

STUDY OF ICT SKILL FOR QUALITY TEACHING AND LEARNING

BY

SADIA SULTANA

ID: 151-15-5354

MD. EBRAHIM JOY

ID: 151-15-5112

AND

MD. SALAUDDIN MAHMUD

ID: 151-15-5045

This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

Supervised By

Prof. Dr. Syed Akhter Hossain

Head

Department of Computer Science and Engineering

Daffodil International University



DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

DECEMBER 2018

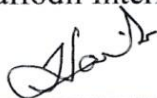
APPROVAL

This Project titled “Study of ICT Skill for Quality Teaching and Learning”, submitted by **Sadia Sultana**, ID No: **151-15-5354**, **Md. Ebrahim Joy**, ID NO: **151-15-5112** and **Md. Salauddin Mahmud**, ID NO: **151-15-5045** to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering (BSc) and approved as to its style and contents. The presentation has been held on **11th December 2018**.

BOARD OF EXAMINERS

Dr. Syed Akhter Hossain
Professor and Head

Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University



Chairman

Dr. Sheak Rashed Haider Noori

Associate Professor and Associate Head
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University



Internal Examiner

Md. Zahid Hasan

Assistant Professor
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University



Internal Examiner

Dr. Mohammad Shorif Uddin
Professor

Department of Computer Science and Engineering
Jahangirnagar University

External Examiner

DECLARATION

We hereby declare that, this research has been done by us under the supervision of **Prof. Dr. Syed Akhter Hossain, Head, Department of CSE** Daffodil International University. We also declare that neither this Research nor any part of this Research has been submitted elsewhere for award of any degree or diploma.

Supervised by:

Prof. Dr. Syed Akhter Hossain
Head
Department of Computer Science and Engineering
Daffodil International University

Submitted by:

Sadia Sultana
ID: 151-15-5354
Department of CSE
Daffodil International University

Md. Ebrahim Joy
ID: 151-15-5112
Department of CSE
Daffodil International University

Md. Salauddin Mahmud
ID: 151-15-5045
Department of CSE
Daffodil International University

ACKNOWLEDGEMENT

First of all, we would like to express our heartiest thanks and gratefulness to almighty Allah for the divine blessings which helped and allowed us to complete this thesis successfully.

Our sincere thanks also goes to **Dr. Syed Akhter Hossain**, Professor and Head Department of Computer Science and Engineering Daffodil International University for his continuous support of our research study and also for his immense sense, motivation for our work. His guidance encourage us in all the time of research and writing of this thesis.

Our special thanks also goes to our honorable sir **Dr. Touhid Bhuiyan**, Head of Software Department along with **Md. Saiful Islam, Zerin Nasrin Tumpa, Rezwana Sultana** and all others who helped us to make the thesis successful by their insightful illustration and encouragement on various perspective.

We give our deepest thanks to all the teacher who were filled up the survey form by spending their valuable time.

Last but not the least, we want to say thanks to all the staff and faculty member of Computer Science & Engineering Department of Daffodil International University.

ABSTRACT

Information and Communication Technology (ICT) is widely used in every sector and part of our life. ICT represents its usefulness in every sector of humankind. ICT mentions the technologies that give access to information through technologies. ICT is very similar to information technologies but it mainly focuses on communication technologies. It contains the Internet, wireless networks, cell phones, and another communication system. ICT is an amazing set of technological tools and resources which is used to communicate, create, store, manage and publish information. These technologies involve computers, the internet, broadcasting technologies such as radio, television, and telephony. A skill is a rational efficiency to complete a task with pre-determined outcomes often within a definite amount of time, energy or both. In other words, the skill may be the capabilities that a person possesses. Teaching and learning is the most significant method in education. Teaching may be defined as the system to help a learner to learn. The quality of education depends on the quality of teaching and learning. The rate of growth and development of a nation depends on the quality teaching and learning. Different kinds of researches proved that the use of ICT is the best instrument for the teaching and learning process. 21st century learners own the characteristics like self-conducted and lifelong learners, legendary leaders, cooperating informer, conscious and adopt information manager adopt and learned performances, caring universal citizens, humble critical thinkers etc. To develop these characteristics of 21st-century learner teacher must be used to ICT. This paper describes the study of ICT skills for quality teaching and learning. Based on the present trend of education, the project is conceived to determine the quality parameters to teaching and learning using data mining. The research is conducted based on the survey data gathered from the students and teachers. This paper mainly finds out the various skill of teachers to ensure quality teaching and learning. In the future the proposed work will be further enhanced based on real-time data.

TABLE OF CONTENTS

CONTENS	PAGE
Board of examiners	i
Declaration	ii
Acknowledgements	iii
Abstract	iv
CHAPTER	
CHAPTER 1: INTRODUCTION	1-3
1.1 Introduction	1
1.2 Motivation	1
1.3 Rationale of the Study	2
1.4 Research Question	2
1.5 Expected Outcome	2
1.6 Report Layout	2
CHAPTER 2: BACKGROUND	4-6
2.1 Introduction	4
2.2 Related Works	4
2.3 Research Summary	6
2.4 Scope of the Problem	6
2.5 Challenges	6

CHAPTER 3: RESEARCH METHODOLOGY	7-15
3.1 Introduction	7
3.2 Research Subject and Instrumentation	8
3.3 Data Collection Procedure	8
3.4 Statistical Analysis	9
3.5 Implementation Requirements	15
CHAPTER 4: EXPERIMENTAL RESULTS AND DISCUSSION	16-22
4.1 Introduction	16
4.2 Experimental Results	16
4.3 Descriptive Analysis	19
4.4 Summary	22
CHAPTER 5: SUMMARY AND CONCLUSION	23-24
5.1 Summary of the Study	23
5.2 Conclusions	23
5.3 Recommendations	24
5.4 Implication for Further Study	24
REFERENCES	25-25
APPENDIX	26-28

LIST OF FIGURES

FIGURES	PAGE NO
Figure 3.1: Work flow of the study	07
Figure 3.2: The Range of Age of Teacher	09
Figure 3.3: Gender of the Teacher	10
Figure 3.4: Teaching Experience of the Teacher	11
Figure 3.5: Teacher Skills	12
Figure 3.6: Use of Technology	13
Figure 3.7: ICT Based Materials Used for Teaching	14
Figure 3.8: Obstacles to the Use of ICT in Teaching and Learning	15
Figure 4.1: Accuracy Percentage	19
Figure 4.2: Precision and Recall chart	21
Figure 4.3: F-Measure scores	22

LIST OF TABLES

TABLE	PAGE NO
Table 4.1: Frequency Table for Teacher Skill	17
Table 4.2: Teacher Skill Score	17
Table 4.3: Table for Teacher Skill	18

CHAPTER 1

INTRODUCTION

1.1 Introduction

We have experienced the greatest social and scientific advances in the last 100 years and it is achieved only for the use of ICT. ICT has brought the whole world to our doorstep. Now ICT is working on education system. Because education is the main basis for economic development and human welfare. But the education system must be full of quality. A good quality teaching and learning process ensures a developed nation. Many governments have been preferring the use of Information Communication Technologies (ICT) in education, especially to expand access to and improve the quality of education. Because information and Communication Technology delivers recent and innovative style of learning for every student at all educational levels. ICT can introduce classrooms excluding walls when teachers are ready to understand the usefulness of this potential tool. Although in the recent time ICT is at the center of education reform efforts, not all countries are currently able to profit from this development and advances that technology can offer. Significant obstacles often mention as digital divide which limit the ability of some countries to receive advantage of technological improvement. The developing countries are faced with challenges related to approach and assessment when using ICTs to improve and qualify education. For this reason, the government of Bangladesh has taken many projects for ensuring quality teaching and learning using ICT. This project is also designed to determine the quality parameters to teaching and learning.

1.2 Motivation

Present era is the time of computer technology. The introduction of the Internet has brought a lot of changes in the way people communicate around the world. Bangladesh is becoming digital to continuing with time. The government has taken several initiatives to fulfill the dreams of Digital Bangladesh. One such initiative is to ensure quality teaching and learning. To ensure quality teaching and learning, Government provided so many ICT tools in educational institution and made ICT subject compulsory. But if quality teaching and learning is not ensured, then the

purpose of the government will be fail. In this research we would like to find out that the quality teaching or learning can be ensured or not.

1.3 Rationale of the Study

Education is the background of a nation. No socio-economic, political and cultural development is possible without education. ICT education is very vital and quality human resources development is essential for the country. It is reflected in the present drives of Digital Bangladesh.

1.4 Research Question

Question of this work are:

- What is the level of teacher and student experience on ICT integration in the teaching and learning process?
- In which ways do teachers and students integrate ICTs in the teaching and learning process?

1.5 Expected Outcome

Expected outcome of the project is to evaluate the education system to ensure quality teaching and learning. Through this process it will be observed whether the student get proper learning from the project and also whether the project help learner to cope up with the developed country in ICT sector.

1.6 Report Layout

The following description is given to understand which chapter represents which topics and besides, their relevant discussions.

- Chapter 1 -The primary guideline and reason for this thesis is described in this chapter. It covers introduction, motivation, rationale of the study, research questions and expected outcome of the study.

- Chapter 2 -In this section, background and related works are described briefly. Moreover, research summary, scope of the problem and challenges are also discussed.
- Chapter 3 -Research Methodology of the study is viewed in this chapter. It contains data collection procedure, data analysis and experimentation requirements.
- Chapter 4 - In this chapter, experimental results and discussion are shown. Besides, a brief summary on how we analysis the result is also given.
- Chapter 5 - Conclusion and recommendation of research result are discussed here.

CHAPTER 2

BACKGROUND

2.1 Introduction

Education is one of the foundation for economic development and enhancement of human welfare. The global economic competition grows inflexible, education plays a vital source of comparative advantage as it is connected to economic growth and the technique for countries to attract investment and hence jobs.

Information and Communication Technology can be a major factor to ubiquitous access to education, equity in education, intonation of quality teaching and learning, more efficient educational management system and teacher's career development.

The Organization for Economic Cooperation and Development (OECD) has identified, ICT is now omnipresent in the current world. The OECD has delineated that, in the twenty-one countries for which data was available, employment in the ICT industry represent 6.6% of total business employment [1]. This referred that more than 16 million people employed in the industry.

More recent and even more dramatic indicator of the growth in IC, the increasing pervade of ICT in all the aspects of the modern life has led to the concept of a 'knowledge base society'. In 2002, Information Society Commission (ISC) recommended that the fundamental skills should, as far as possible become a key component of conventional education.

2.2 Related Works

Harvey Mellar, Maria Kambouri, Kit Logan, Sally Betts, Barbara Nance, Viv mention in their paper that use more ICT tools in the classroom and alongside they focused on developed the teacher approaches to teach using ICT. They reported mobile technologies (tablets, PDAs, mobile phones) were found to be particularly motivating, and enabled greater flexibility in teaching, with teacher taking advantage of the mobility of the technology to move outside the classroom. Increased ICT skills and confidence were positively correlated with the amount of

time learners spent using technology within the classroom. More specifically learner use of the internet, PowerPoint and word processing were found to be positively correlated with gains in ICT skills [2].

Shaheeda Jaffer, Dick Ng'ambi, Laura Czerniewicz, University of Cape Town, South Africa reported in their paper that the argues that a central role of educational technology is to provide additional strategies that can be used to address the serious environmental and educational challenges faced by educators and students in higher education. In developing countries where higher education is fraught with serious challenges at multiple levels, there is increasing pressure to ensure that technological possibilities are viewed in the context of educational needs [3].

Main functions of ICT such as ICT works as like a change agent in learning procedure, impact of ICT on place in two major ways 'when' and 'where' to study improve quality teaching and learning, enhancing educational system and the role of ICT in higher education. This paper also points out few barriers that works behind the ICT and that barrier are lack of teacher confidence, lack of teacher competence, resistance to change and negative attitude, lack of time, lack of effective training, lack of accessibility and lack of technical support [4].

The motive of the research aims to bring together the findings and major points from a review of significant part of the available literature related with ICTs for Education and ICTs in Education. This review finds out to identify and evaluate relevant approach in national and international research and initiatives related to measuring the effective use of ICT for education with consider to the teaching learning process [5].

Another paper states that the key problems arose from student's lack of management skills arose from students' lack of time management skills and from insufficiencies in the usability of the technology. Besides this problem this paper also sorts out some other lacking such as lack of experience in ICT, loneliness and lack of practical usability of ICT [6].

Abdulkafi Albirini reported in his paper that the findings suggest that teachers have positive attitudes toward ICT in education by investigated the relationship between computer attitudes and five independent variables. And they reported the five variables are: computer attributes, cultural perceptions, computer competence, computer access, and personal characteristics [7].

2.3 Research Summary

We can summarize our research such as, any developing country like Bangladesh ICT based quality teaching and learning is needed. The study findings may be used to facilitate the integration of ICT in the teaching and learning system by both teachers and students. In this research, focused exclusively on proper utilization of ICTs in teaching and learning activities.

2.4 Scope of the Problem

In depth literature review reveals that ICT based quality teaching and learning has been applied in several countries though till date nothing special has been done in Bangladesh. Therefore, there is a huge scope to study of ICT skill for quality teaching and learning in order to cope up with present world and the success of our future generation.

2.5 Challenges

The key challenges for the research are as follows:

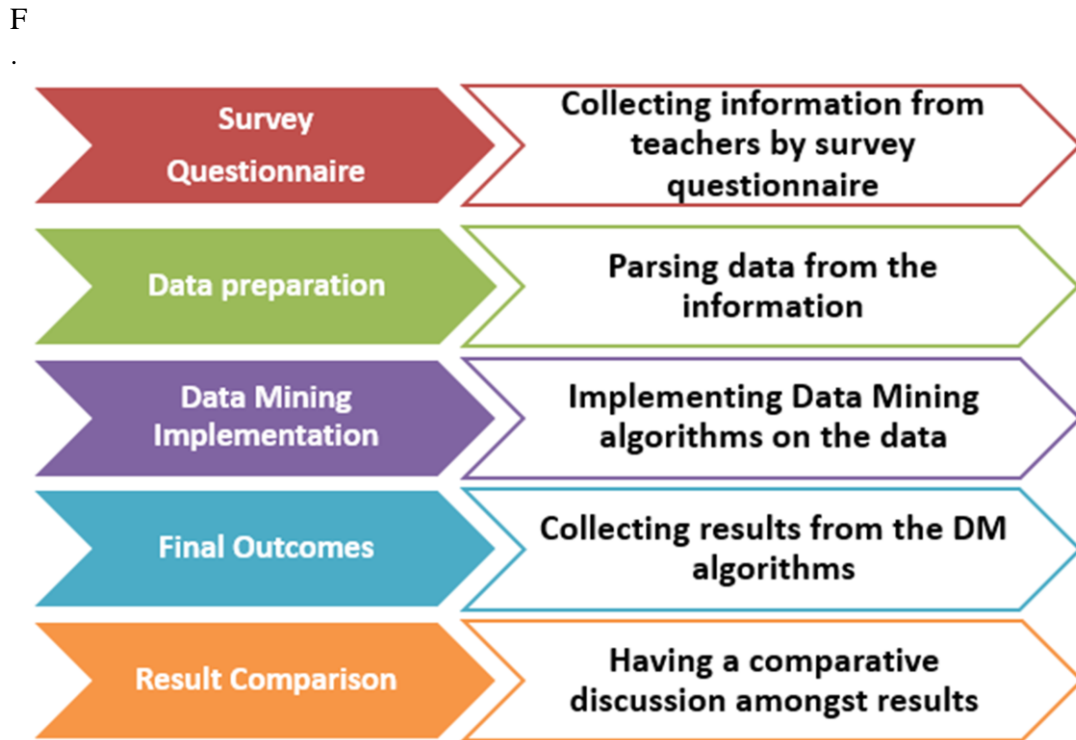
- To collect data from teachers where participants took part.
- To set up the survey questions where that was the sensitive part for our research.
- There was not enough data about the trainees to find them for collecting their feedbacks.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

The section covers research methodology used in this study. It aims at calculating an estimated score for teacher by analyzing teacher data considering various important parameters. These important parameters mostly emphasize on teacher skills, the use of technology, ICT based activities and materials used for teaching and obstacles to the use of ICT in teaching and learning records to ensure a perfect calculation. The data is then analyzed by using classification techniques to calculate teacher's level.



..

s the work flow of this study.

Figure 3.1: Work flow of the study

3.2 Research Subject and Instrumentation

In this section, research subject and instrumentation are described elaborately. Our research subject is “Study of ICT Skill for Quality Teaching and Learning”. The primary goal of the research is to interact with the teacher and student at the tertiary level to identify the answers of the research questions. The primary means is based on survey and personal interview to gather data.

3.3 Data Collection Procedure

I. Dataset preparation

The dataset used in this study is collected from the database. Finally, a survey was conducted using "Google Form". "Google Form" was selected from other services since there is no limit to the number of responses and it provides a helpful data analytics tool and also gives the freedom of developing different types of questionnaires. The survey design has been done by research related question, through which we have made a right decision. Our dataset is collected from the teacher of different universities via online survey using Google form. Initially, the dataset has 77 documents.

II. Data description

In this section, the resultant features are shown after pre-processing and these features are ready to be used by using data mining process. The dataset is collected by 5 major key. They are-

- Demography part
- Teacher skills

- Use of technology
- ICT based activities and materials used for teaching
- Obstacles to the use of ICT in teaching and learning

3.4 Statistical Analysis

In this section, data are analyzed statistically. The data are visualized by bar chart, pie chart, histogram etc. To understand actually who are involved in this survey we have decided to study in their personal background first that's why we are included question (2-5) in the demography part in the survey at the initial section. Where question no 5 are included to know in which area they are expert to teach. Then question no 6, 7, 8 and 9 were designed to evaluate the ICT skill for quality teaching and learning.

First of all, the age of the demography part is shown in the figure 3.2

Age

78 responses

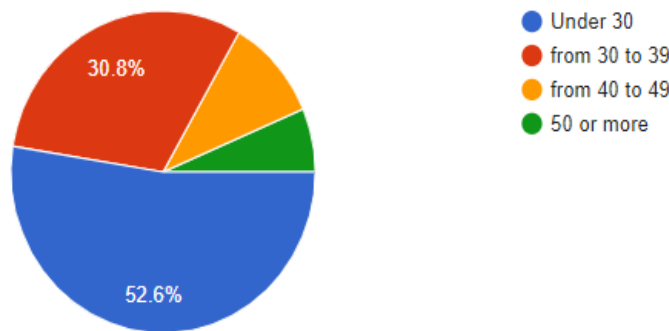


Figure 3.2: The Range of Age of Teacher

Our research is dependent on the ICT-based quality teaching & learning. So here the age of the trainee's plays a vital role. Teachers from various level of age have different mentality to teach. Here the trainee's age divided into 4 different groups i.e. under 30, from 30 to 39, 40 to 49 and 50 or more. From this figure, we see that the maximum response to teachers aged under 30 (52.6%) and it is represented in the figure by blue color. Then the second highest response is between the teachers' age 30 – 39 (30.8%) and red color represents this percentage. Teachers between the ages of 40 – 49 are in the third position (10.3%) and are identified by yellow color. The green color represents lowest responses (6.4%) and they are 50 or more than 50 years old teachers.

Since the data collect are from the teacher, we have to know the gender of teacher. Because we want to see that which gender of teacher use more ICT to teach.

Figure 3.3 presents the gender of the teacher.

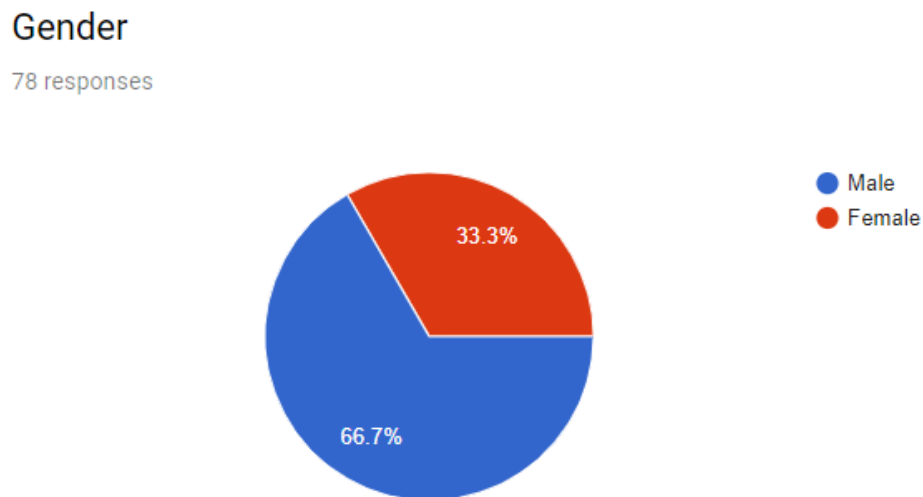


Figure 3.3: Gender of the Teacher

Here we can find that the maximum teachers are male (66.7%) and the female teacher are 33.3% who have filled up the survey form.

Now, we focus on teacher's experience. Because teaching experience is the key fact in quality teaching so why we include this geographical question in our survey form.

The below figure 3.4 represents the teaching experience of the teachers.

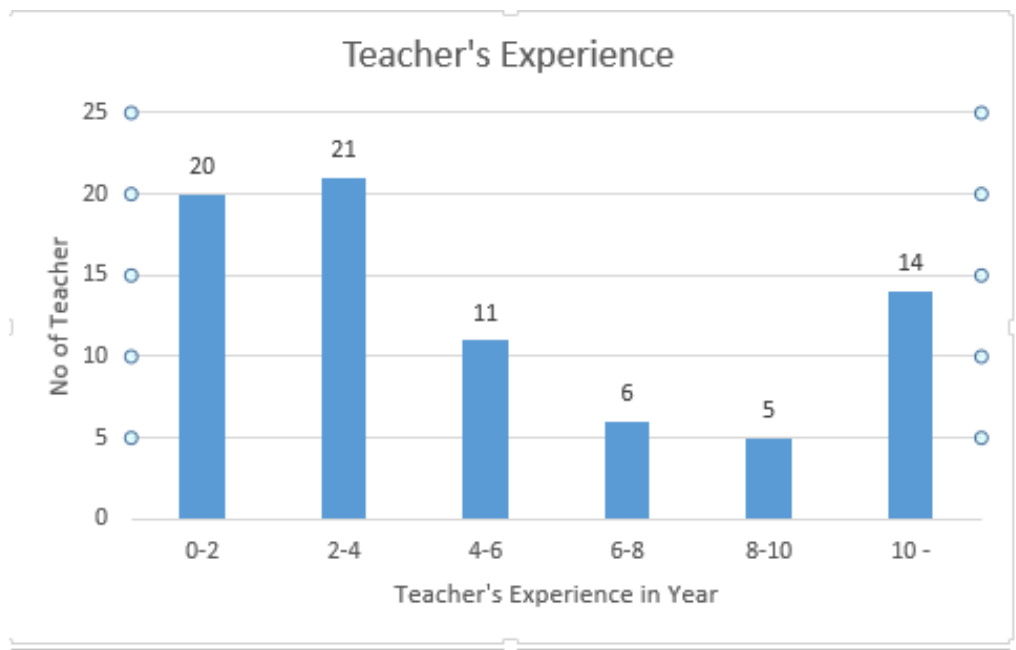


Figure 3.4: Teaching Experience of the Teacher

In the above 3.4 figure, we see that 2-4 years of experienced teacher are about 21, 0-2 years are about 20 and this two classes are the highest experience here.

Our main outlook is on ICT skill for quality education, so we designed our question set in 4 main sections. In this teacher skill section, we tried to know the skill of the teacher in using ICT tools for their teaching.

Figure 3.5 represents teacher skills.

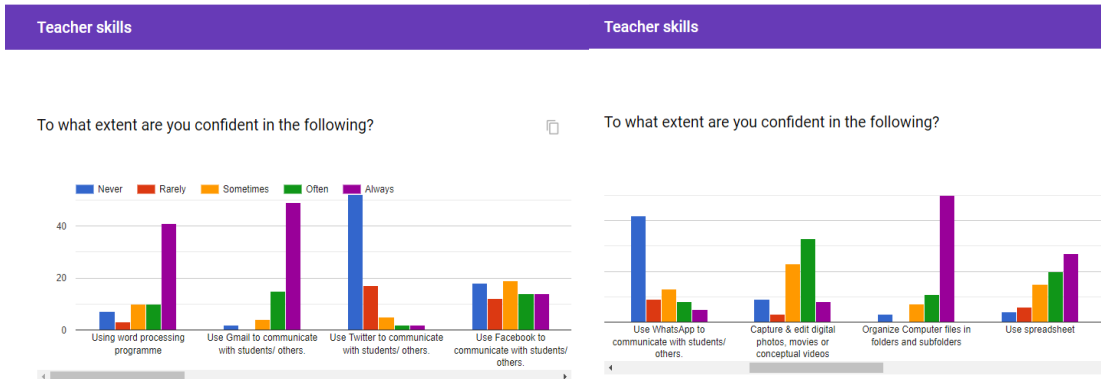


Figure 3.5: Teacher Skills

After analyzing the figure, we see that teachers always use the word processing, use spreadsheet and organize computer file in subfolders for teaching purposes. Teachers always use the Gmail address to communicate with the student but the never use Twitter and WhatsApp to communicate with student. They sometimes use the Facebook and do programming.

In this section of questionnaire, we focus on the use of technology in teaching to make it more effective. We set few critical question to know the teacher mentality for adapting technology. For quality teaching and learning teacher at least need basic knowledge about ICT, familiar with IT related tools and changing mentality.

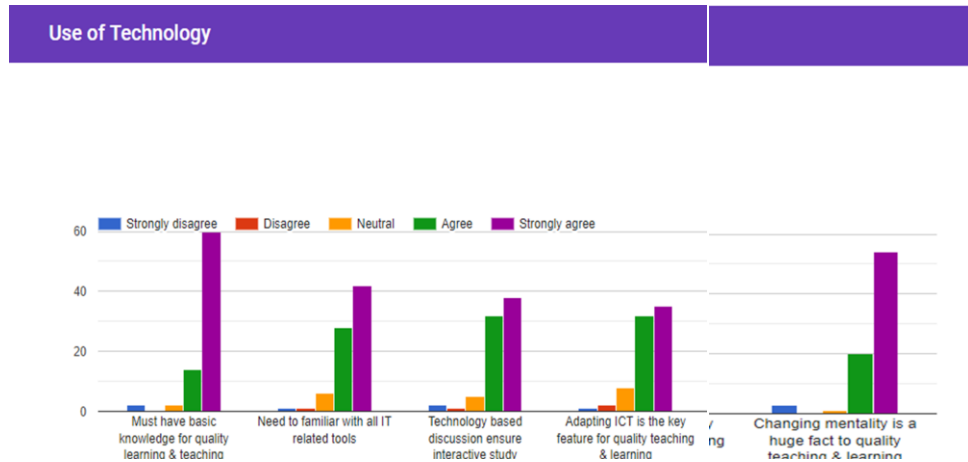


Figure 3.6 represents the use of technology.

Figure 3.6 Use of Technology

In the above figure we see that, most of the teacher strongly agree with the use of the technology. It's clearly indicates that teacher must have at least basic knowledge, need to familiar with IT related tools, technology-based discussion forum and positive mentality toward ICT.

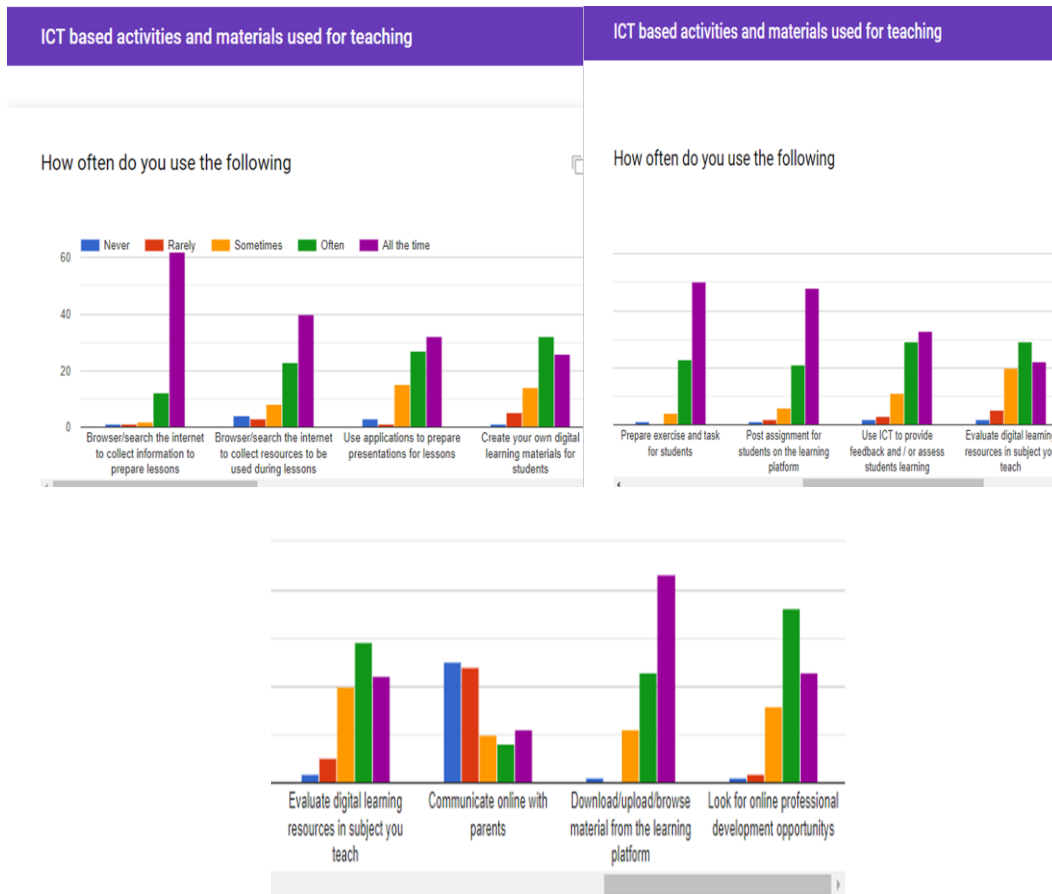


Figure 3.7: ICT Based Materials Used for Teaching

In the figure 3.7, how often teacher use the IT related tools for their teaching purpose because it was very essential to know the teacher's connection with IT. Finally, our survey result saws that teacher were strongly used internet to make their lesson, used internet to make presentation, prepare exercise and task for students, post assignment and download/upload the teaching materials using IT tools. But on the other hand teacher often used to evaluate digital learning resources in subject which they teach, they never used online platform to communicate to the parents.

And the final section of our survey is given below in the figure 3.8.

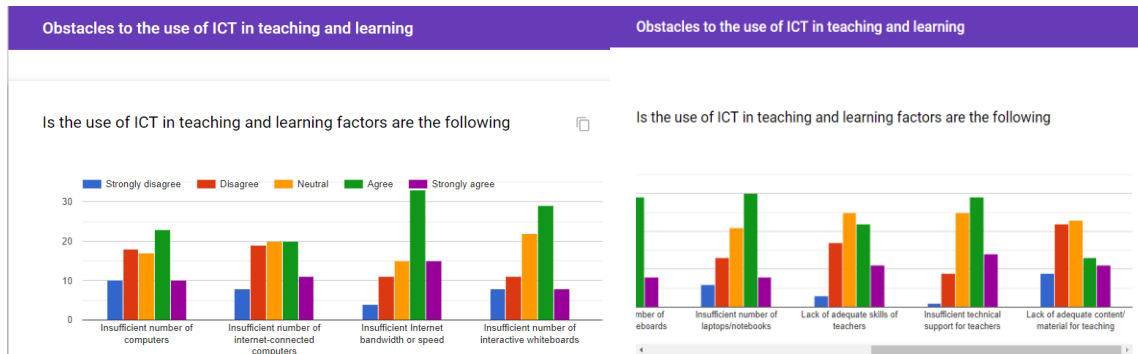


Figure 3.8: Obstacles to the Use of ICT in Teaching and Learning

In figure 3.8, we tried to find out the barriers of ICT in teaching and learning. For this purpose we set few question. Teacher agreed that the insufficient number of computer, insufficient number of internet-connection, lack of bandwidth speed, lack of interactive whiteboard, insufficient technical support for teachers were the main culprit for the ICT based education system.

3.5 Implementation Requirements

In this section, the tools used for the implementation are discussed. At first, the data are collected through an online survey. For this purpose, Google Form is used which is a free online survey service of Google. The data is received as a CSV file (Comma Separated Values). Then we convert it into arff file. The responses are processed and prepared the dataset by using Microsoft Excel. Then the data mining models are implemented on the dataset using weka (an open source of machine learning software) of Java [8]. The decision tree is also used during implementation period. The models are evaluated by calculating different quality measures like accuracy, precision, recall, f-measure using weka. Finally, different bar charts and pie-charts and histogram are built for visualizing data and evaluating the models using Microsoft Excel. All the implementation and procedure is done in a 64 bit, Windows 10 machine.

CHAPTER 4

Experimental Results and Discussion

4.1 Introduction

In this chapter, the results of data collected from the field are represented and discussed with the reference to the aim of the study. A comparative study is also done among the model to obtain better outcome. There are different techniques of discovering knowledge from databases, those techniques are: Association Rule Mining, Classification, Clustering, Regression Analysis, Anomaly or Outlier Detection etc. Classification is a very popular and useful technique for Data Analysis which mainly predicts categorical (discrete, unordered) class level [10]. More exactly, classification models calculate classes for unfamiliar values which are obtained from the training dataset with values of known classes. Many classification models are available here like K Nearest Neighbors, Decision tree, Random Forest, Logistic Regression, Neural Network etc.

4.2 Experimental Result

Various classification models are running on dataset to predict teacher's skill in this study. We do it to have a better solution for our research. It also enables us to have a comparative study amongst the predictive models. We measure the outcomes of various models based on Accuracy, Precision, F-measure and Recall. We verified the accuracy using an effective model evaluation technique named 10 Fold Cross Validation. For experimentation, we apply different algorithm and they are- Naïve Bayes algorithm, PART algorithm, J48 tree algorithm, IBK algorithm, Meta Iterative classifier optimizer algorithm etc.

Weka knowledge explorer is a simple to use graphical user interface. The main packages Filters, Classifiers Cluster and Association [9].

Table 4.1 represents frequency table for teacher skill.

Table 4.1: Frequency Table for Teacher Skill

Range of the Skill	Class
3.00-3.25	Below Average
3.26-3.50	Average
3.51-3.75	Above Average
3.76-4.00	Satisfactory
4.01-4.25	Good
4.26-4.50	Very Good
4.51-4.75	Excellent
4.76-5.00	Outstanding

In table 4.1, we make a frequency for teacher skill depend on the teacher score which was collect by survey. In the table the maximum value is 4.76- 5.00 indicate the outstanding class and the minimum value 3.00-3.25 indicates the below average. Using this class, we find out the Filters, Classifiers Cluster and Association in weka.

Table 4.2 represents the skill score of teachers.

Table 4.2: Teachers' Skill Score

Name: Skill_Score		Type: Numeric
Missing: 0 (0%)		Unique: 1 (1%)
Distinct: 16		
Statistic	Value	
Minimum	3.1	
Maximum	3.85	
Mean	3.615	
StdDev	0.193	

From the figure, we know the standard of teachers' level in our country. This table represents the maximum, minimum, mean and standard deviation of our teacher's skill.

We calculate mean by the following formula.

$$\bar{X} = \left(\frac{\sum x}{n} \right)$$

Since \sum is the symbol which is used to indicate that values are to be summed. By applying the formula, calculating the value of mean is 3.615.

Then the standard deviation is calculated by applying the following formula.

$$\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{n}}$$

By applying this formula, we get the result of standard deviation and that is 0.193

The table 4.3 for teacher skill depend score is given below:

Table 4.3: Table for Teacher Skill

Name: class		Type: Nominal	
Missing: 0 (0%)		Unique: 0 (0%)	
Distinct: 4			
No.	Label	Count	Weight
1	Bellow_Average	7	7.0
2	Average	8	8.0
3	Above_Average	39	39.0
4	Satisfactory	23	23.0

In the above table, we see that Above Average is the most weighted label. So from the table, we make a decision that our teacher belongs to the label above average that is between 3.51 – 3.75.

4.3 Descriptive Analysis

In this section, a comparative study is done between the classifiers according to their result. To measure performance, 4 Ire is selected to evaluate the classifiers. Such as: Model Accuracy, Precision, Recall and F-measure. As the confusion matrix is calculated for each classifier, every necessary data is available to calculate the performance measures.

Accuracy of a classifier is the percentage of test samples that are correctly classified by a classifier on a given test set [11]. Equation (4.3.1) is the calculation of accuracy is given below.

$$\text{Accuracy} = \frac{TP+TN}{TP+TN+FP+FN} \dots\dots\dots (4.1)$$

Here, TP, TN, FP, FN are respectively true positive, true negative, false positive and false negative. BY applying this formula, we calculate the accuracy rate for the algorithm.

Figure 4.1 represents the accuracy rate of different algorithm which are used in our study.

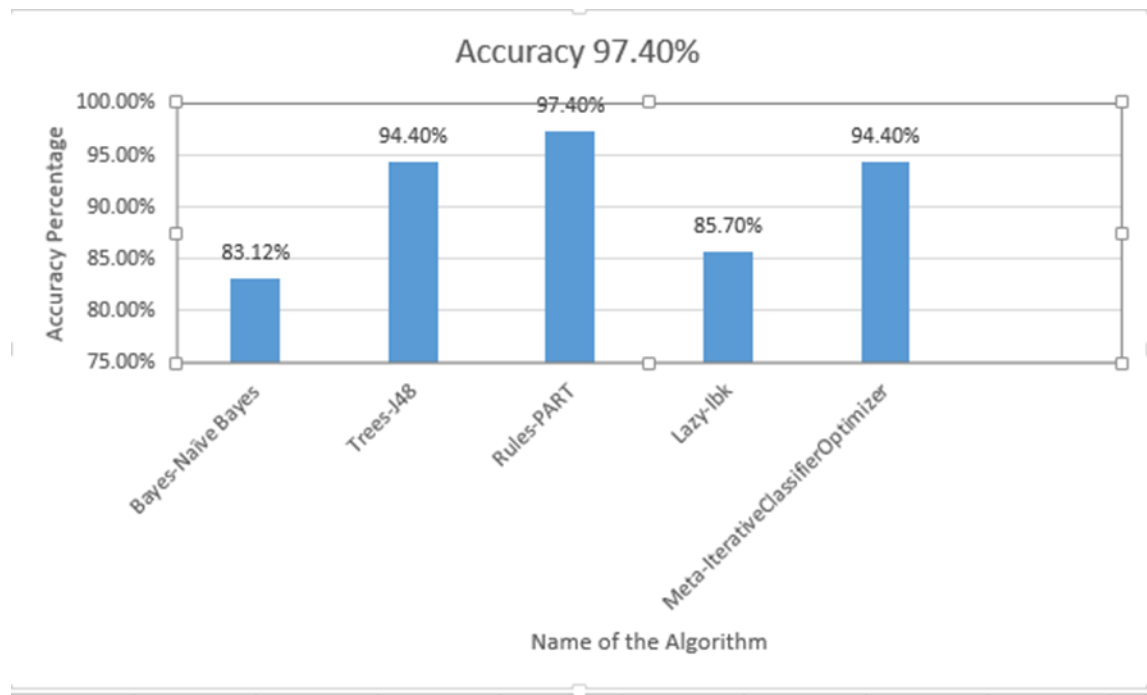


Figure 4.1: Accuracy Percentage

From the figure, we can see that problem-solving and engineering algorithms (PART) gives us the highest prediction accuracy of 97.40%. Random Forest (RF), the second best is the Meta-Iterative Classifier Optimizer and J48 algorithm which gives an accuracy of 94.40%. Other two algorithms, Naïve Bayes and IBK give accuracy of 83.12% and 85.70% respectively.

Precision is another which is also used to measure performance for classifier. Precision of any classifier is the ability of that classifier of not to label an actual negative labeled sample as positive [12]. In other words, it is the measure to determine how exact my model is [11]. The best possible value for precision is 1 and the worst possible value is 0 [12]. Equation (4.3.2) shows the calculation for precision.

$$\text{Precision} = \frac{TP}{TP+FP} \dots\dots\dots (4.2)$$

Here, TP and FP are respectively true positive and false positive. by applying this formula we calculate the precision value for the algorithms we used here.

On the other hand, Recall is the measure to determine the completeness [11]. More precisely, it is the percentages of the actual positive samples that are labeled as positive [11]. Best and worst values for recall are same as precision. Eq. (4.3.3) shows the calculation for the recall.

$$\text{Recall} = \frac{TP}{TP+FN} \dots\dots\dots (4.3)$$

By applying this formula, we calculate recall value for the used algorithms where TP means true positive and FN means false negative.

The precision and recall scores are calculated using weka of java and plotted the chart using Microsoft Excel which is shown in Figure 4.2.

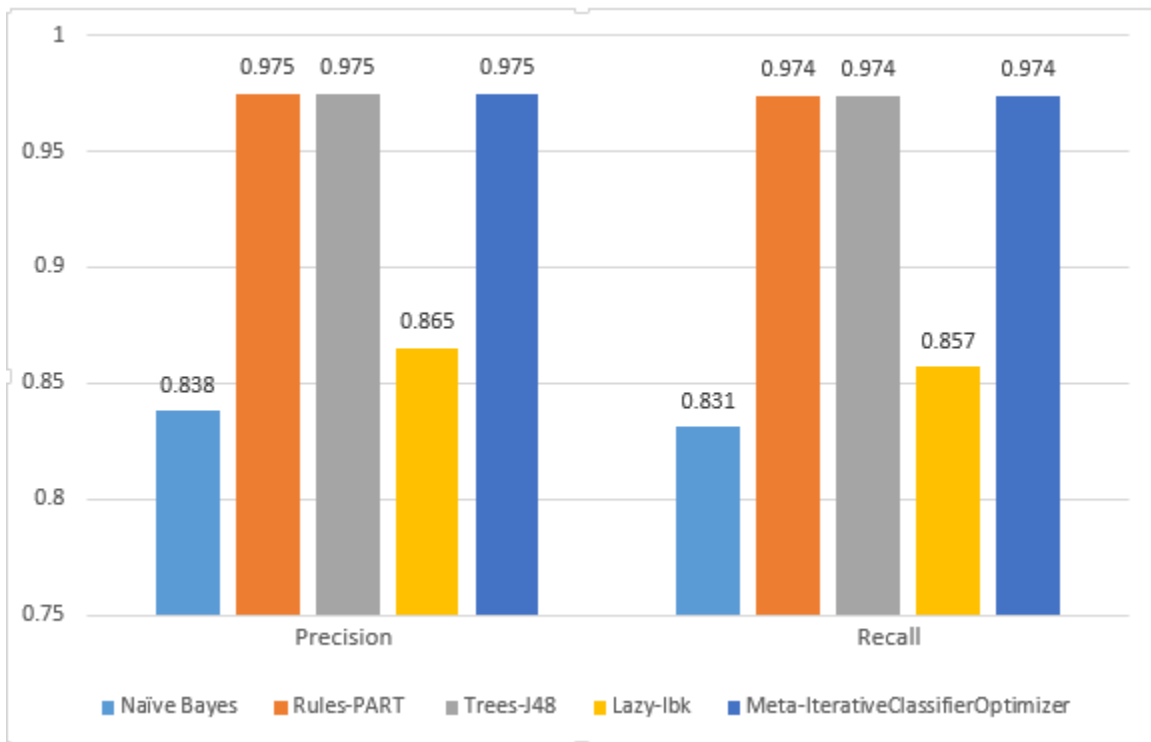


Figure 4.2: Precision and Recall chart

In the chart, PART, J48 and Meta-Iterative Classifier Optimizer give the highest precision and recall score (almost 1).

Now, both precision and recall measures are at our hand. Actually we can do a little bit better with the help of F-beta measure by using both precision and recall scores of a model to do a better comparison amongst the models. Eq. (4.3.4) shows the equation for F-beta measure:

$$F\beta = (1+\beta^2) \cdot \frac{\text{precision} \cdot \text{recall}}{(\beta^2 \cdot \text{precision}) + \text{recall}} \dots\dots\dots (4.4)$$

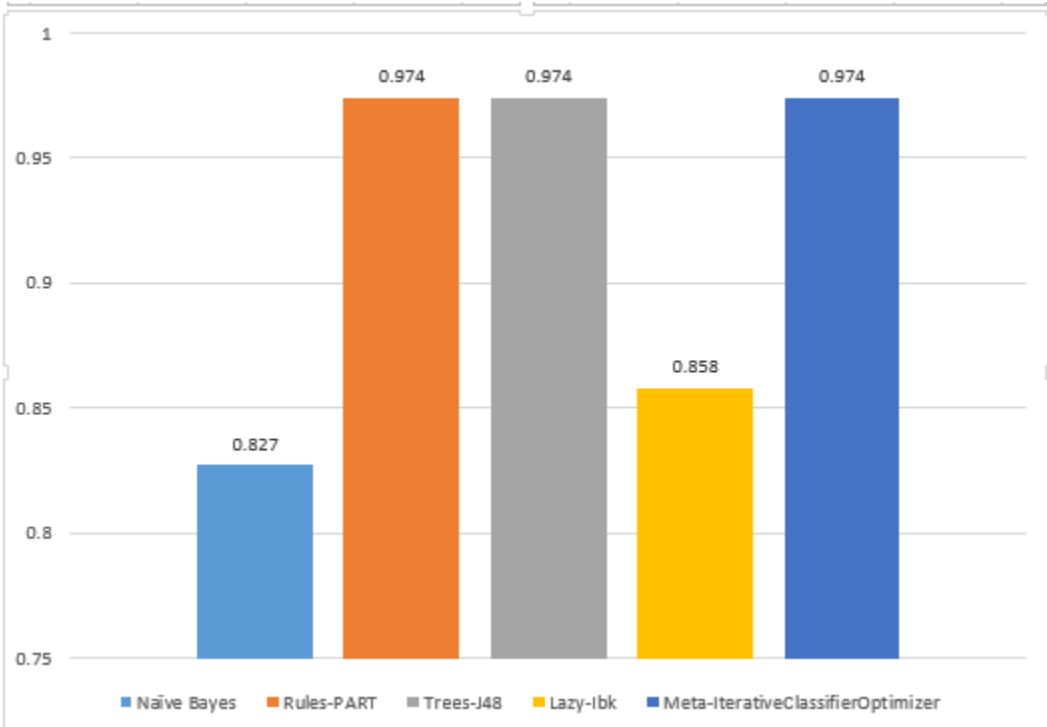


Figure 4.3 represents the F-Measure scores of the models.

Figure 4.3: F-Measure scores

In the figure, we can see that PART, J48 and Meta-Iterative Classifier Optimizer have the highest and same F-measure score (0.974 which is almost 1).

4.4 Summary

In chapter 4, multiple classifiers are applied on the dataset. The weka was used to employ the models. The parameters of models are shown that are used for classification in this study. The confusion matrix of each classifier is also generated by using weka software of java after running the classifiers on the data. Later on, a comparative discussion is done amongst the classifiers regarding their performances based on some quality measures (Accuracy, Precision, Recall and F-measure). We found out that PART, Meta-Iterative Classifier Optimizer gives us the best classification performance for my dataset considering all of my quality measures.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Summary of the Study

The main objective of this study was to understand the teacher skill in ICT for quality teaching and learning and for this reason, we studied different factors. The dataset used in our research was collected by survey from the teachers of different universities. We conducted interview with many the teachers to know their skill about ICT in purpose of teaching and learning. After analyzing the data, we reached a decision that our teachers are not enough skilled in ICT. Without better skill of teacher, student can't get quality teaching and excluding quality teaching, we will never be able to declare ourselves as a developed nation.

5.2 Conclusion

Education has an important role in constructing the society. It is education which determines the standard of society. The quality education assists to empower the nation from all perspectives by giving new concepts and the ways of implementation of various technologies. There are many effective teaching & learning methods in practice. Among all methods, technology is the most effective way to increase the student's knowledge. It gives knowledge of students with experience which are otherwise expensive, time consuming or simply impossible to provide. The role of ICTs in education is recurring and indispensable. Rapid changes in the technologies are

indicating that the role of ICT in future will grow tremendously in education. It activates the classroom and helps students to improve proper study habits and spirit of knowledge distribution. The day is needed to build partnership in the learning process itself that is between teachers and learners. Teacher education is often content - oriented, providing knowledge, which is criticized as narrow and limited. There is no shortage of advice and guidance on effective teaching policy. ICT also emphasized the need for amending the role of teachers. It forces the teacher to look beyond the text book and consecutive process. Apart from classroom teaching, they will have other skills and responsibilities. Teachers will act as virtual guides for students who use electronic media. Finally, the learning experiences of students will be improved with the use of ICT. It also helps them to think independently and communicate creatively. It is a growing technology that helps students to create successful careers and lives.

5.3 Recommendation

The Bangladesh government has taken various initiatives to make more effective education system. One such initiative of the government is the ICT based teaching and learning which will help to realize the dream of building Digital Bangladesh. At the end of the study it is seen that the mean of teacher skill is 3.615 that indicates the skill level of our teacher in ICT is above average. As the teacher skill is directly connected to quality teaching and learning so the teacher skill is the key to make a nation qualified. Our teachers are not enough skilled in ICT, so Government need to take steps in training and encourage the teacher to use ICT in teaching. In this paper, we have highlighted the skills of teaches at ICT. In future, there are opportunities to study the integrity and skills of teachers and students using ICT. If the teacher's skill is above 4.0 then it will be excellent and our education system will be more effective and more reliable.

5.4 Implication for Further Study

Based on further acquisition of data set, further exploration will be performed for real time data mining and apply enhanced algorithm to make it more effective and efficient. Future research with the huge data set association rules will be developed to explore interesting patterns which can be able to improve the skill of both teacher and student. In future this research can be enhanced into an intelligent system

REFERENCES

- [1]. ICT Investment and Economic Growth in the 1990s: Is the United States a Unique Case? A Comparative Study of Nine OECD Countries.
- [2]. Harvey Mellar, Maria Kambouri, Kit Logan, Sally Betts, Barbara Nance and Viv Moriarty. "Using ICT EFFECTIVE TEACHING AND LEARNING".
- [3]. The role of ICTs in higher education in South Africa: one strategy for addressing teaching and learning challenges ShaheedaJaffer, University of Cape Town, South Africa Dick Ng'ambi, University of Cape Town, South Africa Laura Czerniewicz, University of Cape Town, South Africa.
- [4]. International Journal of Scientific Research Engineering & Technology (IJSRET) ISSN: 2278-0882 EATHD-2015 Conference Proceeding, 14-15 March, 2015 Using ICT in Empowering Teachers for Quality Education Dr. (Mrs.) Navdeep Kaur Assistant Professor, Department of Education, Guru Nanak Dev University, Amritsar.
- [5]. An Effective use of ICT for Education and Learning by Drawing on Worldwide Knowledge, Research, and Experience: ICT as a Change Agent for Education (A LITERATURE REVIEW) Syed Noor-Ul-Amin Ph.D Research Scholar Department Of Education, University Of Kashmir.
- [6]. From strategic planning to meaningful learning: diverse perspectives on the development of web- based teaching and learning in higher education Erika Löfström Anne Nevgi First published: 05 June 2006.
- [7]. Teachers attitudes toward information and communication technologies: the case of Syrian EFL teachers Abdulkafi Albirini * Department of Educational Policy and Leadership, Technologies of Instruction and Media Program, 203 Jennings Hall, 1735 Neil Avenue, Columbus, OH 43210, USA Received 18 August 2004; accepted 29 October 2004.
- [8]. <<<https://www.cs.waikato.ac.nz/ml/weka/>>> last accessed in 15 November 2018 at 10.00 pm.
- [9]. Journal of Computer Science 10 (7): 1151-1155, 2014 ISSN: 1549-3636 © 2014 Science Publications doi:10.3844/jcssp.2014.1151.1155 Published Online 10 (7) 2014 (<http://www.thescipub.com/jcs.toc>) Science Publications 1151 JCS ITERATIVE DICHOTOMISER-3 ALGORITHM IN DATA MINING APPLIED TO DIABETES DATABASE P. Vasudevan Department of Computer Science and Engineering, Mookambigai College of Engineering, Anna University, Chennai, India.
- [10]. J. R. Quinlan. C4.5: Programs for machine learning. San Francisco: Morgan Kaufmann, 1993.
- [11]. Jiali Han and Micheline Kamber, Elsevier, 2012 "Model Evaluation and Selection." Data Mining: Concepts and Techniques.
- [12]. Scikit-learn: Machine Learning in Python, Pedregosa et al., JMLR 12, pp. 2825-2830, 2011.

APPENDIX A

Analysis & Assessment of Skill Using Data Mining Questionnaire

11/2/2018

Teacher Questionnaire on the study of ICT skill for quality teaching and learning

Teacher Questionnaire on the study of ICT skill for quality teaching and learning

* Required

1. Email address *

Personal background information

2. Age *

Mark only one oval.

- Under 30
 from 30 to 39
 from 40 to 49
 50 or more

3. Gender *

Mark only one oval.

- Male
 Female
 Other: _____

4. Subject(s)/Area *

5. Teaching Experience(Year) *

Teacher skills

6. To what extent are you confident in the following? *

Mark only one oval per row.

	Never	Rarely	Sometimes	Often	Always
Using word processing programme	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use Gmail to communicate with students/ others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use Twitter to communicate with students/ others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use Facebook to communicate with students/ others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use WhatsApp to communicate with students/ others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Capture & edit digital photos, movies or conceptual videos	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organize Computer files in folders and subfolders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use spreadsheet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Create presentation with simple animation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Create presentation with video or audio clips	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate in discussion forum on Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Create & maintain website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Download curriculum resources from websites	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Upload curriculum resources to websites	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teach how to safely behave with online	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do programming	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Skip to question 6.

Use of Technology**7. ***

Mark only one oval per row.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Must have basic knowledge for quality learning & teaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Need to familiar with all IT related tools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technology based discussion ensure interactive study	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Adapting ICT is the key feature for quality teaching & learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Changing mentality is a huge fact to quality teaching & learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Skip to question 7.

ICT based activities and materials used for teaching

8. How often do you use the following *

Mark only one oval per row.

	Never	Rarely	Sometimes	Often	All the time
Browser/search the Internet to collect information to prepare lessons	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Browser/search the Internet to collect resources to be used during lessons	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use applications to prepare presentations for lessons	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Create your own digital learning materials for students	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prepare exercise and task for students	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Post assignment for students on the learning platform	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use ICT to provide feedback and / or assess students learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Evaluate digital learning resources in subject you teach	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communicate online with parents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Download/upload/browse material from the learning platform	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Look for online professional development opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Skip to question 8.

Obstacles to the use of ICT in teaching and learning**9. Is the use of ICT in teaching and learning factors are the following ***

Mark only one oval per row.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Insufficient number of computers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Insufficient number of internet-connected computers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Insufficient internet bandwidth or speed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Insufficient number of interactive whiteboards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Insufficient number of laptops/notebooks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of adequate skills of teachers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Insufficient technical support for teachers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of adequate content/material for teaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

 Send me a copy of my responses.

Powered by

<https://docs.google.com/forms/d/1aflnm08h/ynwlpfHwYsJAptv8C-Xa77uz4hLGLy4f8/edit>

3/4