# "DEVELOPMENT AND VALIDATION OF TEACHER'S ATTITUDE SCALE TOWARDS INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) AT SENIOR SECONDARY LEVEL".

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**Abstract**:The purpose of this study is to measure the senior secondary school teacher's attitude towards Information and Communication Technology (ICT) in teaching and learning activities. After review of related literature, 70 items pertaining to teacher's attitude towards ICT are framed in preliminary draft; later on 29 items are modified and deleted as per the opinion of experts in the field of Technology and education. This tool is randomly administered on 100 teachers teaching at senior secondary level in UP Board at Saharanpur district. This attitude scale consists of five parts namely, ICT and teaching management, teachers comfort level with ICT, Socialization with ICT, students progression with ICT and impact of ICT on education system. The data is collected from representative sample of teachers from senior secondary schools. Individual analysis of item is carried out using t value then reliability of the tool is established by using split half correlation technique and Cronbach alpha value to show internal consistency of the scale. Items of the scale are reduced to 40 in final draft with adequate psychometric analysis which makes this scale valid and reliable instrument for evaluating teacher's attitude towards ICT.
**Key Words:** Scale development, Attitude, ICT, Factor Analysis, Senior Secondary Level.

## INTRODUCTION:

Education means nurturing individual in the light of knowledge and living a purposeful life. It is a continuous process and plays a vital role in individual's life. Education is attend by several ways, however delivery of instruction is largely influenced by the extent of Technology integration .Technology advancements are instrumental in designing and developing effective teaching methods and effective teacher is a dominating factor that cater and contribute to the qualitative improvements in education. The teacher effectiveness reflects teacher's attitude, skill and behavioral characteristics in classroom environment. Consequently teachers are highly motivated and inclined to construct interactive curriculum and learning experience, but the prevailing scenario is quite meaningless if teachers are reluctant to adopt education technology with positive attitude. Now a day's teaching learning process have been tremendously impacted by Information and Communication Technology ICT, Therefore teacher should have positive attitude towards ICT to create excellent pedagogical approaches . Integrating ICT with classroom activities support students to transcend their cognitive abilities and exploring new possibilities beyond the boundaries of classroom learning. The role of ICT in education is quite important as we are marching rapidly in the era of digital awareness and information explosion.

**Meaning of ICT:** ICT stands for Information and Communication Technology it is the combination of two terms that is information and Technology and Communication Technology information technology is a scientific and engineering discipline and management technique used in handing the information its application and Association with social economical and cultural matters UNESCO (2002).

Communication Technology is the electronic system that facilitates communication between individuals and the groups who are not physically present at the same location "According to Blurton,C ( 2002) ICTs stands for information and communication technology and defined as a diverse set of technological tools and resources used to communicate and to create, disseminate, store and manage information."

ICT transforms society into information based society, for this professional development and change in the attitude of teachers as well as of the society towards learning process is essential.

## STATEMENT OF THE PROBLEM:

"DEVELOPMENT AND VALIDATION OF TEACHER'S ATTITUDE SCALE TOWARDS (ICT) AT SENIOR SECONDARY LEVEL".

## OBJECTIVES:

The major objective of this study is to prepare and standardize research tool which could be utilized for measuring teacher's attitude teaching at Senior Secondary Level towards ICT.

## OPERATIONAL DEFINITION AND LIMITATION OF STUDY

Researcher has defined the operational terms of the present study and determined the limitations of the study, keeping in mind the availability of time, money and resources.

## TEACHER'S ATTITUDE:

In this study teacher's attitude is related to their expressed attitude towards ICT.

**ICT:** ICT means technological tools and resources used to create, communicate, store, retrieve, disseminate and manage information.

## SENIOR SECONDARY SCHOOL: UP board Senior Secondary School

Present study is administered on 100 male and female teachers teaching at Senior Secondary Level to measure their expressed attitude towards ICT in Saharanpur district.

## RESEARCH METHODOLOGY

## METHOD:

Survey research method is used by researcher to collect and analyze data.

## Data collection tool:

Self developed and validated scale to measure teacher's attitude towards ICT is used to collect data from 100 senior secondary school teachers teaching in UP board in Saharanpur district. Data is collected through a questionnaire by contacting teachers personally. Instructions and precautions are clearly conveyed to respondent.

## Sample and sampling technique:

## Sample:

100 Teachers teaching at Senior Secondary School are selected through simple random sampling.

## Content Analysis :

In order to develop a research tool, first of all it is examined and rectified by research supervisor and the experts. Relevancy of item statement, difficulty level, language accuracy and clarity of tool is analyzed and decided by experts of related fields. After careful observation of item statement and with 95 percent consensus among experts 65 attitude statements pertaining to 5 dimensions of the scale namely part 1.ICT and Teaching Management. Part 2, Teachers comfort level and familiarity with ICT. Part3, Socialization with ICT. Part 4, Student progression with ICT and Part 5, Impact of ICT on education system are prepared. Likert five point rating scale is used to frame positive and negative statements of this attitude survey. For positive statements ranging from strongly disagree, disagree, undecided, agree and strongly agree, Point 1,2,3,4 and 5 are assigned respectively and for negative statements this order is reversed for the purpose of scoring and interpretation.

| Dimensions | Name of Dimensions / Factor |
|---|---|
| Dimension-1 | ICT and Teaching Management |
| Dimension 2. | Teachers' Comfort Level and Familiarity with ICT. |
| Dimension 3. | Socialization with ICT |
| Dimension 4. | ICT and Student Progression |
| Dimension 5. | Impact of ICT on Education System |

**Scoring:**

Scores of all the 100 units of sample are personally collected and for positive statements point 1,2,3,4 and 5 are assigned to strongly disagree to strongly agree responses of respondent respectively. Negative statements have reverse order of assigning marks to responses like 1,2,3,4 and 5 to strongly agree to strongly disagree .Thus each statement has maximum 5 and minimum one score for scoring purpose.

**Tryout stage:**

**First Tryout:**

Preliminary draft of the scale is administered on exceedingly small representative group of sample to improve and remove any language ambiguity of test item.

**Proper Tryout:**

Then it is randomly given to 100 senior secondary level teachers of UP board in Saharanpur to take decision about items on the basis of applicable statistical calculations.

**Item analysis:**

Item analysis is an important step for construction and standardization of any research tool. Selection of test items or retaining/ rejecting items is done on the basis of item analysis. Questionnaires are arranged in descending order of obtained scores. Top 27 percent respondents and bottom 27 percent respondents are placed in higher and lower groups respectively. Both groups are used for statistical calculation to do item- analysis for selection of items. Paired sample t- test is applied for analysis of each item to determine its discriminatory power. t-value is calculated for all 65 items and items with t-value 2.58 and more at (.01 level of significance ) are retained and items with less than 2.58 t- value are rejected. Finally 40 items are selected out of 65 items in the final draft of the scale to measure the attitude of teachers towards ICT

**Table:**

| Mean, standard deviation, t value and p value for each item ( n = 100 ) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Item No. | Upper Group | | Lower Group | | Statistical Values | | | |
| SR.NO. | Mean | S.D. | Mean | S.D | t value | P value | R | Item Status. |
| 1. | 4.8 | .41 | 4.0 | .84 | 4.07 | .00 | .44 | Retained |
| 2. | 4.6 | .57 | 3.9 | .88 | 3.09 | .01 | .40 | Retained |
| 3. | 3.1 | 1.5 | 3.0 | 1.1 | .209 | .84 | .11 | Deleted |
| 4. | 4.7 | .48 | 3.8 | 1.1 | 3.65 | .00 | .45 | Retained |
| 5. | 4.5 | .50 | 3.8 | 1.1 | 2.95 | .00 | .40 | Retained |
| 6. | 3.0 | 1.3 | 3.2 | 1.0 | .702 | .56 | .13 | Deleted |
| 7. | 4.4 | .87 | 3.5 | 1.0 | 3.39 | .00 | .45 | Retained |
| 8. | 2.6 | 1.7 | 2.4 | 1.0 | .49 | .64 | .11 | Deleted |
| 9. | 4.3 | .98 | 3.3 | 1.3 | 2.95 | .00 | .47 | Retained |
| 10. | 4.5 | .65 | 3.7 | .77 | 3.73 | .00 | .35 | Retained |
| 11. | 3.9 | .90 | 3.1 | .85 | 3.16 | .00 | .50 | Retained |
| 12. | 4.3 | .70 | 3.4 | 1.0 | 3.72 | .00 | .40 | Retained |
| 13. | 3.1 | 1.6 | 2.7 | 1.0 | 1.04 | .30 | .02 | Deleted |
| 14. | 4.6 | .55 | 3.7 | .73 | 5.19 | .00 | .49 | Retained |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15. | 3.3 | 1.4 | 3.2 | 1.0 | .107 | .92 | .14 | Deleted |
| 16. | 2.6 | 1.7 | 2.4 | 1.0 | .49 | .64 | .11 | Deleted |
| 17. | 3.1 | 1.5 | 3.0 | 1.1 | .209 | .84 | .15 | Deleted |
| 18. | 3.8 | 1.1 | 3.0 | 1.0 | 2.85 | .00 | .40 | Retained |
| 19. | 4.4 | .50 | 3.3 | .95 | 4.83 | .00 | .58 | Retained |
| 20. | 4.0 | .67 | 3.2 | .87 | 3.60 | .00 | .59 | Retained |
| 21. | 3.1 | 1.5 | 3.0 | 1.1 | .209 | .84 | .15 | Deleted |
| 22. | 3.2 | 1.2 | 3.0 | 1.0 | .102 | .95 | .11 | Deleted |
| 23. | 4.5 | .50 | 3.5 | .86 | 4.76 | .00 | .56 | Retained |
| 24. | 4.7 | .45 | 3.5 | .82 | 6.37 | .00 | .42 | Retained |
| 25. | 3.1 | 1.6 | 2.7 | 1.0 | 1.04 | .30 | .05 | Deleted |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 26 | 4.6 | .50 | 3.4 | .82 | 5.81 | .00 | .38 | Retained |
| 27 | 3.2 | 1.2 | 3.0 | 1.0 | .102 | .95 | .11 | Deleted |
| 28 | 3.6 | 1.3 | 2.4 | 1.0 | 3.15 | .00 | .41 | Retained |
| 29 | 4.5 | .65 | 3.7 | .93 | 3.68 | .00 | .49 | Retained |
| 30 | 3.2 | 1.2 | 3.0 | 1.0 | .102 | .95 | .11 | Deleted |
| 31 | 3.1 | 1.6 | 2.7 | 1.0 | 1.04 | .30 | .02 | Deleted |
| 32 | 4.5 | .65 | 3.7 | .77 | 3.73 | .00 | .45 | Retained |
| 33 | 4.5 | .50 | 3.7 | .67 | 4.71 | .00 | .42 | Retained |
| 34 | 3.1 | 1.6 | 2.7 | 1.0 | 1.04 | .30 | .02 | Deleted |
| 35 | 4.5 | .58 | 3.5 | .82 | 4.76 | .00 | .51 | Retained |
| 36 | 3.3 | 1.4 | 3.2 | 1.0 | .107 | .92 | .14 | Deleted |
| 37 | 3.0 | 1.3 | 3.2 | 1.0 | .702 | .56 | .11 | Deleted |
| 38 | 4.6 | .48 | 3.8 | .62 | 5.03 | .00 | .62 | Retained |
| 39 | 4.4 | .58 | 3.5 | 1.1 | 3.69 | .00 | .30 | Retained |
| 40 | 4.6 | .48 | 3.7 | .93 | 4.35 | .00 | .27 | Retained |
| 41 | 3.1 | 1.6 | 2.7 | 1.0 | 1.04 | .30 | .02 | Deleted |
| 42 | 4.6 | .47 | 3.4 | 1.0 | 5.39 | .00 | .20 | Retained |
| 43 | 2.6 | 1.7 | 2.4 | 1.0 | .49 | .64 | .11 | Deleted |
| 44 | 3.1 | 1.6 | 2.7 | 1.0 | 1.04 | .30 | .02 | Deleted |
| 45 | 4.1 | .83 | 3.3 | .99 | 2.92 | .00 | .57 | Retained |
| 46 | 4.4 | .64 | 3.8 | .89 | 2.59 | .03 | .58 | Retained |
| 47 | 3.5 | 1.4 | 2.7 | 1.0 | 2.71 | .00 | .56 | Retained |
| 48 | 4.6 | .56 | 3.7 | .97 | 4.06 | .00 | .56 | Retained |
| 49 | 3.2 | 1.2 | 3.0 | 1.0 | .102 | .95 | .11 | Deleted |
| 50 | 4.6 | .56 | 3.6 | .86 | 4.84 | .00 | .54 | Retained |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 51 | 4.6 | .55 | 3.5 | 1.0 | 4.72 | .00 | .62 | Retained |
| 52 | 4.7 | .45 | 3.7 | .92 | 4.64 | .00 | .60 | Retained |
| 53 | 4.6 | .64 | 3.8 | .98 | 3.22 | .00 | .47 | Retained |
| 54 | 4.7 | .45 | 3.6 | .95 | 5.11 | .00 | .43 | Retained |
| 55 | 3.0 | 1.3 | 3.2 | 1.0 | .702 | .56 | .11 | Deleted |
| 56 | 4.8 | .40 | 3.8 | .86 | 5.22 | .00 | .40 | Retained |
| 57 | 2.7 | 1.3 | 2.5 | 1.0 | .563 | .87 | .09 | Deleted |
| 58 | 4.8 | .50 | 3.7 | 1.1 | 4.46 | .00 | .41 | Retained |
| 59 | 2.6 | 1.7 | 2.4 | 1.0 | .493 | .64 | .11 | Deleted |
| 60 | 3.1 | 1.5 | 3.0 | 1.1 | .209 | .84 | .15 | Deleted |
| 61 | 4.2 | 1.0 | 3.0 | 1.2 | 3.88 | .00 | .47 | Retained |
| 62 | 4.2 | .87 | 3.1 | 1.2 | 3.76 | .00 | .54 | Retained |
| 63 | 3.3 | 1.4 | 3.2 | 1.1 | .107 | .16 | .10 | Deleted |
| 64 | 2.8 | 1.0 | 3.6 | .99 | 3.07 | .00 | .40 | Retained |
| 65 | 4.2 | 1.0 | 2.8 | 1.2 | 4.22 | .00 | .41 | Retained |

**Final draft of Attitude Scale:**

In the final draft 25 items out of 65 items are rejected and 40 items are retained and selected for the scale of teacher's attitude towards ICT. The scale consisted of both positive (34) and negative (06) statements which are placed in order into the scale to procure an honest response.

**Table:**

Distribution of items on scale of attitude towards ICT in specified dimensions.

| No. | Dimension / Factor | Item No |
|-----|--------------------|---------|
| 1 | ICT and Teaching management | 1-14 |
| 2 | Teachers' Comfort level and Familiarity with ICT. | 15-21 |
| 3 | Socialization with ICT | 22-28 |
| 4 | ICT and Student Progression | 29-35 |
| 5 | Impact of ICT on Education system | 36-40 |

**Table:**

Description of positive and negative statements in preliminary draft of the scale.

| Item Type | Item No. |
|-----------|----------|
| Positive Items | 1-10,12-14,19-25,29,31-43,45-46,48-56,58-59,61-63,65 |
| Negative Items. | 11,15-17,18,26-28,30,44,47,57,60,64 |
| Total | 65 |

**Factor Analysis of the Scale:** Each dimension of Scale was taken as a factor for using Factor Analysis technique. All five used dimensions are named here as F1, F2, F3, F4 & F5.
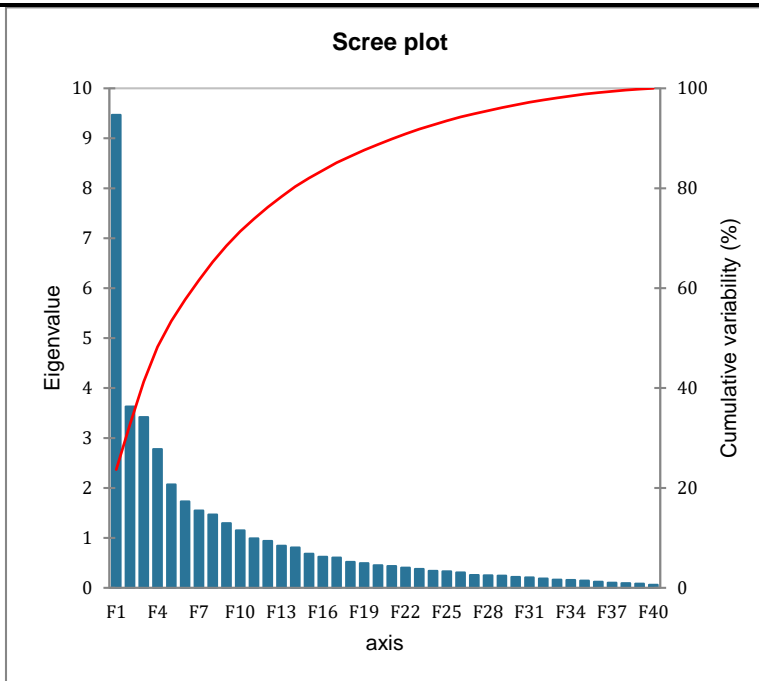
**Table:**

( Eigen values, variance and total variance of five factors.)

**Principal Component Analysis**

**Eigen values:**

| | F1 | F2 | F3 | F4 | F5 |
|---|-----|-----|-----|-----|-----|
| Eigen value | 9.469 | 3.630 | 3.417 | 2.777 | 2.070 |
| Variability (%) | 23.672 | 9.074 | 8.542 | 6.942 | 5.175 |
| Cumulative % | 23.672 | 32.746 | 41.289 | 48.231 | 53.406 |

Scree plot

FACTOR LOADINGS:

| | F1 | F2 | F3 | F4 | F5 |
|---|---|---|---|---|---|
| ICT helps in designing innovative teaching methods. | 0.51 | 0.17 | 0.33 | .30 | 0.25 |
| ICT develop scientific attitude among teachers. | 0.50 | 0.11 | 0.19 | -0.33 | 0.38 |
| ICT increase teacher's potential to prepare teaching materials. | 0.48 | -0.44 | 0.20 | -0.09 | -0.37 |
| ICT makes complicated task easy. | 0.52 | -0.43 | -0.04 | -0.22 | -0.34 |
| ICT increases my overall performance at work. | 0.47 | -0.18 | 0.23 | -0.17 | 0.02 |
| I motivate students to use ICT for independent learning. | 0.48 | -0.28 | 0.33 | -0.11 | -0.01 |
| I use ICT as a tool for evaluating students learning. | 0.33 | -0.28 | -0.12 | 0.30 | 0.11 |
| I lack skill and expertise to use ICT tools. | -0.18 | 0.18 | 0.37 | 0.50 | -0.32 |
| Parents expect teachers to use ICT adequately in teaching. | 0.47 | -0.19 | 0.19 | 0.09 | -0.34 |
| I am always eager to learn more about ICT. | 0.54 | -0.34 | -0.23 | -0.02 | 0.27 |
| I think ICT put extra workload on teachers. | -0.28 | 0.22 | -0.07 | 0.35 | -0.27 |
| I am able to select proper ICT resources for teaching-learning. | 0.52 | -0.25 | -0.21 | 0.32 | 0.06 |
| I use ICT to disseminate relevant information. | 0.43 | -0.11 | -0.25 | 0.10 | -0.21 |
| ICT makes teaching enjoyable to increase student participation. | 0.67 | -0.17 | -0.14 | 0.10 | -0.03 |
| I enjoy my work when I use ICT. | 0.68 | -0.42 | 0.08 | -0.00 | 0.12 |
| I feel confident while working with ICT tools. | 0.58 | -0.21 | -0.16 | 0.33 | 0.24 |
| I will never be able to learn ICT use. | -0.17 | 0.07 | 0.41 | 0.45 | -0.37 |
| I want to have ICT facilities at my home. | 0.49 | -0.24 | -0.31 | 0.11 | -0.34 |
| ICT removes the barriers of time and space for learning autonomy. | 0.41 | -0.25 | -0.18 | 0.08 | -0.37 |
| Learning ICT is a worthwhile practice. | 0.49 | -0.02 | -0.40 | 0.19 | 0.13 |
| I am competent enough to deal with ICT advancement. | 0.50 | 0.00 | -0.23 | 0.36 | 0.27 |
| I feel happy to discuss usage of ICT with others. | 0.49 | -0.05 | -0.43 | 0.36 | 0.14 |
| I like to do online chatting and to use social media. | 0.45 | 0.10 | -0.37 | 0.19 | -0.01 |
| Learning ICT skills makes us informed citizen. | 0.59 | 0.50 | -0.32 | 0.03 | 0.19 |
| ICT encourage me to take part in social activities. | 0.65 | 0.38 | -0.06 | -0.03 | -0.02 |
| Too much ICT usage isolate person from society. | 0.17 | 0.51 | -0.18 | 0.38 | -0.00 |
| ICT remove digital divide between rural and urban community. | 0.24 | 0.21 | -0.22 | 0.26 | -0.24 |

| | | | | | |
|---|---|---|---|---|---|
| ICT broaden the gap between male and female teachers. | -0.09 | 0.34 | 0.35 | 0.53 | 0.00 |
| ICT make students learning more interesting. | 0.65 | 0.35 | -0.02 | -0.07 | -0.02 |
| ICT provides autonomy to students to select courses and Institutions of their choice. | 0.67 | 0.43 | 0.04 | -0.21 | -0.04 |
| ICT helps students to take online examinations and to make assignments. | 0.61 | 0.51 | -0.00 | -0.02 | -0.04 |
| ICT creates self-learning environment. | 0.62 | 0.37 | 0.14 | -0.206 | -0.141 |
| ICT promotes collaborative learning at any time and place. | 0.535 | 0.356 | 0.235 | -0.06 | -0.31 |
| ICT develops initiative abilities among students. | 0.65 | 0.26 | 0.34 | -0.23 | -0.20 |
| ICT helps to keep record of student's performance. | 0.61 | 0.28 | 0.28 | -0.12 | 0.00 |
| ICT can improve the quality of educational Institutions. | 0.50 | -0.31 | 0.26 | -0.10 | -0.14 |
| I have adequate technical support on ICT at my school / college. | 0.25 | -0.25 | 0.62 | 0.42 | 0.16 |
| I am happy with ICT facilities in my school / college. | 0.23 | -0.24 | 0.62 | 0.42 | 0.22 |
| My organization does not provide basic ICT training. | -0.12 | 0.48 | 0.04 | 0.17 | 0.01 |
| There is administrative support for integrating ICT in educational activities at my school / college. | 0.27 | 0.01 | 0.57 | 0.27 | 0.45 |

**Reliability**:

Reliability of test means, consistency of scores obtained in different time and occasion or stability of scores in different set of equivalent items. Therefore Test- retest, Split-half techniques (Even-Odd items) along with Cronbach Alpha value are used to calculate reliability of tool and to determine the degree of internal consistency. .92 And 0.84 correlation Coefficient are found with both techniques which is an index of very high reliability of developed scale.

**Table:**

[**Factors** name, Cronbach value, number of the items and coefficient of correlation between factors and total score of scale]

| Sr. No. | Dimension / Factors Name | No of Items | Correlation Coefficient | Cronbach Alpha Value. |
|---|---|---|---|---|
| 1 | ICT and Teaching management | 14 | .89 | .77 |
| 2. | Teachers' Comfort level and Familiarity with ICT. Socialization with ICT | 07 | .80 | .65 |
| 3. | ICT and Student Progression | 07 | .76 | .70 |
| 4. | Impact of ICT on Education system | 07 | .79 | .90 |
| 5. | | 05 | .64 | .69 |

**VALIDITY:**

Validity of any measuring tool means, validity is the extent to which a test measures what it purports to measure. Validity of test is determined on the verdict of experts. Content and face validity is determined through rating with experts from different disciplines, from the first draft to the final draft of the scale.

Hence, it is found that this tool is reliable and valid. Percentile norms for the tool are determined and same is reported in Table. The minimum score of the scale is 40, while the maximum score is 200. The scores of the scale are categorized into five categories: highly favourable, favourable, neutral, unfavourable and highly unfavorable attitude.

**Norms and Interpretation Table:**
(Percentile Norms for the scale)

| Percentiles | Attitude Scale Scores | Quantitative interpretation | Qualitative interpretation (Attitude) |
|---|---|---|---|
| 90th | 176 | 176 and above | Highly Favourable |
| 75th | 161 | 161-175 | Favourable |

| 50th | 157 | 148-160 | Neutral |
| 25th | 147 | 141-147 | Unfavourable |
| 10th | 140 | 140 and below | Highly Unfavourable |

**CONCLUSION**:

This study describes the development and standardization of teachers attitude scale towards ICT at Senior Secondary Level. Reliability and validity of the tool is determined in context-specific conditions and collected data is based on teachers self expressed responses. However, the psychometric analysis of the scale indicates that the tool is reliable and valid. Therefore this research tool is useful to understand the view point of teachers towards Information and Communication Technology (ICT).

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