a dampener. Many schools do not have computers or if computers are present, they lack the bandwidth. Government providing ICT facilities especially rural schools, but many cases they are not working properly. Schools must strongly implement IT @ school functions by providing IT labs .It create better understanding of Quality Assurance among teachers.

❖ Technology needs investment and funds to set up toll-free lines and computers and pay ongoing internet connectivity cost. Prime Minister Narendra

Modi emphasizes on the Digital India (2015) campaign hopes to increase the possibility of turning India into more tech-savvy country. Some funds allotted for this digital India campaign for digitalizing schools and providing adequate instructional materials including CD ROM, multimedia educational CD's, Slide projector, handbooks, audio and video conferencing facilities, digital and smart class rooms in schools. Digitization for qualitative and quantitative growth for meeting needs of today and tomorrow's pedagogic and learning process. So that students are ready for a knowledge economy in a globalised world.

❖ Use ICT selectively and appropriately to enliven the teaching process, to motivate students and to achieve positive attitudes to learning. The teacher is like a Gardner who tends to flowers (students), prunes and shapes them into marketable products. In a rapidly changing society both teacher and students are explorers. So digital basic skills provide capabilities to adopt change.

❖ Selecting software for use during whole class teaching-learning activities, teacher will need to become familiar with appropriate software to be used in each lesson. Most of the time teachers installing learning technology without reviewing student needs and content availability. It producing low quality content that has poor instructional design and is not adapted to technology in use. So teachers consider themselves life-long learners and skilled learners. As professionals they require to continue studying and improving their craft. Teacher should go into the class not for teaching but for learning.

❖ In the 21st century education, focus is on relationship between teachers' beliefs, knowledge and pedagogic practice in the process of developing and adopting

new knowledge and skills. We must consider the impact of technology and changing face of curriculum. So must introduce need based and advanced concepts in teaching for enabling teachers to develop and use ICT skills in attainment of curriculum learning objectives.

❖ The paradigm of learning has shifted from traditional paper and pen method of teaching and learning with ‘sage on the stage’ replaced with the technologies that boost the same pedagogical advantages as traditional teaching methods but with more advanced learning which can be done at any place or any time. So instructors must implement blogging technology in their class room to help students articulate and share their learning with peers and experts.

❖ ICT have become a driving force of educational reform .So it must an integrative part of National Educational Policies and Plans. Policy makers must give strong attention for making IT Enabled curriculum in the educational system.

❖ Some teachers do not have personal computers to develop their competency in IT. Authorities are to make provisions for teachers who do not have personal computers for developing their techno pedagogical attitude in teaching. It helps to develop teachers’ basic awareness regarding ICT, hardware, software, internet, memory devices and programming.

❖ Teachers should be encourage to use online and internet facilities for getting access of various knowledge resources and for enhancing professionally which will develop their skills to work on with confidence.

❖ Teachers with higher teaching experience find to have lesser level of Techno Pedagogical Attitude and Digital Literacy .Hence teachers must give more time, opportunities and professional help to work on computers to develop their abilities in the field.

❖ Language teachers are less concentrate on teaching content by using technology. So Training programmes give more attention towards language teachers than subject teachers.

Suggestions for Further Research

Following are the some suggestions for further research in the area related with the present investigation.

- The present study is conducted at Kozhikode, Malappuram and kannur districts. The study can be extended to other districts of Kerala.
- The present study can be conducted on Techno Pedagogical Attitude of secondary school teachers of Kerala in relation to their Digital Literacy. Study can be conducted to primary school teachers, higher secondary school teachers and college teachers.
- The study can be conducted to explore TPACK level and Digital Literacy of in-service teachers and pre-service teachers
- The study can be conducted by selecting samples from various universities of Kerala.

- A study on the relationship of Digital Literacy with online professional development of teachers and teacher educators
- A study on Techno Pedagogical Attitude and Digital Literacy of teachers for the academic enhancement of slow learners.
- A study of attitude of parents and society towards Techno Pedagogy and Digital Literacy of teachers.
- Study can be conducted among teachers on their awareness on TPACK strategy
- A study on effectiveness of IT @school project towards Techno Pedagogical Attitude of secondary school teachers.

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APPENDICES

Appendix I
FINAL (English version)
FAROOK TRAINING COLLEGE
TECHNO PEDAGOGICAL ATTITUDE SCALE (2017)

Mohammed Sareef. K

Assistant Professor of Education
Farook Training College

Ashna Baby

M.Ed Student
Farook Training College

Instructions

Given below are some statements related to Techno Pedagogical Attitude .Each statements carries three responses as Agree, No opinion and Disagree. Read the statements carefully and put a [✓] mark against the most suitable response. Your response will be kept confidential and will be used only for research purpose.

1. I use Face Book, Twitter and WhatsApp as a part of my profession.
2. Inorder to make teaching more effective direct method of teaching must be continued.
3. I prepare a lot for technology enabled teaching.
4. I seek help from others for teaching with technology.
5. Technology oriented teaching is more effective than any other method of teaching.
6. My school need IT@ School Advisory Council.
7. Different technologies are always expensive
8. I feel students are more skilled in using technology than me.
9. I don't get time to learn complex and difficult technological activities.
10. I use internet services for information.
11. I take feedback on my teaching and try to modify accordingly.
12. Technology oriented teaching will discourage creative skill of teachers.
13. I attend in-service training in educational technology and try to put it in practice in my teaching.

14. In my view technology has no role in improving the learning standards.
15. I often think about the wide scope of technology in teaching learning process.
16. I don't get time for asking questions during teaching.
17. Even though I can identify teaching method suitable to the content I find it difficult in choosing apt technology.
18. I use you tube videos for making teaching effective
19. I don't get chances to take technology oriented classes.
20. I use e-book for preparing learning aids.
21. Technology helps to diversify leaning experience
22. Technology poorly affects my reading habits
23. I use e-library and Wikipedia for clarifying doubts related to my subjects.
24. Application of laptops and LC D projector in teaching helps me to strengthen teacher student relationships.
25. I often felt some topics in my subject can be taught better with technology.
26. It is Fine to fit L.C.D projector in each class room
27. I use blogs to enhance my teaching skills.
28. I respond to student's doubts in a way that promote enquiry learning.
29. I try to use technologyto assess student learning. .
30. My teaching help to create favourable attitude among students towards technology.
31. I use teaching time effectively and creatively.
32. Technology enabled teaching does not promote my teaching skills.
33. Incorporating technology in classroom teaching is time consuming.
34. I believe I am proficient in using ICT.
35. In my opinion use of technology in learning discourages thinking skill of students.
36. I use internet addressesgiven in text books and resource book for teaching.
37. I use open educational resources to increase knowledge in my subject.

38. I can't give much attention to students while using technology in class room teaching.
39. Computer lab in my school is efficient and active.
40. I try to secure more qualifications in technology after entering service.
41. Technology oriented teaching is not suitable to transact my subjects to students.
42. ICT enabled classroom makes me confident.

Appendix II
FINAL (Malayalam version)
FAROOK TRAINING COLLEGE
TECHNO PEDAGOGICAL ATTITUDE SCALE

Mohammed Sareef. K
Assistant Professor of Education
Farook Training College

Ashna Baby
M.Ed Student
Farook Training College

നിർദ്ദേശങ്ങൾ

സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുകൊണ്ടുള്ള അധ്യാപനവൃത്തിയോടുള്ള നിങ്ങളുടെ മനോഭാവം അറിയുന്നതിനു വേണ്ടിയുള്ള ഏതാനും പ്രസ്താവനകളാണ് താഴെ കൊടുത്തിരിക്കുന്നത്. ഓരോ പ്രസ്താവനയും വായിച്ചശേഷം അതിനെക്കുറിച്ചുള്ള നിങ്ങളുടെ പ്രതികരണം, പ്രത്യേകം തന്നിരിക്കുന്ന ഉത്തരക്കടലാസിൽ

യോജിക്കുന്നു (A)

അഭിപ്രായമില്ല (U)

വിയോജിക്കുന്നു(D)

എന്നിങ്ങനെ രേഖപ്പെടുത്തുക. നിങ്ങളുടെ പ്രതികരണം ഏതാണോ അതിനെ സൂചിപ്പിക്കുന്ന പ്രസ്താവന നമ്പറിനനുസൃതമായി കൊടുത്തിരിക്കുന്ന കോളത്തിൽ ‘✓’ ചിഹ്നം ഉപയോഗിച്ചു അടയാളപ്പെടുത്തുക. (സത്യസന്ധമായി പ്രതികരിക്കാൻ അഭ്യർത്ഥിക്കുന്നു. നിങ്ങളുടെ പ്രതികരണങ്ങൾ ഗവേഷണാവശ്യത്തിനു മാത്രം ഉപയോഗിക്കുന്നതുംതികച്ചും രഹസ്യമായി സൂക്ഷിക്കുന്നതുമാണ്).

1. ഞാൻ ഫെയ്സ്ബുക്ക്, ട്വിറ്റർ, വാട്ട്സആപ്പ് തുടങ്ങിയ ശൃംഖലകൾ ജോലിയുടെ ഭാഗമായി ഉപയോഗിക്കാറുണ്ട്.
2. പഠനം അർത്ഥവത്താകണമെങ്കിൽ നേരിട്ടു പറഞ്ഞുകൊടുക്കുന്ന രീതി തുടരണം.
3. സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുള്ള ബോധനരീതികളിൽ ഞാൻ ധാരാളം തയ്യാറെടുപ്പുകൾ നടത്താറുണ്ട്.
4. പഠഭാഗങ്ങളെ സാങ്കേതികവിദ്യ ഉപയോഗിച്ചു പഠിപ്പിക്കുന്നതിനു ഞാൻ മറ്റുള്ളവരുടെ സഹായം തേടാറുണ്ട്.
5. സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുള്ള ബോധനരീതി മറ്റേതു ബോധനരീതിയേക്കാളും മികവുറ്റതാണ്.
6. എന്റെ സ്കൂളിൽ IT@school Advisory council ആവശ്യമാണ്.

7. വിവിധ സാങ്കേതികവിദ്യകൾ എപ്പോഴും ചെലവേറിയതാണ്.
8. കുട്ടികൾ സാങ്കേതികവിദ്യകൾ ഉപയോഗിക്കുന്നതിൽ എന്നേക്കാളും കഴിവുറ്റവരാണ് എന്ന് എനിക്ക് തോന്നാറുണ്ട്.
9. മനസ്സിലാക്കാൻ ബുദ്ധിമുട്ടുള്ള സാങ്കേതിക പ്രവർത്തനരീതികളെക്കുറിച്ച് വ്യക്തമായ അറിവു നേടാൻ എനിക്കു സമയം ലഭിക്കാറില്ല.
10. ആവശ്യമായ വിവരങ്ങൾ ശേഖരിക്കാൻ ഞാൻ ഇന്റർനെറ്റ് സേവനങ്ങൾ ഉപയോഗിക്കാറുണ്ട്.
11. സഹായപാഠകരിൽ നിന്നും കുട്ടികളിൽ നിന്നും എന്റെ അധ്യാപനത്തെ സംബന്ധിച്ച അഭിപ്രായങ്ങൾ ശേഖരിക്കുകയും വേണ്ട മാറ്റങ്ങൾ വരുത്തുകയും ചെയ്യാറുണ്ട്.
12. സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുകൊണ്ടുള്ള അധ്യാപനരീതി അധ്യാപകരുടെ സർഗാത്മകശേഷിയെ തളർത്തുകയാണെന്നാണ് എന്റെ അഭിപ്രായം.
13. സാങ്കേതിക വിദ്യാഭ്യാസത്തെ സംബന്ധിച്ച in-service ട്രെയിനിംഗുകളിൽ ഞാൻ പങ്കെടുക്കാൻ ശ്രമിക്കുകയും ലഭിക്കുന്ന അറിവുകൾ പരീക്ഷണാടിസ്ഥാനത്തിൽ നടപ്പിൽ വരുത്തുകയും ചെയ്യാറുണ്ട്.
14. കുട്ടികളുടെ പഠനനിലവാരം ഉയർത്തുന്നതിൽ സാങ്കേതിക വിദ്യയ്ക്ക് പങ്കില്ല എന്നാണ് എന്റെ അഭിപ്രായം.
15. പഠനത്തിലും ബോധനത്തിലും സാങ്കേതികവിദ്യയുടെ ഉപയോഗ സാധ്യതകളെക്കുറിച്ച് ഞാൻ പലപ്പോഴും ചിന്തിക്കാറുണ്ട്.
16. അധ്യാപനത്തിനിടയിൽ കുട്ടികളോടു ചോദ്യങ്ങൾ ചോദിക്കാൻ എനിക്ക് ഇപ്പോൾ സമയം ലഭിക്കാറില്ല.
17. Content നു അനുയോജ്യമായ അധ്യാപനരീതി കണ്ടെത്താൻ എനിക്കു സാധിക്കുമെങ്കിലും അതിനു ചേർന്ന സാങ്കേതിക വിദ്യ കണ്ടെത്തുന്നതിൽ സങ്കീർണ്ണത അനുഭവപ്പെടാറുണ്ട്.
18. അധ്യാപനവേളയിൽ YouTube Videos കുട്ടികളെ കാണിക്കാൻ ശ്രമിക്കാറുണ്ട്.
19. എനിക്ക് സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുള്ള അധ്യാപനരീതികൾ പൂർണ്ണമായി നടപ്പിലാക്കാനുള്ള അവസരങ്ങൾ ലഭിക്കാറില്ല.
20. e-book ഉപയോഗിച്ചുകൊണ്ടു ഞാൻ പഠനസഹായികൾ ഉണ്ടാക്കാറുണ്ട്.
21. സാങ്കേതിക വിദ്യയ്ക്ക് പഠനാനുഭവങ്ങളെ വൈവിധ്യമാക്കാൻ സാധിക്കും.
22. എന്റെ വായനാശീലത്തെ ടെക്നോളജി പ്രതികൂലമായി ബാധിക്കുന്നുണ്ട്.
23. എന്റെ വിഷയവുമായി ബന്ധപ്പെട്ട സംശയനിവാരണങ്ങൾക്ക് ഞാൻ ഇ-ലൈബ്രറിയും വിക്സിപീഡിയയും ഉപയോഗിക്കാറുണ്ട്.
24. ക്ലാസ്റൂമുകളിൽ ലാപ്ടോപ്പ്, എൽ.സി.ഡി പ്രൊജക്ടർ എന്നിവ ഉപയോഗിച്ചുള്ള അധ്യാപനം കുട്ടികളുമായുള്ള എന്റെ ബന്ധത്തെ കൂടുതൽ ദൃഢമാക്കുകയാണ് ചെയ്യുന്നത്.
25. എന്റെ വിഷയത്തിലെ ചില കാര്യങ്ങൾ സാങ്കേതികവിദ്യ ഉപയോഗിച്ചു പഠിപ്പിക്കുന്നതാണ് അഭികാമ്യം എന്നു എനിക്കു തോന്നിയിട്ടുണ്ട്.

- 26. ഓരോ ക്ലാസുകളിലും എൽ.സി.ഡി പ്രൊജക്ടറുകൾ സ്ഥാപിക്കുന്നതു വളരെ നല്ലതാണ്.
- 27. അധ്യാപന കഴിവുകൾ വർദ്ധിപ്പിക്കുന്നതിന്റെ ഭാഗമായി ഞാൻ ബ്ലോഗുകൾ ഉപയോഗിക്കാൻ ശ്രമിക്കാറുണ്ട്.
- 28. അന്വേഷണത്വര വർദ്ധിപ്പിക്കുന്ന രീതിയിൽ കുട്ടികളുടെ സംശയങ്ങൾക്കു ഞാൻ പ്രതികരിക്കാറുണ്ട്.
- 29. കുട്ടികളെ വിലയിരുത്തുന്നതിനു വേണ്ടി ഞാൻ സാങ്കേതികവിദ്യ ഉപയോഗിക്കാൻ ശ്രമിക്കാറുണ്ട്.
- 30. കുട്ടികളിൽ സാങ്കേതികവിദ്യയോടു ഒരു അനുകൂല മനോഭാവം സൃഷ്ടിക്കാൻ എന്റെ അധ്യാപനരീതികൾക്ക് സാധിച്ചിട്ടുണ്ട്.
- 31. ഫലപ്രദമായും ക്രിയാത്മകമായും ബോധനസമയം ഞാൻ വിനിയോഗിക്കാറുണ്ട്.
- 32. എന്റെ അധ്യാപന കഴിവുകൾ വളർത്താൻ സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുകൊണ്ടുള്ള അധ്യാപനരീതി അഭികാമ്യമല്ല.
- 33. സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുള്ള അധ്യാപനരീതികൾ സമയനഷ്ടമാണ് സൃഷ്ടിക്കുന്നത്.
- 34. ഞാൻ ICT ഉപയോഗിക്കുന്നതിൽ സമർത്ഥയാണ് എന്നാണു എന്റെ വിശ്വാസം.
- 35. സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുകൊണ്ടുള്ള അധ്യാപന രീതികൾ കുട്ടികളുടെ ചിന്താശേഷിയെ തളർത്തുന്നു എന്നാണ് എന്റെ അഭിപ്രായം.
- 36. പാഠപുസ്തകങ്ങളിലും ടീച്ചർ ടെക്സ്റ്റുകളിലും ബോധനത്തിനു ആവശ്യമായി നൽകിയിട്ടുള്ള ഇന്റർനെറ്റ് വിലാസങ്ങൾ ഞാൻ ഉപയോഗിക്കാറുണ്ട്.
- 37. ഓപ്പൺ എജ്യൂക്കേഷണൽ റിസോഴ്സുകൾ ഉപയോഗിക്കുന്നതിലൂടെ എന്റെ വിഷയത്തിലുള്ള അറിവു വർദ്ധിപ്പിക്കാൻ ഞാൻ ശ്രമിക്കാറുണ്ട്.
- 38. സാങ്കേതികവിദ്യ ഉപയോഗിച്ചു ക്ലാസുകൾ എടുക്കുമ്പോൾ കുട്ടികളെ ശ്രദ്ധിക്കാൻ എനിക്ക് സാധിക്കാറില്ല.
- 39. കാര്യക്ഷമമായി പ്രവർത്തിക്കുന്ന കമ്പ്യൂട്ടർ ലാബുകൾ ഇവിടെയുണ്ട്.
- 40. സർവ്വീസിൽ കയറിയ ശേഷം സാങ്കേതികവിദ്യയിൽ കൂടുതൽ വിദ്യാഭ്യാസയോഗ്യതകൾ നേടാൻ ഞാൻ ശ്രമിച്ചിട്ടുണ്ട്.
- 41. എന്റെ വിഷയം കുട്ടികളിലേക്ക് എത്തിക്കാൻ സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുള്ള അധ്യാപനരീതി അനുയോജ്യമല്ല.
- 42. ICT ഉപയോഗിച്ചുകൊണ്ടുള്ള ക്ലാസുകൾ എനിക്കു ആത്മവിശ്വാസം നൽകുന്നതാണ്.

Appendix III

DRAFT (English version)

TECHNO PEDAGOGICAL ATTITUDE SCALE FAROOK TRAINING COLLEGE

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Instructions

Given below are some statements related to Techno Pedagogical Attitude .Each statements carries three responses as Agree, No opinion and Disagree. Read the statements carefully and put a [✓] mark against the most suitable response. Your response will be kept confidential and will be used only for research purpose.

1. I use Face Book, Twitter and Whats App as a part of my profession.
2. Inorder to make teaching more effective direct method of teaching must be continued.
3. I prepare a lot for technology enabled teaching.
4. I seek help from others for teaching with technology.
5. Information from internet is not at all real.
6. I try to make interest among students through transaction of content in an original valuable way.
7. Technology oriented teaching is more effective than any other method of teaching.
8. My school need IT@ School Advisory Council.
9. Different technologies are always expensive
10. I try to completely realize teaching objectives of each lesson.
11. I feel students are more skilled in using technology than me.
12. I don't get time to learn complex and difficult technological activities.
13. I use internet services for information.

14. I take feedback on my teaching and try to modify accordingly.
15. Technology oriented teaching will discourage creative skill of teachers.
16. I am vigilant about Softwares that appropriate to convey my subjects among students.
17. Lesson plan or planning is not important to convey lessons
18. I have doubts that students may find mistakes when technology is used for teaching.
19. I attend in-service training in educational technology and try to put it in practice in my teaching.
20. In my view technology has no role in improving the learning standards.
21. I often think about the wide scope of technology in teaching learning process.
22. I don't get time for asking questions during teaching.
23. Even though I can identify teaching method suitable to the content I find it difficult in choosing apt technology.
24. Teaching can't help to generate real inspiration among students
25. I use you tube videos for making teaching effective
26. I don't get chances to take technology oriented classes.
27. I use e-book for preparing learning aids.
28. Technology helps to diversify leaning experience
29. Technology poorly affects my reading habits
30. I use e-library and Wikipedia for clarifying doubts related to my subjects.
31. Currently not available the facility that selection of appropriate teaching methods based on individual difference of students.
32. Application of laptops and LC D projector in teaching helps me to strengthen teacher student relationships.
33. I often felt some topics in my subject can be taught better with technology.
34. It is Fine to fit L.C.D projector in each class room
35. . I attend webinars for improving subject knowledge
36. I use blogs to enhance my teaching skills.

37. I respond to student's doubts in a way that promote enquiry learning.
38. I often to take classes by using PowerPoint
39. I try to use technology to assess student learning. .
40. My teaching help to create favourable attitude among students towards technology.
41. I believe that errors will not occur in my teaching contents.
42. I use teaching time effectively and creatively.
43. I try to implement type of activities that helps to convey difficult ideas in the lessons into simplified form.
44. Technology enabled teaching does not promote my teaching skills.
45. Incorporating technology in classroom teaching is time consuming.
46. I believe I am proficient in using ICT.
47. In my opinion use of technology in learning discourages thinking skill of students.
48. I use internet addresses given in text books and resource book for teaching.
49. I use open educational resources to increase knowledge in my subject.
50. I do not use life related examples during teaching.
51. I make use of virtual classroom to motivate students in learning.
52. I can't give much attention to students while using technology in class room teaching.
53. Computer lab in my school is efficient and active.
54. I try to secure more qualifications in technology after entering service.
55. . I am not aware about how to transact content among students through technology.
56. I try to use mobile internet to clarify doubts of students.
57. I try to collect information through visit websites.
58. Technology oriented teaching is not suitable to transact my subjects to students.
59. ICT enabled classroom makes me confident.
60. Efficient teaching is possible only through technology.

Appendix IV

DRAFT (Malayalam version)

FAROOK TRAINING COLLEGE

TECHNO PEDAGOGICAL ATTITUDE SCALE

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നിർദ്ദേശങ്ങൾ

സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുകൊണ്ടുള്ള അധ്യാപനവൃത്തിയോടുള്ള നിങ്ങളുടെ മനോഭാവം അറിയുന്നതിനു വേണ്ടിയുള്ള ഏതാനും പ്രസ്താവനകളാണ് താഴെ കൊടുത്തിരിക്കുന്നത്. ഓരോ പ്രസ്താവനയും വായിച്ചശേഷം അതിനെക്കുറിച്ചുള്ള നിങ്ങളുടെ പ്രതികരണം, പ്രത്യേകം തന്നിരിക്കുന്ന ഉത്തരക്കടലാസിൽ

യോജിക്കുന്നു (അ)

അഭിപ്രായമില്ല (ഡ)

വിയോജിക്കുന്നു(ഉ)

എന്നിങ്ങനെ രേഖപ്പെടുത്തുക. നിങ്ങളുടെ പ്രതികരണം ഏതാണോ അതിനെ സൂചിപ്പിക്കുന്ന അക്ഷരത്തിനു താഴെ പ്രസ്താവന നമ്പറിനനുസൃതമായി കൊടുത്തിരിക്കുന്ന കോളത്തിൽ '✓' ചിഹ്നം ഉപയോഗിച്ചു അടയാളപ്പെടുത്തുക. (സത്യസന്ധമായി പ്രതികരിക്കാൻ അഭ്യർത്ഥിക്കുന്നു. നിങ്ങളുടെ പ്രതികരണങ്ങൾ ഗവേഷണാവശ്യത്തിനു മാത്രം ഉപയോഗിക്കുന്നതുംതികച്ചും രഹസ്യമായി സൂക്ഷിക്കുന്നതുമാണ്).

- 1. ഞാൻ ഫെയ്സ്ബുക്ക്, ട്വിറ്റർ, വാട്ട്സആപ്പ് തുടങ്ങിയ ശൃംഖലകൾ ജോലിയുടെ ഭാഗമായി ഉപയോഗിക്കാറുണ്ട്.
2. പഠനം അർത്ഥവത്താകണമെങ്കിൽ നേരിട്ടു പറഞ്ഞുകൊടുക്കുന്ന രീതി തുടരണം.
3. സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുള്ള ബോധനരീതികളിൽ ഞാൻ ധാരാളം തയ്യാറെടുപ്പുകൾ നടത്താറുണ്ട്.
4. പാഠഭാഗങ്ങളെ സാങ്കേതികവിദ്യ ഉപയോഗിച്ചു പഠിപ്പിക്കുന്നതിനു ഞാൻ മറ്റുള്ളവരുടെ സഹായം തേടാറുണ്ട്.
5. ഇന്റർനെറ്റിൽ നിന്നും നമുക്കു ലഭിക്കുന്ന വിവരങ്ങൾ ഒരിക്കലും യഥാർത്ഥ്യമാവാറില്ല.
6. പാഠ്യവസ്തുക്കളെ അതിന്റെ തനതായ മൂല്യത്തോടെ കൂട്ടികളിലേക്ക് എത്തിക്കാൻ ശ്രമിക്കുന്നതിലൂടെ അവരുടെ താല്പര്യം വർദ്ധിപ്പിക്കാൻ ശ്രമിക്കാറുണ്ട്.

- 7. സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുള്ള ബോധനരീതി മറ്റേതു ബോധനരീതിയേക്കാളും മികവുറ്റതാണ്.
- 8. എന്റെ സ്കൂളിൽ IT @school ആവശ്യമാണ്.
- 9. വിവിധ സാങ്കേതികവിദ്യകൾ എപ്പോഴും ചെലവേറിയതാണ്.
- 10. ഓരോ പാഠത്തിന്റെയും ബോധനോദേശ്യങ്ങൾ പൂർണ്ണമായും തിരിച്ചറിയാൻ ഞാൻ ശ്രമിക്കാറുണ്ട്.
- 11. കുട്ടികൾ സാങ്കേതികവിദ്യകൾ ഉപയോഗിക്കുന്നതിൽ എന്നേക്കാളും കഴിവുറ്റവരാണ് എന്ന് എനിക്ക് തോന്നാറുണ്ട്.
- 12. മനസ്സിലാക്കാൻ ബുദ്ധിമുട്ടുള്ള സാങ്കേതിക പ്രവർത്തനരീതികളെക്കുറിച്ച് വ്യക്തമായ അറിവു നേടാൻ എനിക്കു സമയം ലഭിക്കാറില്ല.
- 13. ആവശ്യമായ വിവരങ്ങൾ ശേഖരിക്കാൻ ഞാൻ ഇന്റർനെറ്റ് സേവനങ്ങൾ ഉപയോഗിക്കാറുണ്ട്.
- 14. സഹായ്യാപകരിൽ നിന്നും കുട്ടികളിൽ നിന്നും എന്റെ അധ്യാപനത്തെ സംബന്ധിച്ച അഭിപ്രായങ്ങൾ ശേഖരിക്കുകയും വേണ്ട മാറ്റങ്ങൾ വരുത്തുകയും ചെയ്യാറുണ്ട്.
- 15. സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുകൊണ്ടുള്ള അധ്യാപനരീതി അധ്യാപകരുടെ സർഗാത്മകമകശേഷിയെ തളർത്തുകയാണെന്നാണ് എന്റെ അഭിപ്രായം.
- 16. എന്റെ വിഷയത്തെ കുട്ടികളിലേക്ക് എത്തിക്കാൻ ഉതകുന്ന സോഫ്റ്റ്‌വെയറുകളെക്കുറിച്ച് ഞാൻ ബോധവനാണ്.
- 17. പാഠഭാഗങ്ങൾ വിനിമയം ചെയ്യുന്നതിൽ ആസൂത്രണരൂപരേഖ അത്ര പ്രധാനമല്ല.
- 18. സാങ്കേതികവിദ്യ ഉപയോഗിച്ചു ക്ലാസ് എടുക്കുമ്പോൾ ഏതെങ്കിലും തരത്തിലുള്ള തെറ്റുകൾ കുട്ടികൾ കണ്ടെത്തുമോ എന്നു ഞാൻ സംശയിക്കുന്നു.
- 19. സാങ്കേതിക വിദ്യാഭ്യാസത്തെ സംബന്ധിച്ച in-service ട്രെയിനിംഗുകളിൽ ഞാൻ പങ്കെടുക്കാൻ ശ്രമിക്കുകയും ലഭിക്കുന്ന അറിവുകൾ പരീക്ഷണാടിസ്ഥാനത്തിൽ നടപ്പിൽ വരുത്തുകയും ചെയ്യാറുണ്ട്.
- 20. കുട്ടികളുടെ പഠനനിലവാരം ഉയർത്തുന്നതിൽ സാങ്കേതിക വിദ്യയ്ക്ക് പങ്കില്ല എന്നാണ് എന്റെ അഭിപ്രായം.
- 21. പഠനത്തിലും ബോധനത്തിലും സാങ്കേതികവിദ്യയുടെ ഉപയോഗ സാധ്യതകളെക്കുറിച്ച് ഞാൻ പലപ്പോഴും ചിന്തിക്കാറുണ്ട്.
- 22. അധ്യാപനത്തിനിടയിൽ കുട്ടികളോടു ചോദ്യങ്ങൾ ചോദിക്കാൻ എനിക്ക് ഇപ്പോൾ സമയം ലഭിക്കാറില്ല.
- 23. content നു അനുയോജ്യമായ അധ്യാപനരീതി കണ്ടെത്താൻ എനിക്കു സാധിക്കുമെങ്കിലും അതിനു ചേർന്ന സാങ്കേതിക വിദ്യ കണ്ടെത്തുന്നതിൽ സങ്കീർണത അനുഭവപ്പെടാറുണ്ട്.
- 24. കുട്ടികളിൽ ശരിയായ പ്രചോദനങ്ങൾ ഉളവാക്കാൻ സാങ്കേതികവിദ്യയ്ക്കു ഒരിക്കലും സാധിക്കാറില്ല.

- 25. അധ്യാപനവേളയിൽ you tube videos കുട്ടികളെ കാണിക്കാൻ ശ്രമിക്കാറുണ്ട്.
- 26. എനിക്ക് സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുള്ള അധ്യാപനരീതികൾ പൂർണ്ണമായി നടപ്പിലാക്കാനുള്ള അവസരങ്ങൾ ലഭിക്കാറില്ല.
- 27. e-book ഉപയോഗിച്ചുകൊണ്ടു ഞാൻ പഠനസഹായികൾ ഉണ്ടാക്കാറുണ്ട്.
- 28. സാങ്കേതിക വിദ്യയ്ക്ക് പഠനാനുഭവങ്ങളെ വൈവിധ്യമാക്കാൻ സാധിക്കും.
- 29. എന്റെ വായനാശീലത്തെ ടെക്നോളജി പ്രതികൂലമായി ബാധിക്കുന്നുണ്ട്.
- 30. എന്റെ വിഷയവുമായി ബന്ധപ്പെട്ട സംശയനിവാരണങ്ങൾക്ക് ഞാൻ ഇ-ലൈബ്രറിയും വിക്സിപീഡിയയും ഉപയോഗിക്കാറുണ്ട്.
- 31. കുട്ടികളിലുള്ള വ്യക്തിവ്യത്യാസം പരിഗണിച്ച് അതിനനുസരിച്ചുള്ള ബോധന മാർഗങ്ങൾ സ്വീകരിക്കാനുള്ള സൗകര്യങ്ങൾ ഇപ്പോൾ ലഭ്യമല്ല.
- 32. ക്ലാസ്റൂമുകളിൽ ലാപ്ടോപ്പ്, എൽ.സി.ഡി പ്രൊജക്ടർ എന്നിവ ഉപയോഗിച്ചുള്ള ധ്യാപനം കുട്ടികളുമായുള്ള എന്റെ ബന്ധത്തെ കൂടുതൽ ദൃഢമാക്കുകയാണ് ചെയ്യുന്നത്.
- 33. എന്റെ വിഷയത്തിലെ ചില കാര്യങ്ങൾ സാങ്കേതികവിദ്യ ഉപയോഗിച്ചു പഠിപ്പിക്കുന്നതാണ് അഭികാമ്യം എന്നു എനിക്കു തോന്നിയിട്ടുണ്ട്.
- 34. ഓരോ ക്ലാസുകളിലും എൽ.സി.ഡി പ്രൊജക്ടറുകൾ സ്ഥാപിക്കുന്നതു വളരെ നല്ലതാണ്.
- 35. എന്റെ വിഷയത്തിലുള്ള അറിവുകൾ വർദ്ധിപ്പിക്കുന്നതിനായി ഞലയശിമുകളിൽ പങ്കെടുക്കാറുണ്ട്.
- 36. അധ്യാപന കഴിവുകൾ വർദ്ധിപ്പിക്കുന്നതിന്റെ ഭാഗമായി ഞാൻ ബ്ലോഗുകൾ ഉപയോഗിക്കാൻ ശ്രമിക്കാറുണ്ട്.
- 37. അന്വേഷണത്വര വർദ്ധിപ്പിക്കുന്ന രീതിയിൽ കുട്ടികളുടെ സംശയങ്ങൾക്കു ഞാൻ പ്രതികരിക്കാറുണ്ട്.
- 38. ഞാൻ powerpoint കൾ ഉപയോഗിച്ചാണ് പലപ്പോഴും ക്ലാസുകൾ എടുക്കാറുള്ളത്.
- 39. കുട്ടികളെ വിലയിരുത്തുന്നതിനു വേണ്ടി ഞാൻ ടെക്നോളജി ഉപയോഗിക്കാൻ ശ്രമിക്കാറുണ്ട്.
- 40. കുട്ടികളിൽ ടെക്നോളജിയോടു ഒരു അനുകൂല മനോഭാവം സൃഷ്ടിക്കാൻ എന്റെ അധ്യാപനരീതികൾക്ക് സാധിച്ചിട്ടുണ്ട്.
- 41. ഞാൻ പഠിപ്പിക്കുന്ന കാര്യങ്ങളിൽ തെറ്റുകൾ വരുകയില്ല എന്നാണ് എന്റെ വിശ്വാസം.
- 42. ഫലപ്രദമായും ക്രിയാത്മകമായും ബോധനസമയം ഞാൻ വിനിയോഗിക്കാറുണ്ട്.
- 43. പാഠഭാഗങ്ങളിലുള്ള സങ്കീർണ്ണമായ ആശയങ്ങളെ ലളിതവൽക്കരിക്കുന്ന തരത്തിലുള്ള പ്രവർത്തനങ്ങൾ ക്ലാസ് മുറികളിൽ ഞാൻ നടപ്പിലാക്കാൻ ശ്രമിക്കാറുണ്ട്.

- 44. എന്റെ അധ്യാപന കഴിവുകൾ വളർത്താൻ ടെക്നോളജി ഉപയോഗിച്ചുകൊണ്ടുള്ള അധ്യാപനരീതി അഭികാമ്യമല്ല.
- 45. ടെക്നോളജി ഉപയോഗിച്ചുള്ള അധ്യാപനരീതികൾ സമയനഷ്ടമാണ് സൃഷ്ടിക്കുന്നത്.
- 46. ഞാൻ ICT ഉപയോഗിക്കുന്നതിൽ സമർത്ഥയാണ് എന്നാണു എന്റെ വിശ്വാസം.
- 47. സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുകൊണ്ടുള്ള അധ്യാപന രീതികൾ കുട്ടികളുടെ ചിന്താശേഷിയെ തളർത്തുന്നു എന്നാണ് എന്റെ അഭിപ്രായം.
- 48. പാഠപുസ്തകങ്ങളിലും ടീച്ചർ ടെക്സ്റ്റുകളിലും ബോധനത്തിനു ആവശ്യമായ ഇന്റർനെറ്റ് വിലാസങ്ങൾ നൽകിയിട്ടുണ്ട്.
- 49. ഓപ്പൺ എജ്യൂക്കേഷണൽ റിസോഴ്സുകൾ ഉപയോഗിക്കുന്നതിലൂടെ എന്റെ വിഷയത്തിലുള്ള അറിവു വർദ്ധിപ്പിക്കാൻ ഞാൻ ശ്രമിക്കാറുണ്ട്.
- 50. ബോധന സമയങ്ങളിൽ നിത്യജീവിതവുമായി ബന്ധപ്പെട്ട ഉദാഹരണങ്ങൾ ഞാൻ ഉപയോഗിക്കാറില്ല.
- 51. വെർച്വൽ ക്ലാസ്സറൂമുകളിലൂടെ കുട്ടികളുടെ താല്പര്യം വർദ്ധിപ്പിക്കാൻ ഞാൻ ശ്രമിക്കാറുണ്ട്.
- 52. സാങ്കേതികവിദ്യ ഉപയോഗിച്ചു ക്ലാസുകൾ എടുക്കുമ്പോൾ കുട്ടികളെ ശ്രദ്ധിക്കാൻ എനിക്ക് സാധിക്കാറില്ല.
- 53. കാര്യക്ഷമമായി പ്രവർത്തിക്കുന്ന കമ്പ്യൂട്ടർ ലാബുകൾ ഇവിടെയുണ്ട്.
- 54. സർവ്വീസിൽ കയറിയ ശേഷം സാങ്കേതികവിദ്യയിൽ കൂടുതൽ വിദ്യാഭ്യാസ യോഗ്യതകൾ നേടാൻ ഞാൻ ശ്രമിച്ചിട്ടുണ്ട്.
- 55. സാങ്കേതികവിദ്യ ഉപയോഗിച്ചു content എങ്ങനെ കുട്ടികളിലേക്ക് എത്തിക്കണം എന്നതിനേക്കുറിച്ചുള്ള അറിവ് എനിക്ക് കുറവാണ്.
- 56. കുട്ടികളുടെ സംശയനിവാരണത്തിനുവേണ്ടി ഞാൻ മൊബൈൽ ഇന്റർനെറ്റ് ഉപയോഗിക്കാൻ ശ്രമിക്കാറുണ്ട്.
- 57. വെബ്സൈറ്റുകൾ സന്ദർശിച്ച് വിവരങ്ങൾ ശേഖരിക്കാൻ ശ്രമിക്കാറുണ്ട്.
- 58. എന്റെ വിഷയം കുട്ടികളിലേക്ക് എത്തിക്കാൻ ടെക്നോളജി ഉപയോഗിച്ചുള്ള അധ്യാപനരീതി അനുയോജ്യമല്ല.
- 59. ICT ഉപയോഗിച്ചുകൊണ്ടുള്ള ക്ലാസുകൾ എനിക്കു ആത്മവിശ്വാസം നൽകുന്നതാണ്.
- 60. കാര്യക്ഷമമായ ബോധനം സാങ്കേതികവിദ്യയിലൂടെ മാത്രമേ സാധ്യമാകൂ.

Appendix V
FINAL (English version)
FAROOK TRAINING COLLEGE
DIGITAL LITERACY TEST

Mohammed Sareef. K
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M.Ed Student
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Directions

This is a test to assess' knowledge of secondary school teachers in IT subject. Carefully read all questions and mark yours answers by putting (√) mark only in the response sheet given separately. The information will only be used for research purpose and its secrecy is ensured.

Example: Which of the following is an output device of computer?

a) Mouse b)Printer c)Hard disk d) Keyboard

1. Storage area for E-mail messages is called.....
a) Folder b) File c) Mailbox d) Directory
2. Which is known as brain of computer?
a) LLU b)CPU c) RAM d) LAN
3. Which is not an integral part of computer?
a)CPU b) Mousec)Monitor d) UPS
4. What is the keyboard key using for transferring output into capital letter in English?
a) Shift key b) Enter key c) Caps lock d) ctrl key
5. Which is the most appropriate software for prepare mark lists?
a) Text Editor b) Spread Sheet c) Presentation Software d) Image Editor
6. Which type of user ID symbol used in an e-mail address?
a) # b) @ c) & d) \$

7. The machine part of computer is called.....
 - a) Monitor b) CPU c) Hardware d) Software
8. Which one of the following is 'Search Engine'?
 - a) Flash b) Internet Explorer c) Google d) USB
9. Which indicates the red coloured underline in text documents?
 - a) Important information b) Spelling mistakes
 - c) Headings d) Grammar Mistakes
10. To open an action by using mouse
 - a) Click left button b) Click right button
 - c) Double click left button d) Double click right button
11. What is known as pen drive (Thumb Drive)
 - a) A device to avail internet facility b) A device to draw pictures
 - c) A device to store information d) Another name for hard disk
12. For what purpose the command 'undo' is used in window?
 - a) To avoid the work did last b) To switch off computer
 - c) To repeat the work did last d) To close a window
13. Which option in file pull-down menu is used to close a file in MSWord?
 - a) New b) Quit c) Close d) Exit
14. What is the purpose of LCD projector?
 - a) To display pictures without help of computer
 - b) To display movies in theatre
 - c) To project the scenes on monitor to screen
 - d) To give information to computer with the help of pictures
15. What is 'VIRUS'?
 - a) Dust particles that damages computer
 - b) The programme that damages files in the computer

- c) The damages of computer due to long term use
 - d) Unusable soft wares
16. What is meant by 'Animation'?
- a) Drawing picture using digital camera
 - b) Displaying the pictures using computer
 - c) Drawing pictures using computer
 - d) Making pictures dynamic
17. Which command is used to store information permanently in computer?
- a) Edit b) Copy c) Save d) Paste
18. The process of writing data to CD is called.....
- a)Loading b) Writing c) Backup d) Burning
19. Group of instructions that directs a computer is called.....
- a) Storage b) Memory c) Programme d) Logic
20. What is the common name for the extensions like '.com', '.org' at the end of web site addresses?
- a) Range b) Password c) Domain d) Identifier
21. The main circuit –board of the system unit is.....
- a) Computer programme b) Central unit c) Motherboard d) RAM
22. In computers, which number system is used for data storage and Processing?
- a) Hexa Decimal b)Binary c) Decimal d) Octal
23. Starting process of a computer is known as.....
- a) Login b) Surfing c) Browsing d) Booting
24. Short key that used to copy of a content is.....
- a) Ctrl+V b) Ctrl+ C c) Ctrl+P d) Ctrl+F
25. Which of the following is the device required for internet connection?
- a) Joystick b) CD Drive c) Ctrl + p d) Ctrl+F
26. The network of the computers in your school is an example of.....
- a) LAN b) WAN c) Web d) Internet

27. Excel uniquely identifies cells within a worksheet is based on.....
- a) Cell name b) Column number & row letter
 - c) column letter & row number d) cell locator coordinates
28. How to create a new folder in windows?
- a) Right click + select new folder
 - b) Double click + select view
 - c) Left click +select new folder
 - d) Double click on desktop
29. Which of the following is the set of basic commands required to Function a computer?
- a) Windows b) Operating System
 - c) Programme d) Application Software
30. CD Rom is an.....
- a) Magnetic Disc b) optical Disc
 - c) Laser Disc d) electromagnetic Disc
31. Programming language used to design web pages is.....
- a) Oracle b) HTML c) Java d) C++
32. Which of the following is the major factor in determining the quickness of the computer?
- a) Storage capacity of hard disc
 - b) Efficiency of micro processor
 - c) Size of the computer
 - d) Number of programmes
33. What is known as Grammar of a programming language?
- a) Password b) Key words c) Syntax d) Rules
34. Which of the following is most suitable to prepare Letters, pamphleteers, project reports etc?
- a) Libre Office Draw b) Libre Office Writer
 - c) Libre Office Impress d) Libre Office Calc

35. Cache memory is used in computers for.....
- a) Extend memory capacity
 - b) Increase speed
 - c) Increase accuracy
 - d) Protect data loss due to power failure
36. Which is the directory in windows operating system, similar to 'Home' in Linux operating system?
- a) My computer
 - b) Start
 - c) My document
 - d) My folder
37. Which folder used in GNU/LINUX to store unused file?
- a) Trash b) Home c) Recycle bin d) Delete
38. Unit of memory storage of computer is.....
- a) Site b) Bit c) Kbps d) Hertz (Hz)
39. Which shortcut key that used to run a slide show in MS PowerPoint?
- a)F1 b) F5 c) F9 d) F10
40. In GNU/LINUX..... Programme can be used to draw pictures.
- a) Writer b) MS Paint c) GIMP d) PowerPoint

Appendix VI
FINAL(Malayalam version)
FAROOK TRAINING COLLEGE
DIGITAL LITERACY TEST

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നിർദ്ദേശങ്ങൾ

IT വിഷയത്തിലുള്ള സെക്കണ്ടറി സ്കൂൾ അധ്യാപകരുടെ അറിവ് അളക്കുന്നതിനുള്ള ഒരു ടെസ്റ്റ് ആണിത്. ഓരോ ചോദ്യങ്ങളും ശ്രദ്ധയോടെ വായിച്ചശേഷം നിങ്ങളുടെ ഉത്തരം ഏതാണോ അതിനെ സൂചിപ്പിക്കുന്ന നമ്പറിന് നേരെയുള്ള അക്ഷരത്തിന്റേകോളത്തിൽ '✓' ചിഹ്നം ഉപയോഗിച്ചു അടയാളപ്പെടുത്തുക. (സത്യസന്ധമായി പ്രതികരിക്കാൻ അഭ്യർത്ഥിക്കുന്നു. നിങ്ങളുടെ പ്രതികരണങ്ങൾ ഗവേഷണാവശ്യത്തിനുമാത്രം ഉപയോഗിക്കുന്നതും തികച്ചും രഹസ്യമായി സൂക്ഷിക്കുന്നതുമാണ്).

1. ഇ-മെയിൽ മെസേജുകളുടെ storage area ആണ് -----
 a) folder b) file c) mail box d) directory
2. കമ്പ്യൂട്ടറിന്റെ brain എന്നറിയപ്പെടുന്നത്?
 a) LLU b) CPU c) RAM d) LAN
3. കമ്പ്യൂട്ടറിന്റെ Integral part അല്ലാത്തവ ഏത്?
 a) CPU b) mouse c) monitor d) UPS
4. ഔട്ട്പുട്ട് ഇംഗ്ലീഷിൽ capital letter ൽ ആക്കുന്നതിനായി ഉപയോഗിക്കുന്ന keyboard ലെ key ഏതാണ്?
 a) Shift key b) enter key c) caps lock d) ctrl key
5. മാർക്കുലിസ്റ്റുകൾ തയ്യാറാക്കാൻ ഏറ്റവും അനുയോജ്യമായ സോഫ്റ്റ്‌വെയർ ഏതാണ്?
 a) text editor b) spread sheet
 c) presentation software d) image editor

- 6. ഇ-മെയിൽ അഡ്രസ്സിൽ നാം ഉപയോഗിക്കുന്ന user ID സൂചകം ഏതാണ്?
 - a) #
 - b) @
 - c) &
 - d) \$
- 7. കമ്പ്യൂട്ടറിന്റെ യന്ത്രഭാഗങ്ങളെ --- എന്നു വിളിക്കുന്നു
 - a) മോണിറ്റർ
 - b) CPU
 - c) ഹാർഡ്‌വെയർ
 - d) സോഫ്റ്റ്‌വെയർ
- 8. താഴെ പറയുന്നവയിൽ 'Search Engine' ഏത്?
 - a) flash
 - b) internet explorer
 - c) google
 - d) USB
- 9. ടെക്സ്റ്റ് ഡോക്യുമെന്റുകളിൽ വാക്കുകൾക്കിടയിൽ ചുവന്ന അടിവര ദൃശ്യമാകുന്നത് സൂചിപ്പിക്കുന്നത് എന്തിനെയാണ്?
 - a) പ്രധാനവിവരങ്ങൾ
 - b) അക്ഷരതെറ്റുകൾ
 - c) ശീർഷകങ്ങൾ
 - d) വ്യാകരണ തെറ്റുകൾ
- 10. ഒരു File open ചെയ്യുമ്പോൾ mouse ൽ നാം ഉപയോഗിക്കുന്ന action ഏതാണ്?
 - a) click left button
 - b) click right button
 - c) doubleclick left button
 - d) double click right button
- 11. പെൻഡ്രൈവ് എന്നറിയപ്പെടുന്നതു എന്താണ്?
 - a) ഇന്റർനെറ്റ് സൗകര്യം ലഭ്യമാക്കുന്നതിനുള്ള ഒരു ഉപകരണം.
 - b) കമ്പ്യൂട്ടറിൽ ചിത്രങ്ങൾ വരക്കാനുള്ള ഒരു ഉപകരണം.
 - c) വിവരങ്ങൾ സംഭരിച്ച് വെക്കുന്നതിനുള്ള ഒരു ഉപകരണം.
 - d) ഹാർഡ് ഡിസ്കിന്റെ മറ്റൊരു പേര്.
- 12. windows ൽ 'undo' എന്ന നിർദ്ദേശം ഉപയോഗിക്കുന്നത് എന്തിന്?
 - a) ഏറ്റവും അവസാനം ചെയ്ത പ്രവൃത്തി ഒഴിവാക്കാൻ
 - b) കമ്പ്യൂട്ടർ ഓഫ് ചെയ്യാൻ
 - c) ഏറ്റവും അവസാനം ചെയ്ത പ്രവൃത്തി ആവർത്തിക്കാൻ
 - d) വിൻഡോസ് ക്ലോസ് ചെയ്യാൻ
- 13. MS Wordലെ ഒരുfile close ചെയ്യാൻ താഴെ പറയുന്ന ഏതു option ആണ്സീകരിക്കേണ്ടത്?
 - a) new
 - b) quite
 - c) close
 - d) exit

- 14. LCD Projector ഉപയോഗിക്കുന്നതിന്റെ ആവശ്യകത എന്ത്?
 - a) കമ്പ്യൂട്ടറിന്റെ സഹായമില്ലാതെ ചിത്രങ്ങൾ സ്ക്രീനിൽ പ്രദർശിപ്പിക്കുന്നതിന്
 - b) തിയറ്ററുകളിൽ സിനിമ പ്രദർശിപ്പിക്കുന്നതിന്
 - c) മോണിറ്ററിലെ ദൃശ്യങ്ങൾ സ്ക്രീനിൽ പ്രദർശിപ്പിക്കുന്നതിന്
 - d) കമ്പ്യൂട്ടറിലേക്ക് ചിത്ര സഹായത്തോടെ വിവരങ്ങൾ നൽകുന്നതിന്.

- 15. വൈറസ് (VIRUS) എന്താണ്?
 - a) കമ്പ്യൂട്ടറിനെ തകരാറിലാക്കുന്ന പൊടിപടലങ്ങൾ
 - b) കമ്പ്യൂട്ടറിലെ ഫയലുകൾ കേടുവരുത്തുന്ന പ്രോഗ്രാം
 - c) പഴക്കം മൂലം കമ്പ്യൂട്ടറിൽ സംഭവിക്കുന്ന കേടുപാടുകൾ
 - d) ഉപയോഗശൂന്യമായ സോഫ്റ്റ്‌വെയറുകൾ

- 16. Animation എന്നാലെന്താണ്?
 - a) ഡിജിറ്റൽ ക്യാമറ ഉപയോഗിച്ചുള്ള ചിത്രരചന
 - b) കമ്പ്യൂട്ടറിന്റെ സഹായത്തോടെ ചിത്രങ്ങൾ പ്രദർശിപ്പിക്കുന്നു.
 - c) കമ്പ്യൂട്ടർ ഉപയോഗിച്ചുള്ള ചിത്രരചന
 - d) ചിത്രങ്ങൾക്ക് ചലനാത്മകത നൽകൽ

- 17. വിവരങ്ങൾ സ്ഥിരമായി കമ്പ്യൂട്ടറിൽ സൂക്ഷിച്ചുവെക്കുന്നതിനായി ഏത് നിർദ്ദേശമാണ് നൽകേണ്ടത്?

| | | | |
|---------|---------|---------|----------|
| a) Edit | b) copy | c) save | d) paste |
|---------|---------|---------|----------|

- 18. Data യെ CD യിലേക്കു write ചെയ്യുന്ന പ്രക്രിയ ആണ് -----

| | | | |
|------------|------------|------------|------------|
| a) loading | b) writing | c) back up | d) burning |
|------------|------------|------------|------------|

- 19. കമ്പ്യൂട്ടറിനെ പ്രവർത്തനക്ഷമമാക്കുന്ന ഒരു കൂട്ടം നിർദ്ദേശങ്ങളാണ്?

| | | | |
|------------|-----------|--------------|----------|
| a) storage | b) memory | c) programme | d) logic |
|------------|-----------|--------------|----------|

- 20. വെബ്സൈറ്റ് വിലാസങ്ങളുടെ അവസാനഭാഗങ്ങളിൽ കാണുന്ന '.com', '.org' എന്നിവയ്ക്ക് പൊതുവിൽ പറയുന്ന പേര് എന്താണ്?

| | | | |
|----------|-------------|-----------|---------------|
| a) range | b) password | c) domain | d) identifier |
|----------|-------------|-----------|---------------|

21. കമ്പ്യൂട്ടർ യൂണിറ്റിന്റെ പ്രധാന circuit board ആണ് -----
a) computer programme b) central unit c) mother board d) RAM
22. കമ്പ്യൂട്ടറിൽ ഡാറ്റ സൂക്ഷിക്കുന്നതിനായി ഉപയോഗിക്കുന്ന നമ്പർ സംവിധാനം ഏതാണ്?
a) hexa decimal b) binary c) decimal d) octal
23. ഒരു കമ്പ്യൂട്ടർ പ്രവർത്തന സജ്ജമാകുന്നതുവരെയുള്ള പ്രക്രിയയാണ് -----
a) ലോഗിൻ b) സർഫിംഗ് c) ബ്രൗസിംഗ് d) ബൂട്ടിംഗ്
24. ഒരു content നെ copy ചെയ്യുന്നതിന് ഉപയോഗിക്കുന്ന short key ആണ് -----
a) Ctrl + V b) Ctrl +c c) Ctrl + p d) Ctrl + F
25. താഴെ പറയുന്നവയിൽ ഇന്റർനെറ്റ് connection നു ആവശ്യമായ device ഏതാണ്?
a) Joystick b) CD Drive c) modem d) key board
26. നിങ്ങളുടെ സ്കൂളിലെ കമ്പ്യൂട്ടറുകൾ തമ്മിൽ ബന്ധിപ്പിച്ചിരിക്കുന്നതു -----
---- ശൃംഖലയ്ക്ക് ഉദാഹരണമാണ്?
a) WAN b) LAN c) web d) internet
27. Excel ലെ സെല്ലുകളുടെ പേരുകൾ arrange ചെയ്തിരിക്കുന്നത്----- ന്റെ അടിസ്ഥാനത്തിലാണ്.
a) cell name b) column number & row letter
c) column letter & row number d) cell locater coordinates
28. windows പുതിയ ഫോൾഡർ ഉണ്ടാക്കുന്നത് എങ്ങനെയാണ്?
a) right click + select new folder b) double click + select view
c) left click + select new folder d) double click on desktop
29. താഴെ കൊടുത്തവയിൽ കമ്പ്യൂട്ടർ പ്രവർത്തിക്കാൻ ഏറ്റവും ആവശ്യമായ സംവിധാനം ഏത്?
a) windows b) operating system
c) programme d) application software
30. CD Rom എന്നത് ----- ആണ്.
a) magnetic disc b) optical disc c) laser disc d) electromagnetic disc

31. വെബ്ബ്‌പേജുകൾ ഉണ്ടാക്കാൻ ഉപയോഗിക്കുന്ന പ്രോഗ്രാമിംഗ് ഭാഷയാണ് -----
- a) Oracle b) HTML c) Java d) C++
32. താഴെ പറയുന്നവയിൽ കമ്പ്യൂട്ടറിന്റെ പ്രവർത്തന വേഗത നിർണ്ണയിക്കുന്നത് എന്ത്?
- a) ഹാർഡ് ഡിസ്കിന്റെ സംഭരണശേഷി
- b) മൈക്രോ പ്രോസസറിന്റെ പ്രവർത്തനശേഷി
- c) കമ്പ്യൂട്ടറിന്റെ വലുപ്പം
- d) പ്രോഗ്രാമുകളുടെ എണ്ണം
33. ഒരു കമ്പ്യൂട്ടർ പ്രോഗ്രാമിംഗ് ലാംഗ്വേജിന്റെ വ്യാകരണമെന്നു അറിയപ്പെടുന്നത് എന്താണ്?
- a) password b) keywords c) syntax d) rules
34. കത്തുകൾ, ലഘുലേഖകൾ, പ്രൊജക്ട് റിപ്പോർട്ടുകൾ തുടങ്ങിയവ തയ്യാറാക്കാൻ ഏറ്റവും അനുയോജ്യമായ പ്രോഗ്രാം ഏതാണ്?
- a) libre office draw b) libre office writer
- c) libre office impress d) libre office calc
35. കമ്പ്യൂട്ടറിൽ cache memory ഉപയോഗിക്കുന്നത് ----- വേണ്ടിയാണ്.
- a) memory capacity വർദ്ധിപ്പിക്കുന്നതിന്
- b) speed വർദ്ധിപ്പിക്കുന്നതിന്
- c) കൃത്യത വർദ്ധിപ്പിക്കുന്നതിന്
- d) പവർ ഇല്ലാത്ത സമയങ്ങളിൽ data നഷ്ടപ്പെടുന്നത് തടയുന്നതിന്
36. LINUX ൽ Home എന്ന ഡയറക്ടറിക്ക് പകരമായി windows ഓപ്പറേറ്റിംഗ് സിസ്റ്റത്തിൽ ഉപയോഗിക്കുന്നത് ഏത് ഡയറക്ടറി ആണ്?
- a) my computer b) start c) my documents d) my folder
37. GNU/LINUX ആവശ്യമില്ലാത്ത ഫയലുകൾ സൂക്ഷിക്കുന്നതിനുവേണ്ടി ഉപയോഗിക്കുന്ന ഫോൾഡർ ഏതാണ്?
- a) ട്രാഷ് b) ഹോം c) റീസൈക്കിൾബിൻ d) ഡിലീറ്റ്
38. കമ്പ്യൂട്ടർ മെമ്മറിയുടെ സംഭരണശേഷിയുടെ യൂണിറ്റ് ---- ആണ്.
- a) സൈറ്റ്, b) ബിറ്റ് c) kbps d) ഹെർട്ട്സ് (H₂)

39. Power point ൽ slide show run ചെയ്യുന്നതിനായി ഉപയോഗിക്കുന്ന short key ഏതാണ്?
- a) F1 b) F5 c) F9 d) F10
40. GNU/LINUX ൽ ചിത്രം വരക്കാനുപയോഗിക്കുന്ന പ്രോഗ്രാം -----ആണ്.
- a) writer b) MS paint c) GIMP d) Power point

Appendix VII**SCORING KEY**

| Question No. | Answer |
|--------------|--------|
| 1 | C |
| 2 | B |
| 3 | D |
| 4 | C |
| 5 | B |
| 6 | B |
| 7 | C |
| 8 | C |
| 9 | B |
| 10 | C |
| 11 | C |
| 12 | C |
| 13 | C |
| 14 | C |
| 15 | B |
| 16 | D |
| 17 | C |
| 18 | D |
| 19 | C |
| 20 | C |

| Question No. | Answer |
|--------------|--------|
| 21 | C |
| 22 | B |
| 23 | D |
| 24 | B |
| 25 | C |
| 26 | B |
| 27 | C |
| 28 | A |
| 29 | B |
| 30 | B |
| 31 | B |
| 32 | B |
| 33 | C |
| 34 | B |
| 35 | B |
| 36 | A |
| 37 | A |
| 38 | B |
| 39 | B |
| 40 | C |

APPENDIX VIII
FAROOK TRAINING COLLEGE
DIGITAL LITERACY TEST

RESPONSE SHEET

PERSONAL DATA

Name of the teacher : Age: Gender : Male/Female
 Name of the school : Locality : Urban/Rural
 Subject : Type of Management : Govt. /Aided

മാതൃക: താഴെ പറയുന്നതിൽ കമ്പ്യൂട്ടറിന്റെ ഔട്ട്പുട്ട് സംവിധാനം ഏതാണ്?

- a) മൗസ് b) പ്രിന്റർ c) ഹാർഡ് ഡിസ്ക് d) കീബോർഡ്

| Sl.No. | A | B | C | D |
|--------|---|---|---|---|
| 1 | | ✓ | | |

| Sl.No. | A | B | C | D |
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Appendix IX

FAROOK TRAINING COLLEGE
TECHNO PEDAGOGICAL ATTITUDE SCALE
RESPONSE SHEET

PERSONAL DATA

Name : Age: Gender: Male/Female
School : Type of Management: Govt /Aided
Subject: Locality: Urban/Rural

മാതൃക: 1) സാങ്കേതികവിദ്യ ഉപയോഗിച്ചുകൊണ്ടുള്ള അധ്യാപനരീതി എനി കിഷ്ടമാണ്.

| ക്രമ നമ്പർ | യോജി ക്കുന്നു | അഭിപ്രായമില്ല | വിയോജി ക്കുന്നു |
|------------|---------------|---------------|-----------------|
| 1 | ✓ | | |

| ക്രമ നമ്പർ | യോജി ക്കുന്നു | അഭിപ്രായമില്ല | വിയോജി ക്കുന്നു |
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| ക്രമ നമ്പർ | യോജി ക്കുന്നു | അഭിപ്രായമില്ല | വിയോജി ക്കുന്നു |
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