Over the past few decades, Information Communication Technology (ICT) has completely transformed our lives in all possible ways. India, a successful ICT powered nation, has always laid a lot of accent on the use of ICT, not only for good governance but also in diverse sectors of the economy such as health, agriculture and education etc. Education, undoubtedly, is one of the most important investments in building human capital in a country and a medium that not only shapes literate citizens but also makes a nation technologically innovative, thus, paving a path to economic growth. India’s need for education is diversified and extensive, as it requires individuals who are equipped with specific knowledge to assume development responsibilities. This requires not only basic education but also comprehensive continuing education programmes to upgrade the skills in the line with development requirements and the technological developments. The internet world wide web has provided an inexpensive system for delivery of education contents any where 24/7. India is in a position to exploit this as its educational IT environment has the flexibility and the ability to support the recent information and communication technology initiatives. Indian education system has been working towards imparting need based technical education from early 90s. The internet and www has added a new delivery dimension.

Information and Communication Technologies (ICTs) which include television, digital technologies such as computers and the internet are powerful tools for educational change and reform. Information and Communication Technology (ICT) used in teaching and learning includes the full range of computer hardware, computer software, and telecommunication facilities. It includes the full range of display and projection devices used to view computer output. It includes the local area and wide area networks that allow computer systems and user (teachers and students) to communicate with each other. It includes digital cameras, computer games, CDs, DVDs, cell telephones, telecommunication satellites, fibre optics, computerized instruments and computerized machinery.
RATIONALE OF THE STUDY

The 21st century is an era of acute modernization and both teacher and students will have to cope with the changes and challenges. The information age requires a higher level of skill and knowledge of all individuals. Teachers’ professional knowledge, skill and capabilities are enhanced by ICT as their subject knowledge is expending. ICT enables teachers in planning and preparing them for more efficient teaching. Research by Sutton (2006) also shows that ICT enables effective learning. For creating learning environment ICT is recognized as an essential ingredient of education system. Power of technology to transform learning is recognized by educators worldwide. Teachers have been identified as major factor in fostering classroom ICT integration. They are the mind setters and torch bearers in the society. Hence, teachers must be able to increase conceptual understanding and analytical ability among students through the use of diverse Information and Communication Technology (ICT). Use of ICT definitely affects the performance of students and teachers in classroom. Through the ongoing and effective use of technology in the schooling process, students have the opportunity to acquire important technology capabilities. The teacher is responsible for establishing the classroom environment and preparing the learning opportunities that facilitate students’ use of technology to learn and communicate. Consequently, it is critical that all classroom teachers are prepared to provide their students with these opportunities.

Most critical issues in developing and maximizing the benefits of ICT in teaching-learning process is the level of Morale, Attitude towards ICT and Technology Competence the teacher have in using ICT and accessing its benefits in their work.

Teaching in present schools requires teachers who are knowledgeable and skillful especially in using computer and other technology tools. Unfortunately researches (Yildirim, 2007) shows that teachers hesitate to use technology, don’t feel prepared and fear to integrate ICT in their teaching in classroom. Their
reluctance to use ICT is mainly due to their negative views towards accepting technology as part of their new teaching methodologies (Summar, 1990).

Akbaba and Kurubacak (1999) also reported that if teachers already have negative perception towards the use of technology, this may affect not only their teaching effectiveness but more importantly they may become incompetent in using technology. The act of teaching along with high teacher morale, positive attitude towards ICT and technology competence enforces the teacher to use ICT productively to enhance the effectiveness of teaching and learning process for giving the best output from the curriculum in the limited time in hand. It is important to evaluate teachers’ attitude towards ICT and their technology competence as ICTs are being implemented in both private and government schools. Thus it is essential to investigate the impact of their attitude and competencies towards ICT in determining the success of educational system. A perusal of research studies reveals that teacher effectiveness is related to factors like high teacher morale, positive attitude towards ICT and technology competence of teachers. So, the researcher has undertaken this study to find out the significance of teachers’ morale, attitude towards ICT and level of technology competence of secondary school teachers in the productive use of ICT.

STATEMENT OF THE PROBLEM

“AN EXPLORATORY STUDY OF USE OF ICT BY TEACHERS IN RELATION TO THEIR MORALE, ATTITUDE TOWARDS ICT AND TECHNOLOGY COMPETENCE.”

OPERATIONAL DEFINITIONS OF THE KEY TERMS

1. Information and Communication Technology (ICT)

Information and Communication Technology (ICT) includes the full range of computer hardware, computer software, and telecommunication facilities.

In the present study, Information and Communication Technology (ICT) includes the full range of display and projection devices like liquid crystal display
and overhead projectors used in school to view computer output. It includes the local area network, wide area network, radio, television, digital cameras, educational CDs and DVDs that allow teachers to communicate with learners.

2. **Morale**

Morale is the confidence, enthusiasm and discipline of a person or a group at particular time.

In the present study, morale refers to the professional interest and enthusiasm that a secondary school teacher displays. Precisely, teacher morale here refers to ten factors viz-teacher rapport with principal, satisfaction with teaching, rapport among teachers, teacher salary, teacher load, curriculum issues, teacher status, community support of education, school facilities and services and community pressures.

3. **Attitude towards ICT**

Attitude is a settled way of thinking or feeling, typically reflected in a person’s behavior.

In the present study, attitude refers to the feelings, opinion and beliefs of secondary school teacher towards ICT use in classroom.

4. **Technology Competence**

Technology Competence is the ability to select and apply up to date forms of technology to solve problems or compile information.

In the present study, technology competence refers to the proficiency of secondary school teacher in using computer in the classroom, sending and receiving e-mail messages, and creating documents with graphics, accessing online resources, creating desktop publishing documents, developing multimedia presentations, selecting and customizing instructional software to fit students' needs.

**OBJECTIVES OF THE STUDY**

The study has been planned with the following objectives-

1. To assess the extent of use of ICT by teachers.
2. To assess the level of teacher morale.
3. To study the attitude of teachers towards ICT use.

4. To adjudge the level of technology competence among teachers.

5. To study the relationship between use of ICT by teachers and their morale.

6. To study the relationship between use of ICT by teachers and their attitude towards ICT use.

7. To study the relationship between use of ICT by teachers and their technology competence.

8. To study differences between male and female teachers in terms of ICT use in relation to their morale, attitude towards ICT and technology competence.

HYPOTHESES OF THE STUDY

The study has been planned with the following hypotheses-

1. There is a significant positive relationship between the extent of ICT use by teachers and their morale.

2. There is a significant positive relationship between the extent of ICT use by teachers and their attitude towards ICT.

3. There is a significant positive relationship between the extent of ICT use by teachers and their technology competence.

4. There is a significant difference between the extent of ICT use by male and female teachers in relation to their morale, attitude towards ICT and technology competence.

DELIMITATIONS OF THE STUDY

- The study is delimited to 200 private secondary school teachers of four districts of Northern Haryana state only.

- The study is confined to four variables only i.e. teachers’ use of ICT, teachers’ morale, teachers’ attitude towards ICT and technology competence.
RESEARCH METHODOLOGY

Research is an art of scientific investigation, based on the principle of known to unknown. The Advanced Learner’s Dictionary of current English lays down the meaning of research as, ‘A careful investigation or inquiry especially through search for new facts in any branch of knowledge’. Research is a systematized effort to gain new knowledge (Redman & Mory). Slesinger & Stephenson defined research as, “The manipulation of things, concepts or symbols for the purpose of generalizing to extend, correct or verify knowledge, whether that knowledge aids in construction of theory or in the practice of an art”. The objectives of the research are to find out a new fact which is hidden and to invent new things to the existing stock of knowledge for making advancement. Research studies have their own specific objectives depending upon the nature of the problem. The main objectives of the research are to achieve new insights into the problem, to discover facts which are existing in the world and to invent new things or new solutions to the problem. Educational research is the application of scientific method of the study of educational problems. Educational research does not lead to any sound findings without a strong base of clear cut methodology. It should be based on broad and scientific foundations. Defining educational research, J. W. Best points out, “Educational research is that activity which is directed towards development of a science of behavior in educational situations. The ultimate aim of such a science is to provide knowledge that will permit the educator to achieve goals by the most effective methods.”

The research provides the scholar the necessary training in collecting material, participation in the field work, training in techniques for the collection of data suitable to a particular problem. Research knowledge inculcates the ability to evaluate and use results with reasonable confidence. Knowledge of research methodology is useful in every field such as community work, social science, business, education etc. The knowledge of research methodology helps the scholar of research to evaluate results and enable scholar to reach on appropriate decisions.
Research methods are no more than the tools of the trade. Research method refers to the method that the researcher uses in performing research operations. This is an unfortunate tendency to think that research begins and ends with methodology. This is just not so. It is important to be aware of the range of methods available and to understand how they work appreciating their advantages and disadvantages. The essential thing is to be able to select the methods that are most likely to achieve the objectives of the research. In the present study, the researcher considering all the above-discussed facts chooses for the Descriptive survey method. Descriptive survey method is designed to obtain pertinent and precise information concerning the current status of phenomena and whenever possible to draw valid general conclusion from the facts discovered. A study of use of ICT by teachers in relation to their morale, attitude towards ICT and technology competence cannot be attempted in a laboratory situation. So, survey method is adopted for the present study as it is most appropriate method for such type of studies. Survey research refers to actually a fact finding study. It is a kind of research method of research involving collection of data directly from a population or a selected sample at particular time. Survey requires planning with some experiences and imaginative ability, very careful analysis with rational interpretation of the findings made. Collection of data in survey research may be through observation, interview or mailing questionnaires. The quality of survey depends upon the thoroughness in planning, the soundness in sampling, the adequacy and reliability of collected data, the quality of analysis of data and the interpretation of the findings.

The Characteristics of Survey Method

The survey method has following specific characteristics:

- It can seek and cover a very large population.
- It is always carried in a natural setting or field study.
- It obtains responses directly from the respondents.
- Data collected from survey method may be quantitative or qualitative.
- It is based on whole population or its sampling than individuals.
- It helps to compare cause and effect relationships to make use of certain predictions.

Keeping in mind all these facts the investigator decided to use Descriptive survey method for the present study.

VARIABLES OF THE STUDY

Variable is a trait or characteristic which gets changed in its quantity and the change can be measured.

In the present Study -

- Dependent Variable is ‘Use of ICT by secondary school teachers’.

- Independent Variables are Morale, Attitude towards ICT and Technology Competence of secondary school teachers.

POPULATION

The term population in research is used in broader sense than its common place meaning as a population of people. The population or a universe may possess a common trait or traits. A population is any group of individuals that have common characteristics and that are of interest of researcher. In a sample survey the interest usually lies in the study of variation with respect to one or more characteristics relating to individuals belonging to a group. This group of individuals under study from which the sample has been selected is called as the population. That group may consist of persons, objects, attributes, qualities, behavior of people, answer to various items of a test and like. According to the nature and scope of research in hand, a population should be well defined in terms of age, grade, sex, category, socio-economic status, physical attributes and psycho-social behavior. The secondary school teachers teaching in private schools in Northern Haryana were considered as population of present research study.

SAMPLE

In words of Good (1972) “Sample, is a finite number of observations, individual, or units selected from those which comprise a particular universe, often
assumed to be representative of the total group.”

A sample is a smaller representation of a larger whole i.e. a population. It is a small proportion of a population selected for observation and analysis. A sample survey involves the selection of a subset of the population. Sample helps to estimate the unknown population. An investigator makes generalization about the population accurately basing the samples drawn from it. It is very easy to understand that the researcher can never collect the data about the whole population in any research. The researcher has to take selected group of individuals who are to represent the whole population and form the basis for making references for certain population facts. Moreover, the sampling has great utility in research because it is easier, less time consuming and economical to deal with a sample than with the whole population. Sampling provides adequate information needed for the purpose. Selecting an appropriate sampling design is also very sensitive issue. A good sampling design should meet certain requirements.

Kush (1965) has identified four board criteria for a good sampling design. These are-

- Goal orientation
- Measurability
- Practicability
- Economy

The population of present study constituted all the secondary school teachers teaching in private schools of Northern Haryana but obviously, it was not possible for the researcher to conduct the study on entire population, for that the researcher had to select sample out of population. The population selected for present study was secondary school teachers working in schools of Haryana state. Treating this as the reference population, the investigator selected the sample considering the following aspects:

1) Factors to be considered for selecting sample
2) Size of the sample

3) Technique of sampling

4) Intended sample for the study.

**Sample Design**

Northern Haryana State
downward arrow

Purposive Sampling

downward arrow

4 Districts of Northern Haryana
downward arrow

Random Sampling

downward arrow

10 Private Secondary Schools from each District
downward arrow

Random Sampling

downward arrow

200 Secondary School Teachers Selecting 05 Teachers from each school

**TOOLS USED**

After determining the sample of the study, the next step was to select suitable tools for the collection of data. The selection of the tool appropriate for a particular study is dependent upon various considerations, such as the objectives of the study, the amount of time at the investigator’s disposal, availability of suitable test etc. Taking these factors into consideration in the present study, the investigator used the following self developed tools-

1. ‘Scale to Assess Use of ICT’ by Secondary School Teachers
2. ‘Morale Opinionnaire’ for Secondary School Teachers
3. ‘ICT Attitude Scale’ for Secondary School Teachers
4. ‘Technology Competence Scale’ for Secondary School Teachers

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SCORING OF THE TOOLS

1. Scoring of ‘Scale to Assess Use of ICT’ by Secondary School Teachers

The scoring of the tool ‘Scale to Assess Use of ICT’ by secondary school teachers was done on four point scale ranging from Very often to Never. In this scale numerical value was assigned to each scale point i.e. 4, 3, 2 and 1 Very Often (every day), Often (twice or more in a week), Seldom (few times a month) and Never respectively. The minimum score of respondent on this scale could be 29 (29×1=29) whereas the maximum score could be 116 (29×4 = 116) and average score of respondent could be 58 (29 × 2 = 58). High score indicates more use of ICT. Hence score on the scale could range from 29 to 116 in the increasing order, indicating from less use of ICT to moderate and more use of ICT wr.t. score equal or less than 54, in between 54 and 92 and equal or above 92.

2. Scoring of ‘Morale Opinionnaire’ for Secondary School Teachers

The scoring of the opinionnaire was done on four point scale ranging from Agree to Disagree. In this scale Numerical value assigned to each scale point was 4 for Agree (A), 3 for Probably agree (PA), 2 for Probably disagree (PD) and 1 for Disagree (D). In negatively worded items reverse scoring was done.

The score of the respondents could range from 89 to 356. The minimum score of a respondent on this scale could be 89 (89×1=89), indicating low level of morale of a respondent whereas the maximum score of a respondent could be 356 (89× 4 = 356), indicating high level of morale of a respondent.

3. Scoring of ‘ICT Attitude Scale’ for Secondary School Teachers

Scoring of the tool ‘ICT attitude scale’ for secondary school teachers was done on five point scale ranging from strongly agree to strongly disagree. In this scale numerical value was assigned to each scale point i.e. in case of positive items the weightage of 5, 4, 3, 2 and 1 points was given where as in case of negative statement the weightage of 1, 2, 3, 4 and 5 points was given to each response.

The minimum score of a respondent on this ‘ICT Attitude Scale’ could be 34
(34×1=34) whereas the maximum score of a respondent could be 170 (34× 5 = 170) an average score could be 102 (34× 3 =102). Scores of respondents could range from 34 to 170. Where score equal or less than 117 expressed negative attitude towards ICT, score in between 117 and 147 expressed neutral attitude towards ICT and score equal or above 147 expressed positive attitude towards ICT; experienced by respondent.

4. **Scoring of ‘Technology Competence Scale’ for Secondary School Teachers**

Scoring of the tool ‘Technology Competence Scale’ for secondary school teachers was done on four point scale ranging from Very competent to Not competent. In this scale numerical value was assigned to each scale point i.e. 4 for Very competent (can teach others how to perform the task), 3 for Competent (can complete the task), 2 for Somewhat competent (can perform a task with assistance) and 1 for Not competent (cannot perform a task). The minimum score of a respondent on this Technology Competence scale could be 42 (42×1=42), indicating low level of technology competence acquired by respondent whereas the maximum score of a respondent could be 168 (42×4 = 168), indicating high level of technology competence acquired by respondent. A respondent could score from 42 to 168 on this ‘Technology Competence Scale’ in the increasing order of low level of technology competence if respondent scored less than or equal to 106, moderate level of technology competence if scored between 106 to 150 and high level of technology competence if scored above or equal to150.

**ADMINISTRATION OF THE TOOLS**

The tools, i.e. Scale to Assess use of ICT, Morale Opinionnaire, Attitude Scale and Technology Competence Scale, were administrated upon the selected private secondary schools teachers of four districts of Haryana state by the investigator. Any doubt on part of the respondents about the tools was immediately solved by the investigator.
PROCEDURE OF DATA COLLECTION

The investigator visited the selected private secondary schools for the collection of relevant data. All the instructions were given to the teachers w.r.t. to attempt the items on the tools properly.

The objectives of the study were explained to the respondent teachers. The instructions for the best concerned were read clearly, distinctly and effectively. This was done to establish a rapport with the participant teachers and also with a view to help them understand the task clearly. Following instructions were given to the respondents-

- There are no right and wrong responses, do not hesitate to respond to these statements frankly.
- Do not write anything else on test booklets.
- There is no time limit though you should complete your task in time.

STATISTICAL TECHNIQUES USED

1. For the preliminary analysis of test scores, descriptive statistics such as Mean, Median, Mode and Standard deviation were found out.

2. To assess the extent of dependent variable and level of independent variables percentage was employed.

3. Pearson’s Product Moment Coefficient of correlation was used to find out the relationship between dependent variable (Use of ICT by secondary school teachers) and independent variables (Morale of secondary school teachers, attitude towards ICT of secondary school teachers and Technology competence of secondary school teachers) for the whole sample.

4. Analysis of variance was employed to study the variables using type of gender as classificatory variable and independent variables (Morale of secondary school teachers, attitude towards ICT of secondary school teachers and technology competence of secondary school teachers) as covariate one by one.
MAJOR FINDINGS

Findings of obtained data for overview of dependent and independent variables

Findings related to overview of extent of Use of ICT by teachers

The study indicated that 19 percent of the teachers in the total sample were making less use of ICT. Around 18.5 percent of respondents were found to be making more use of ICT and the remaining 62.5 percent using ICT moderately.

Findings related to overview of level of teachers’ Morale

14.5 percent of respondents of the sample were having low level of morale. Around 19.5 percent of respondents had high level of morale and the remaining 66 percent had moderate level of morale. This clearly indicated that secondary school teachers differ in their morale level.

Findings related to overview of the Attitude of teachers towards ICT

Out of total teachers of the sample, 14 percent were having negative attitude towards ICT and same percentage of teachers had positive attitude towards ICT and the remaining 72 percent had neutral attitude towards ICT.

Findings related to overview of the level of Technology Competence among teachers

15.5 percent of respondents of the sample were having low level of technology competence. Around 17.5 percent of respondents had high level of technology competence and the remaining 67 percent had moderate level of technology competence.

Findings of obtained data through Pearson product moment correlation

Findings related to relationship between the extent of Use of ICT by teachers and their Morale

The calculated mean and S.D. values for the dependent variable i.e. ‘Use of ICT’ by teachers were 72.94 and 19.79 respectively and that of the independent
variable i.e. ‘Teacher Morale’ were 275 and 30.31 respectively. The coefficient of correlation between the two factors was found to be $r = 0.688$ i.e. positive correlation. This was found to be significant at 0.01 level of significance for the degree of freedom 198. Hence, it can be said that there is a significant positive correlation between the extent of use of ICT by teachers and their morale. Hence, the hypothesis ‘There is a significant positive relationship between the extent of ICT use by teachers and their morale’ was accepted.

Thus it can be said that as the morale of teachers increases the extent of use of ICT by teachers increases i.e. the teachers having high morale use ICT more/ in a better way.

Findings related to relationship between the extent of Use of ICT by male teachers and their Morale

The calculated mean and S.D. values for the dependent variable i.e. ‘Use of ICT’ by male teachers were 72.76 and 19.83 respectively and that of the independent variable i.e. ‘Male Teachers’ Morale’ were 273.51 and 30.68 respectively. The coefficient of correlation between the two factors was found to be $r = 0.690$ i.e. positive correlation. This was found to be significant at 0.01 level of significance for degree of freedom 98. Hence, it showed that there is a significant positive correlation between the extent of use of ICT by male teachers and their morale.

Thus it can be said that as the morale of male teachers increases the extent of use of ICT by male teachers also increases i.e. the male teachers having high morale use ICT more/ in a better way.

Findings related to relationship between the extent of Use of ICT by female teachers and their Morale

The calculated mean and S.D. values for the dependent variable i.e. ‘Use of ICT’ by female teachers was 73.12 and 19.86 respectively and that of the independent variable i.e. ‘Female Teachers’ Morale’ was 276.46 and 30.02
respectively. The coefficient of correlation between the two factors was found to be $r = 0.686$ i.e. positive correlations, which was found to be significant at 0.01 level of significance for degree of freedom 98. Hence, it showed that there is a significant positive correlation between the extent of use of ICT by female teachers and their morale.

Thus it can be said that as the morale of female teachers increases the extent of use of ICT by female teachers also increases i.e. the female teachers having high morale use ICT more/ in a better way.

**Findings related to relationship between the extent of Use of ICT by teachers and their Attitude towards ICT**

The calculated mean and S.D. values for the dependent variable i.e. ‘Use of ICT’ by teachers was 72.94 and 19.79 respectively and that of the independent variable i.e. ‘Teachers’ Attitude towards ICT’ was 131.86 and 15.04 respectively. The coefficient of correlation between the two factors was found to be $r = 0.762$ i.e strong positive correlation, which was found to be significant at 0.01 level of significance for the degree of freedom 198. Hence, it can be said that there is a significant positive correlation between the extent of use of ICT by teachers and their attitude towards ICT. Hence, the hypothesis ‘**There is a significant positive relationship between the extent of ICT use by teachers and their attitude towards ICT**’ was accepted.

Thus it can be said that as the attitude towards ICT of teachers is positive the extent of use of ICT by teachers increases i.e. the teachers having positive attitude towards ICT use ICT more/ in a better way.

**Findings related to relationship between the extent of Use of ICT by male teachers and their Attitude towards ICT**

The calculated mean and S.D. values for the dependent variable i.e. ‘Use of ICT’ by teachers was 72.76 and 19.83 respectively and that of the independent variable i.e. ‘Male Teachers’ Attitude towards ICT’ was 131.11 and 16.08
respectively. The coefficient of correlation between the two factors was found to be \( r = 0.778 \) i.e. positive correlation, which was found to be significant at 0.01 level of significance for the degree of freedom 98. Hence, it showed that there is a significant positive correlation between the extent of use of ICT by male teachers and their attitude towards ICT.

Thus it can be said that as the attitude towards ICT of male teachers is positive the extent of use of ICT by male teachers increases i.e. the male teachers having positive attitude towards ICT use ICT more/ in a better way.

**Findings related to relationship between the extent of Use of ICT by female teachers and their Attitude towards ICT**

The calculated mean and S.D. values for the dependent variable i.e. ‘Use of ICT’ by female teachers was 73.12 and 19.86 respectively and that of the independent variable i.e. ‘Female Teachers’ Attitude towards ICT’ was 132.61 and 13.96 respectively. The coefficient of correlation between the two factors was found to be \( r = 0.749 \) i.e. positive correlation, which was found to be significant at 0.01 level of significance for the degree of freedom 98. Hence, it showed that there is a significant positive correlation between the extent of use of ICT by female teachers and their attitude towards ICT.

Thus it can be said that as the attitude towards ICT of female teachers is positive the extent of use of ICT by female teachers increases i.e. the female teachers having positive attitude towards ICT use ICT more/ in a better way.

**Findings related to relationship between the extent of Use of ICT by teachers and their Technology Competence**

The calculated mean and S.D. values for the dependent variable i.e. ‘Use of ICT’ by teachers was 72.94 and 19.79 respectively and that of the independent variable i.e. ‘Teachers’ Technology Competence was 127.86 and 21.60 respectively. The coefficient of correlation between the two factors was found to be \( r = 0.508 \) i.e. positive correlation, which was found to be significant at 0.01 level of significance
for the degree of freedom 198. Hence, it can be said that there is a significant positive correlation between the extent of use of ICT by teachers and their technology competence. Hence, the hypothesis ‘There is a significant positive relationship between the extent of ICT use by teachers and their technology competence’ was accepted.

Thus it can be said that as the technology competence of teachers increases the extent of use of ICT by teachers increases i.e. the teachers having high level of technology competence use ICT more/ in a better way.

Findings related to relationship between the extent of Use of ICT by male teachers and their Technology Competence

The calculated mean and S.D. values for the dependent variable i.e. ‘Use of ICT’ by male teachers were 72.76 and 19.83 respectively and that of the independent variable i.e. ‘Male Teachers’ Technology Competence were 127.32 and 22.40 respectively. The coefficient of correlation between the two factors was found to be r - 0.543 i.e. positive correlation, which was found to be significant at 0.01 level of significance for the degree of freedom 98. Hence, it showed that there is a significant positive correlation between the extent of use of ICT by male teachers and their technology competence.

Thus it can be said that as the technology competence of male teachers increases the extent of use of ICT by male teachers increases i.e. the male teachers having high level of technology competence use ICT more/ in a better way.

Findings related to relationship between the extent of Use of ICT by female teachers and their Technology Competence

The calculated mean and S.D. values for the dependent variable i.e. ‘Use of ICT’ by female teachers were 73.12 and 19.86 respectively and that of the independent variable i.e. ‘Female Teachers’ Technology Competence were 128.41 and 20.86 respectively. The coefficient of correlation between the two factors was found to be r - 0.471 i.e. positive correlation, which was found to be significant at
0.01 level of significance for the degree of freedom 98. Hence, it showed that there is a significant positive correlation between the extent of use of ICT by female teachers and their technology competence.

Thus it can be said that as the technology competence of female teachers increases the extent of use of ICT by female teachers increases i.e. the female teachers having high level of technology competence use ICT more/ in a better way.

Findings of obtained data through Analysis of Variance

Findings related to difference between male and female teachers in terms of ICT use in relation to their Morale

Gender Factor

The computed F-value for gender factor was 0.070, which was found to be non significant at 0.05 level of confidence. It indicated that there exists no significant difference between male and female teachers in terms of ICT use. Hence, the hypothesis ‘There is a significant difference between male and female teachers in terms of ICT use’ was rejected.

From this it may be concluded that gender factor does not affect the level of ICT use. Further the mean score of male teachers was 72.76 and it was slightly lower than the mean score of the female teachers i.e. 73.12 in terms of use of ICT. It indicates that the extent of use of ICT among the female teachers is marginally higher than their male counterpart.

Morale Factor

The computed F value for morale factor was 113.765, which was found to be higher than the table value 6.76 at 0.01 level of confidence. It indicated that there exists a significant difference between high and low morale teachers in terms of ICT use. Hence, the hypothesis ‘There is a significant difference between the high and low morale level of teachers in terms of ICT use’ was accepted.

From this it may be concluded that morale factor has significant effect on the level of ICT use. Further the mean score of teachers possessing low morale was
61.33 and it was lower than the mean score of the teachers possessing high morale i.e. 85.27 in terms of use of ICT. It indicates that the extent of use of ICT among the teachers possessing high morale is higher than the teachers possessing low morale.

**Gender x Morale) Interaction Factor**

The computed F value for interaction factor between gender and morale was 0.004, which was found to be lower than the table value 3.89 at 0.05 level of confidence. It indicated that there exists no significant difference between gender and morale of teachers in terms of ICT use. Hence, the hypothesis ‘There is a significant difference between the extent of ICT use by male and female teachers in relation to their morale’ was rejected. From this it may be concluded that there was no significant effect of interaction among gender and morale factor on the level of ICT use.

**Findings related to difference between male and female teachers in terms of ICT use in relation to their Attitude towards ICT**

**Gender Factor**

The computed F-value for gender factor was 0.082, which was found to be non significant at 0.05 level of confidence. It indicated that there exists no significant difference between male and female teachers in terms of ICT use. Hence, the hypothesis ‘There is a significant difference between male and female teachers in terms of ICT use’ was rejected.

From this it may be concluded that gender factor does not affect the level of ICT use. Further the mean score of male teachers was 72.76 and it was slightly lower than the mean score of the female teachers i.e. 73.12 in terms of use of ICT. It indicates that the extent of use of ICT among the female teachers is marginally higher than their male counterpart.

**Attitude toward ICT Factor**

The computed F value for attitude towards ICT factor was 213.340, which was found to be higher than the table value 6.76 at 0.01 level of confidence. It indicated that there exists a significant difference between teachers having positive
and negative attitude towards ICT, in terms of ICT use. Hence, the hypothesis ‘There is significant difference between the positive and negative attitude towards ICT in terms of ICT use’ was accepted.

From this it may be concluded that attitude towards ICT factor has significant effect on the level of ICT use. Further the mean score of teachers having positive attitude towards ICT was 88.85 which was higher than the teachers having negative attitude towards ICT i.e. 60.18 in terms of use of ICT. It indicates that the extent of the use of ICT among the teachers having positive attitude towards ICT is higher than the teachers having negative attitude towards ICT.

(Gender x Attitude toward ICT) Interaction Factor

The computed F value for interaction factor between gender and attitude towards ICT was 0.153, which was found to be lower than the table value 3.89 at 0.05 level of confidence. It indicated that there exists no significant difference between gender and attitude towards ICT of teachers in terms of ICT use. Hence, the hypothesis ‘There is a significant difference between the extent of ICT use by male and female teachers in relation to their attitude towards ICT’ was rejected. From this it may be concluded that there was no significant effect of interaction among gender and attitude towards ICT factor on the level of ICT use.

Findings related to difference between male and female teachers in terms of ICT use in relation to their Technology Competence

Gender Factor

The computed F-value for gender factor was 0.046, which was found to be non significant at 0.05 level of confidence. It indicated that there exists no significant difference between male and female teachers in terms of ICT use. Hence, the hypothesis ‘There is a significant difference between male and female teachers in terms of ICT use’ was rejected.

From this it may be concluded that gender factor does not affect the level of ICT use. Further the mean score of male teachers was 72.76 and it was slightly lower than the mean score of the female teachers i.e. 73.12 in terms of use of ICT. It
indicates that the extent of use of ICT among the female teachers is marginally higher than their male counterpart.

**Technology Competence Factor**

The computed F-value for technology competence factor was 58.217, which was found to be higher than the table value 6.76 at 0.01 level of confidence. It indicated that there exists a significant difference between high and low technology competence level of teachers in terms of ICT use. Hence, the hypothesis ‘There is a significant difference between the high and low technology competence level in terms of ICT use’ was accepted.

From this it may be concluded that technology competence factor affect the level of ICT use. Further the mean score of high technology competence group of teachers was 82.47 which were higher than the mean score of low technology competence group of teachers i.e. 63.59 in terms of the use of ICT. It indicates that the extent of the use of ICT among the teachers having high level of technology competence is higher than the teachers having low level of technology competence.

**(Gender x Technology Competence) Interaction Factor**

The computed F value for interaction factor between gender and technology competence was 0.374, which was found to be lower than the table value 3.89 at 0.05 level of confidence. It indicated that there exists no significant difference between gender and technology competence of teachers in terms of ICT use. Hence, the hypothesis ‘There is a significant difference between the extent of ICT use by male and female teachers in relation to their technology competence’ was rejected. From this it may be concluded that there was no significant effect of interaction among gender and technology competence factor on the level of ICT use.

**TESTING OF HYPOTHESES**

It may be concluded from the above findings that use of ICT by secondary school teachers is significantly related to morale level of teachers’, their attitude towards ICT and technology competence factors. Findings show that teachers
having high level of morale and technology competence use of ICT more/ in a better way as compare to teachers having low level of morale and technology competence. Similar findings are shown by attitude towards ICT factor, teachers possessing positive attitude towards ICT use of ICT more/ in a better way as compare to the teachers possessing negative attitude towards ICT. But gender has no significant effect on ICT use. The fundamental variable of the study included: (1) teachers’ morale level; (2) attitude towards ICT of teachers; (3) technology competence of teachers.

The retention of the three hypotheses of the study namely (1) There is a positive relationship between the extent of ICT use by teachers and their morale; (2) There is a positive relationship between the extent of ICT use by teachers and their attitude towards ICT; (3) There is a positive relationship between the extent of ICT use by teachers and their technology competence dose prove the importance of these factors in assessing the extent of use of ICT by teachers, which indeed has the special impact on teachers’ teaching in present scenario of technology and communication, making teaching and learning an effective, purposeful and appropriate, especially at the secondary school level.

**DISCUSSION OF RESULTS**

This study explored the effective use of ICT by teachers in relation to important factors that influence the secondary school teachers to use ICT effectively in their classrooms. Present research also examined domains to assess the morale level, attitude of teachers towards ICT and technology competence of secondary school teachers.

This study primarily aimed at studying extent of use of ICT by secondary school teachers, adjudging their morale level, attitude towards ICT and technology competence level. The secondary aim was to see the relationship of use of ICT with other variables and also the difference of these variables in terms of use of ICT with respect to gender.

The subsequent chapter deals with the discussion of findings in sequence as:
Discussion of results pertaining to Use of ICT

Discussion of results pertaining to Teachers’ Morale

Discussion of results pertaining to Teachers’ Attitude towards ICT

Discussion of results pertaining to Teachers’ Technology Competence

Discussion of results pertaining to Use of ICT

Majority of the teachers of selected secondary schools of Haryana were found to be at moderate level in their use of ICT and approximately the same number of teachers were in low and high level of use of ICT. This could be ascribed to different types of reasons. Perhaps, it is because of availability of infrastructural facilities, working conditions, technological knowledge, commitment to pupils learning and concerns about their own professional growth which stand corroborated with the findings of Pelgrum (2001), Knezek and Christensen (2002), M. Rajesh (2003), Plessis & Webb (2012), Albugami & Ahmed (2015) and Chandra (2015) who found that poor working conditions and lack of infrastructure in schools may lead to less use of ICT by teachers. Similarly, those teachers who are motivated, encouraged and have strong commitments to their pupils’ learning and their own professional development integrated computers more easily within their teaching (Chandra, 2015; Copriady, 2014; Abbas Zare-ee, 2011; Becker & Riel, 2000; Becker, 1994; Hadley & Sheingold, 1993; Sheingold & Hadley, 1990). Use of ICT by teachers was also influenced by lack of knowledge and skill, technical problems and shortage of time as shown in the findings of Tosun & Baris (2011), Yang (2012), Bozdogan & Ozen (2014), Albugami & Ahmed (2015) and Elzbieta Gajek (2015).

Further, the results indicated that use of ICT by female teachers was marginally higher than their male counterparts. The reason could perhaps be that they had more command over their subject. Their confidence level and healthy relationship with the staff and students could be another contributing factor towards better performance. The results of this study were contradictory to the findings of

Discussion of results pertaining to Teachers’ Morale

Percentage of teachers with high level of morale was comparatively higher than teachers with low morale. This may have been due to ten factors viz- teacher rapport with principal, satisfaction with teaching, rapport among teachers, teacher salary, teacher load, curriculum issues, teacher status, community support of education, school facilities and services and community pressures used for defining secondary school teachers’ Morale. Findings of Anderson (2000), Cooper (2001), Baylor & Ritchie (2002) also showed support of school administration, rapport among teachers, community support of education, total job satisfaction and student behavior as significant factors affecting morale of teacher.

Further mean score of teachers possessing low morale was lower than the mean score of the teachers possessing high morale in terms of the use of ICT. This indicated that the extent of the use of ICT among the teachers possessing high morale was higher than the teachers possessing low morale. These results were also in accordance with the study of Baylor & Ritchie (2002) that stated that those teachers who incorporate technologies, their own level of technical competence increases, as does their morale.

Results also indicated that there exists no significant difference between gender and morale of teachers. This was similar to the findings of Eggers (2012) but opposite to the findings of Savadanuthu (1994) and Blackbourn & Wilkes (2003) who stated morale of women teachers is higher than that of men teachers.

Discussion of results pertaining to Teachers’ Attitude towards ICT

The present study on the basis of attitude towards ICT revealed that the majority of the secondary school teachers’ attitude towards ICT was neutral. Reasons for being neutral could have been lack of availability of technology, less use of computer due to feeling of burden, lack of training in using computer, level of accessibility to school computers, lack of ICT knowledge and computer ownership.
The results were in accordance with the findings of Na (1993) & Pelgrum (2001) who concluded that there is a significant correlation between computer access and attitude towards computer also there is a significant relationship between the proximity of computers and the number of access resources (home and school) on the one hand, and, on the other, teachers’ attitudes toward computers. Similar results were shown by Varol (2013) who concluded that teachers’ attitude toward technology is at medium level and teachers’ ICT engagement predicts their attitude towards technology and self-confidence for teaching with technology.

Results also suggested that there is a significant positive correlation between the extent of ICT use by teachers and their attitude towards ICT. Similar results were shown by Kersaint, Horton, Stohl, & Garofalo (2003); Hew & Brush (2007); Drent & Meelissen (2008); Keengewe & Onchwari (2008); Demici (2009); Hue & Jalil (2013) and Lal (2014). They found that teachers who have positive attitudes towards technology feel more comfortable with using it and usually incorporate it into their teaching. Similarly Bullock (2004) found that teachers’ attitudes are a major enabling/disabling factor in the adoption of technology.

Results of the present study showed that the teachers’ attitudes towards ICT were the principal determinant of effective ICT use in classroom as supported by the findings of Demetriadis, et al. (2003) and Albirini (2006). Though the mean score of female teachers was a bit higher than the mean score of male teachers, it did not promise any noteworthy difference. Shah and Agarwal (1994), in their study evaluated teachers’ attitude towards computer education as well as Computer Assisted Instruction (CAI). The results showed positive attitude in all the groups, though female teachers showed more positive attitude towards computer-assisted instruction (CAI). However, Francis, 1994 and Jones, 1998 found a significant relationship between gender and attitudes toward computers. For instance, Francis (1994) found that males are more enthusiastic and more confident using computers than females. However, as far as the present study is concerned, whatever the difference between the scores of the male and female teachers belonging to
secondary schools existed, it was due to fluctuation in sampling and chance factor.

One of the results related to attitude was that there exists no significant difference between gender and attitude towards ICT of teachers in terms of ICT use. These findings were in consonance with the findings of Rouquia (2001) & Annaraja & Joseph (2006) study on teacher trainees’ attitude towards ICT. Their findings indicated that there is no significant difference between male and female teacher trainees in their attitude towards ICT. Similarly Cavas, Cavas, Karaoglan & Kisla (2009) also concluded that teachers’ attitude towards ICT do not differ regarding gender.

Discussion of results pertaining to Teachers’ Technology Competence

Secondary school teachers differ in their level of technology competence. This may be due to the teacher factors that involved beliefs about the way the subject should be taught and skills associated with competence in managing classroom activities and computer-handling technical skills as showed by Veen (1993), that teacher factors far outweighed the institutional or school factors. Despite essential technical support provided by the school and a positive attitude to IT from the school principal, personal level factors influenced teachers’ take-up of ICT.

Another finding of the present research was that as the technology competence of teachers increased, the extent of use of ICT by teachers was also found to increase i.e. the teachers with high level of technology competence made use of ICT more. This could have been due to teachers’ personal feelings. While the schools encouraged ICT use, the real take-up depended largely on teachers’ skills and attitudes to IT in general. These findings were in accordance with the results shown by Cox, Preston & Cox (1999) that teachers who have a high value for ICT and perceive it to be useful, completely transform their teaching. Afshari, Bakar, Luan & Siraj (2012) showed that computer competence has a positive relationship with the level of computer use.

The result concerning the relationship between the extent use of ICT by
female teachers and their technology competence revealed that there exists a significant positive relationship between extent of ICT use by female teachers and their technology competence. Though the mean score of female teachers was a bit higher than the male teachers belonging to secondary schools, it did not reflect any noteworthy difference. Whatever the difference between the scores of the male and female teachers belonging to secondary school existed; it was due to fluctuation in sampling and chance factor. Thus, it can be concluded that the teacher technology competence is the principal determinant of effective ICT use in classroom as supported by the findings of Knezek and Christense (2002), Isleem (2003).

One of the results from present study showed that there exists no significant difference between gender and technology competence of teachers in terms of ICT use, which is contradictory from the study of Meredyth et al. (1999). They had concluded from their study that teacher’ characteristics, such as gender, computer ownership, computer experience, and school education level, as well beliefs about teaching and learning with computers, perception of their technological skills were all significant influences on the ICT classroom environment.

EDUCATIONAL IMPLICATIONS

The most outstanding characteristics of any research is that it must contribute something new to the development of the area concerned. So, an investigator should find out the educational implications of her study. This study has implications for teachers, students in particular and the whole educational system in general.

Technology is becoming more and more dominant in our society. Technology is all around us whether we want it to be or not: it is the vehicles we drive. Upgrades are being made and new innovations are being discovered every day in field of information and communication technology (ICT). ICT has had a major impact on our school systems and is still impacting it today. ICT enables all students to master more complex subjects via rich interactions with resources outside of classroom walls just as geographically distributed workers create, share, and master knowledge. Thus technology is impacting the young mind to a great extent.
However, the issue is not whether instructional tools are more efficient at accomplishing current goals of education, but instead how much is this emerging technology being explored by teachers in their classrooms with high morale, positive attitude and required technology competence, so that it can provide an effective means of reaching essential educational objectives in the technology-driven evolution of a knowledge-based economy.

This research attempted to provide a few recommendations that may help in developing morale, attitude towards ICT and technology competence among secondary school teachers. These are offered in the subsequent section under the heading suggested implications of the present study.

This study revealed that majority of the secondary school teachers are at a moderate level of use of ICT. In order to make teachers reach a higher level of use of ICT, there is a need to implement more ICT resources and to provide opportunities to them to utilize and integrate ICT to its fullest potential in their classrooms.

Findings from the study also suggested that majority of the teachers have moderate level of morale, neutral attitude towards ICT and moderate level of technology competence. These in turn have affected educational objectives in present scenario of technology. For effective use of ICT, teachers should have more use of ICT, positive attitude towards ICT, high level of Technology Competence. Therefore, there should be a collaboration in working of the Principal, teachers, administration and society for high level of morale development in teachers. Teachers should be concerned about learners’ learning, their own professional development and keeping him/her self updated to have positive attitude and becoming technology competent.

Training programmes should be run by administration bodies to make teachers competent in using emerging ICT in their classrooms. Teachers should be encouraged and motivated by giving some awards and incentives on integrating technology in their classroom by principles and administration to develop positive attitude towards ICT.

Curriculum and time table should be flexible for utilizing full potential of
In teaching and learning so that teachers do not hesitate in integrating ICT due to lack of time and taking it as separate from curriculum.

It is concluded from the study that there is a positive correlation between use of ICT and all other variables. Efforts of teachers using ICT should be recognized and outstanding achievements of its teachers should be celebrated, so that it increases their morale and attitude towards ICT. Efforts to provide opportunities to attend special awareness programmes of ICT use should be provided to such teachers so that they become technologically competent as well.

Parents and community should also create supportive learning environment, towards use of ICT, which in turn affect teachers’ attitude towards ICT.

To increase the level of teachers’ morale students’ and teachers’ collaboration across the world in sharing educational views on various internet facilities should be encouraged by school, teachers themselves and the parents.

Teachers’ requirements should be considered while developing educational softwares so that they use these ICT tools and develop a positive attitude towards ICT.

Since the use of information technology helps to develop leadership qualities and communication skills in the students, the teachers can encourage the learners to live a better life in the future. Today’s classroom environment is suitable for encouraging the students to face the challenges of globalised world. Thus efforts should be made by the state and the central government to support teachers in all possible ways to enhance use of technologies in the classrooms.

**SUGGESTIONS FOR FURTHER RESEARCH**

The study could be replicated

- to explore use of ICT by pre-service teachers.
- to explore use of ICT by teachers at different grade level.
- to explore use of ICT by teachers in relation to other factors like teachers’ adoption of ICT, self efficacy, teaching competence and perception.
- to explore use of ICT in government schools.

- on a large sample for validation and could be done in a whole state by taking a single or more factors at a time.

Tools for data collection can be developed to study use of ICT by students in different subjects at different grade level, as also to determine the extent to which it could be used within the existing conditions and parameters in schools and other educational institutions.