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Research Article

CONSTRUCTION OF A SCALE TO MEASURE THE ATTITUDE OF THE FACULTY MEMBERS TOWARDS INFORMATION AND COMMUNICATION TECHNOLOGY

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Abstract- A teacher should be dynamic and always search for innovations in his teaching abilities for effective outreach of majority of students in a class. Starting from the age-old chalk and talk to the present e-learning, several Information and Communication Technology (ICT) tools were designed by the educationists to upgrade the education system. All such tools have shown tremendous effect in the teaching-learning process not only in terms of speedy delivery of the message but also improved the quality of message. Accordingly, several efforts been made by all the stake holders but could not be able to reach their expectations. As attitude is one of the precursor that contributes for extent of extent of ICT utilization an attempt has been made to develop a scale to measure the attitude of the faculty members towards ICT utilization. The method of Summated Rating scale developed by Likert (1932) was used in this study to construct an attitude scale to measure the attitude of Faculty members towards ICT utilization. All the possible statements about 'attitude of faculty members towards ICT utilization' represented the universe for the scale. A tentative list of 51 statements belonging to attitude of faculty members towards ICT utilization were gathered from books, magazines, newspapers, research articles, journals, academic attainments, expertise of intellectuals in extension, research, teaching, farmers, self intuitions and own experiences. These 51statements collected were carefully edited by using various informal criteria suggested by Edwards (1941) and Thurstone (1946). After editing the 51 statements, 13 statements were deleted, thus making a total of 38 statements. These statements were subjected to relevancy test with the help of 60 judges. The judges were requested to critically evaluate each statement for its relevancy to measure attitude of faculty members towards ICT utilization on a four point continuum *viz*., highly relevant, moderately relevant, slightly relevant and less relevant with scores 4, 3, 2 and1. After giving the scores to the statements, 'z' values were calculated by using Standard Normal Deviates test to screen the statements. Thus, 25 statements out of 38 were selected through relevancy testing. The 25 statements selected through relevancy test were given to 60faculty members from a non sample area and were asked to indicate their responses on a five point continuum *viz*., strongly agree (SA), agree (A), undecided (UD), disagree (DA) and strongly disagree (SDA) with 5, 4, 3, 2 and 1 for positive statements and vice-versa for negative statements. After receiving the responses from the respondents, the 't' values were calculated by using the formula suggested by Edwards (1969). The statements with 't' values more than 1.75 were selected for the final attitude scale. Thus, out of 25 statements, 18 statements were selected in the final attitude scale Out of which 10 were positive statements and 8 were negative statements. Reliability and validity tests were carried out with appropriate tools. The final scale was administered to the 480 sampled faculty members. The total score of the respondent on the scale was obtained by summing up the scores of all the statements in the scale. The possible minimum and maximum score was 18and 90. The respondents were grouped into five categories based on the scores obtained by each of them duly following mean and standard deviation.

Keywords-Information and Communication Technology, Attitude, Summated rating scale, Agricultural Education.

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Introduction

The Information and Communication Technology (ICT) is a very broad term focusing on improving the quality, quantity and speed of information to reach the students in an educational system. Jeevan and Nair[1] reported that the problems faced in ICT adoption included inadequacy of funds, shortage of IT skilled manpower, difficulties in periodic up-gradation of infrastructural facilities, frequent change and advancement of technology, high hardware and software costs, insufficient training of professionals and absence of hands-on training. Walmiki and Ramakrishnegowda [2] revealed that most of the universities lack sufficient hardware and software facilities and internet with required bandwidth to exploit the benefits of digital information environment. Kannappanavar and Vijayakumar [3] observed that, though the agricultural university is having hardware and software facilities to some extent, the results are not reaching the clientele. It recommends that the faculty should be trained on IT application. Most teachers do not make use of the potential of ICT to contribute to the quality of learning environments, although they value this potential quite significantly [4]. Faculty members have shown a positive attitude towards the use of ICT applications and automation, majority expressed the need for appropriate training to make use of ICT tools. Keeping in view of the above scenario, an attempt has been made to construct a scale to measure the attitude of the faculty members towards ICT, which will give an appropriate direction for the policy maker to design strategies to enhance the ICT utilization by the faculty members. The present study was taken up under ICAR extramural research project during the year 2016-17. The detailed procedure has been presented for better comprehension of the scale construction [5].

Procedure followed for the construction of scale to measure the "Attitude of faculty members towards Information and Communication Technology (ICT)"

The method of Summated Rating scale developed by Likert (1932) was used in this study to construct an attitude scale to measure the attitude of Faculty members towards ICT utilization. The following steps were carried out to construct the scale to measure the attitude of Faculty members towards ICT utilization [6].

Definition of Universe

The first step in the scale construction is to define the general area of universe of content. The class of all possible statements that could be made about a given psychological object is often called a universe. In the present study all the possible statements about 'attitude of faculty members towards ICT utilization' represent the universe.

Collection of Statements

In this step, a number of statements about "attitude of faculty members towards ICT utilization" were gathered from books, magazines, newspapers, research articles, journals, academic attainments, expertise of intellectuals in extension, research, teaching, farmers, self intuitions and own experiences. From all these sources a tentative list of 51 statements belonging to attitude of faculty members towards ICT utilization were prepared keeping in view of the applicability of statements suited to the area of study.

Editing of Statements

The 51statements collected were carefully edited by using various informal criteria suggested by [7]. After editing the 51 statements, 13 statements were deleted, thus making a total of 38 statements.

Testing the Statements for Relevancy

All the statements collected may not be relevant equally in measuring the attitude of faculty members towards ICT utilization. Hence the statements were subjected to scrutiny by judges to determine the relevancy and screening for inclusion in the final scale. For this purpose, the list of all the 38 statements was prepared in the form of questionnaire and was sent to 60 judges. The judges were requested to critically evaluate each statement for its relevancy to measure attitude of faculty members towards ICT utilization. They were requested to give their responses on a four point continuum *viz.,* highly relevant, moderately relevant, slightly relevant and less relevant with scores 4, 3, 2 and 1. They were also requested to feel free to add some more statements, if they feel important and also delete unrelated statements.

Selection of attitude statements based on relevancy test

S. No.	Statements	'z' value
1.	Utilization of ICT is very difficult to understand*	0.19#
2.	ICT is an effective means for sharing of global knowledge	2.36#
3.	ICT utilization is imperative for the growth of education	2.20#
4.	ICT utilization is surpassing the gravity of information*	1.52#
5.	Monotony of work can be reduced by using ICT	0.91#
6.	Black board is enough for teaching *	0.31#
7.	ICT utilization will hamper the practicality of Agricultural education*	0.11#
8.	ICT utilization helps in speedy delivery of information	0.08#
9.	I don't have interest to use ICT*	0.38#
10.	One can explore unimaginable information through ICT utilization	0.91#
11.	Presentation of topics can be effective through ICT utilization	0.11#
12.	Most of my time is wasted in browsing of information*	0.43#
13.	ICT utilization saves the time of a teacher	0.83#
14.	More scope for plagiarism through ICT utilization*	0.31#
15.	ICT utilization is the stepping stone for the global development	0.21#
16.	Self thinking is ignored due to high dependence on ICT*	0.04#
17.	ICT utilization updates the knowledge of a teacher	0.43#
18.	ICT utilization widens the vision of a teacher	0.44#
19.	There is no necessity to use ICT in all activities*	0.95#
20.	Integration of ICT into existing curriculum is necessary	0.48#
21.	ICT is making teaching and learning easier	0.52#
22.	Professional development policies should support ICT related teaching models	0.06#
23.	Performance of ICTs is not up to the mark*	0.18#
24.	ICT will provide quality output in my works	0.06#
25.	ICT is very supportive to perform my academic activities	0.35#
26.	Pluralism of the information dilutes the essentiality of the works*	-0.25
27.	ICTs give scope to innovate the technologies easily	-1.57
28.	Technology improvements are dynamic in ICT	-2.56
29.	Using ICTs in teaching increases my preparation time*	-0.25
30.	I do not find any relevant information for my teaching using ICTs*	-1.57
31.	ICT tools always provide new ideas for designing effective lessons	-2.34
32.	I am sure I can improve the quality of teaching using ICTs	-0.18
33.	ICTs are good but its utilization by the people is not proper	-1.57
34.	I am unable to use ICT properly*	-2.35
35.	Teachers can engage ICT professional instead of self utilization of ICT	-0.14
36.	ICT helps in connecting the remote places to cosmopolitan places	-1.59
37.	I am an ICT literate but not ICT professional	-2.14
38.	ICT is a waste exercise for me	-0.12

The judges included the faculty and scientists working in Acharya N. G. Ranga Agricultural University. The responses obtained from judges were subjected to Standard Normal Deviate test (z test). After giving the scores to the statements, 'z' values were calculated for each statement. Finally, the grand 'z' of all the 38 statements was obtained and '$\bar{z}$' was calculated. All the statements with 'z'values above $\bar{z}$ (-0.013) were selected as the scalable statements of attitude of faculty members towards ICT utilization. The statements with 'z' values below '$\bar{z}$' were eliminated. Thus, 25 statements out of 38 were selected through relevancy testing. The list of statements selected with their 'z' values was given in Table.

Treating the statements with Likert's Summated Rating Technique of Scale Construction

In this step, the 25 statements selected through relevancy test were given to 60faculty members from a non sample area and were asked to indicate their responses on a five point continuum *viz.*, strongly agree (SA), agree (A), undecided (UD), disagree (DA) and strongly disagree (SDA) with 5, 4, 3, 2 and 1 for positive statements and vice-versa for negative statements. After receiving the responses from the respondents, the sum of the scores of all statements given by each respondent was calculated and the respondents were arranged in descending order based on the sum of the scores obtained for all the statements. Then the top 25 percent of the respondents with the highest scores and the bottom 25 percent of the respondents with the lowest scores were considered as criterion groups to evaluate individual statements. The middle 50 percent of the respondents were deleted for further analysis. The top 25 percent was considered as high group and bottom 25 percent was considered as low group to calculate the critical ratio *i.e.* 't' value for each statement. The calculated 't' value for each statement will measure the extent to which the statement differentiates between the respondents of high group and low group. The 't' values were calculated by using the formula suggested by Edwards (1969). The 't' value for each statement was calculated by using the formula.

$$t = \frac{\left(\overline{X}_H - \overline{X}_L\right)}{\sqrt{\sum\left(X_H - \overline{X}_H\right)^2 + \sum\left(X_L - \overline{X}_L\right)^2 / n(n-1)}}$$

where,

$\overline{X}_H$ =Mean score on a given statement for the high group

$\overline{X}_L$ =Mean score on a given statement for the low group

$\Sigma\left(X_H - \overline{X}_H\right)^2$ = $\Sigma X_H^2 - \frac{\Sigma\left(X_H\right)^2}{n_H}$

$\Sigma\left(X_L - \overline{X}_L\right)^2$ = $\Sigma X_L^2 - \frac{\Sigma\left(X_L\right)^2}{n_L}$

$\overline{X}_H$ = $\frac{\Sigma X_H}{n_H}$

$\overline{X}_L$ = $\frac{\Sigma X_L}{n_L}$

n = $n_L = n_H$

Selection of final attitude statements based on 't' values

S. No.	Statements	't' value
1	Monotony of work can be reduced by using ICT	4.13#
2	One can explore unimaginable information through ICT utilization	4.04#
3	Utilization of ICT is very difficult to understand*	3.59#
4	ICT utilization is imperative for the growth of education	3.42#
5	I don't have interest to use ICT*	2.89#
6	Presentation of topics can be effective through ICT utilization	2.44#
7	Most of my time is wasted in browsing of information*	2.39#
8	ICT utilization saves the time of a teacher	2.33#
9	ICT utilization will hamper the practicality of Agricultural education*	2.23#
10	ICT utilization is the stepping stone for the global development	2.19#
11	More scope for plagiarism through ICT utilization*	2.14#
12	ICT utilization helps in speedy delivery of information	2.05#
13	Self thinking is ignored due to high dependence on ICT*	2.04#
14	ICT utilization widens the vision of a teacher	2.03#
15	Black board is enough for teaching*	1.94#
16	ICT utilization updates the knowledge of a teacher	1.89#
17	ICT utilization is surpassing the gravity of information*	1.86#
18	ICT is an effective means for sharing of global knowledge	1.79#
19.	There is no necessity to use ICT in all activities*	1.54
20.	Integration of ICT into existing curriculum is necessary	1.31
21.	ICT is making teaching and learning easier	1.02
22.	Professional development policies should support ICT related teaching models	0.96
23.	Performance of ICTs is not up to the mark*	0.34
24.	ICT will provide quality output in my works	0.24
25.	ICT is very supportive to perform my academic activities	0.08

After computing 't' values for all the 25 statements, they were arranged in the order of highest 't' value to lowest 't' value. The statements with 't' values more than 1.75 were selected for the final attitude scale. Thus, out of 25 statements, 18 statements with 't' value more than 1.75 were selected in the attitude scale and are presented in the Table. The final attitude scale to measure the attitude of faculty members towards ICT utilization comprised of 18 statements, out of which were 10 positive statements and 8 negative statements measured on a five point continuum *viz.*, strongly agree (SA), agree (A), undecided (UD), disagree (DA) and strongly disagree (SDA) with 5, 4, 3, 2 and 1 for positive statements and vice-versa for negative statements as shown in the Table.

Testing the Reliability of the scale

A scale is reliable when it will consistently produce the same results when applied on the same sample. For testing the reliability, split half method was employed. The attitude scale of 18 statements was distributed to thirty faculty members of non sample area for their responses. After getting back the responses, the scale was divided into two halves, all odd statements into one half and all even statements into another. Then the co-efficient of reliability was calculated between the two halves. The correlation coefficient for both the sets was worked out. The correlation coefficient (r=0.82) was significant at 0.01 level indicating the attitude scale was highly suitable for administration to the faculty members.

Testing the Validity of the scale

The validity of the scale on attitude of faculty members towards ICT utilization was obtained through content validity by taking the judge's opinion. The statements selected for the scale were evaluated individually and as a whole by the judges. These were again checked by experts in Acharya N.G. Ranga Agricultural University for their relevance and coverage.

Scale to measure attitude of faculty members towards ICT utilization

S. No.	Statements	Measurement				
		SA	A	UD	DA	SDA
1	Monotony of work can be reduced by using ICT					
2	One can explore unimaginable information through ICT utilization					
3	Utilization of ICT is very difficult to understand*					
4	ICT utilization is imperative for the growth of education					
5	I don't have interest to use ICT*					
6	Presentation of topics can be effective through ICT utilization					
7	Most of my time is wasted in browsing of information*					
8	ICT utilization saves the time of a teacher					
9	ICT utilization will hamper the practicality of Agricultural education*					
10	ICT utilization is the stepping stone for the global development					
11	More scope for plagiarism through ICT utilization*					
12	ICT utilization helps in speedy delivery of information					
13	Self thinking is ignored due to high dependence on ICT*					
14	ICT utilization widens the vision of a teacher					
15	Black board is enough for teaching*					
16	ICT utilization updates the knowledge of a teacher					
17	ICT utilization is surpassing the gravity of information*					
18	ICT is an effective means for sharing of global knowledge					

As the content of the attitude scale was borne out by the method of collecting statements within the universe of attitude of faculty members towards ICT

utilization, it may reasonably be assumed that the attitude of faculty members towards ICT utilization scale has content validity. The final standardized scale to measure attitude of faculty members towards ICT utilization was used for the present investigation.

Administration of the Attitude Scale to Measure "Attitude of faculty members towards ICT"

Attitude of faculty members towards ICT utilization was measured with the help of five point scale developed for the study. The final scale selected with 18 statements was administered to the 480 sampled faculty members. They were requested to give responses to each statement in terms of their own degree of agreement or disagreement on a five point continuum. Each statement of scale was provided with five point continuum *viz.,* strongly agree (SA), agree (A), undecided (UD), disagree (DA), strongly disagree (SDA) with scores of 5, 4, 3, 2 and 1 respectively for positive statements and 1,2,3,4 and 5 for negative statements. The total score of the respondent on the scale was obtained by summing up the scores of all the statements in the scale. The possible minimum and maximum score was 18and 90. The respondents can be grouped into the following five categories based on the scores obtained by each of them duly following mean and standard deviation *viz.,* Highly unfavourable, Moderately unfavourable, Neutral, Moderately favourable and Highly favourable bt taking the score range of Below Mean-SD, Between Mean-SD and Mean-0.5 (SD), Between Mean-0.5 (SD) and Mean+0.5(SD), Between Mean+0.5(SD) and Mean+SD and Above Mean+SD values respectively.

Conclusion: The scale is more precise and comprehensively covers all the dimensions of ICT with respect to the attitude of a faculty member.

Application of research: Similar other studies can utilize the attitude scale developed in this present research. The attitude of faculty members towards ICT utilization plays key role in developing and using different type of ICT tools in teaching. It is helpful for the administration and management to decide upon the moderations to be carried out for the advancement of technical knowledge among the faulty of the universities.

Research Category: Information and Communication Technology

Abbreviations:
ICT: Information and Communication Technology
SD: Standard Deviation

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