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Development and validation of a scale measuring the attitude of post-graduate students towards e-resources

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Abstract

Electronic Resources are publicly available resources, which can be accessed via a computer or internet and now-a-days it becomes a very important component in academic institutions as it plays a pivotal role in meeting the information and communication needs of institutions. It makes possible for the research scholars to access a wide range of information, such as up-to-date research reports, from anywhere in the world. It is therefore significant to know the attitude of postgraduate students towards e-resources. Keeping this in view a standardized scale has been developed to measure the attitude of the postgraduate scholars towards e-resources as one of the important components of research and learning. A summated (Likert) rating scale was used to develop scale. The process started with identifying the dimension, collection of items followed by relevancy and item analysis and checking the reliability and validity for precision and consistency of the results. A total of 66 statements consisting 46 positive and 20 negative statements were framed in which 17 statements (14 positive and 3 negative statements) were retained in the final scale which have the practical applicability in measuring the attitude towards e-resources. Reliability of the scale was calculated by using split half method. Validity of the scale was tested by experts' judgement. The psychometric properties of the scale include: Pearson product moment correlation between two sets was 0.584, reliability of test 0.74 ($P < 0.01$) and Cronbach $\alpha = 0.759$ which means scale is consistent in measurement. The reliability and validity of the scale indicates its consistency and precision of the results. This scale can be used to measure the attitude of students in similar situation beyond the study area with suitable modifications.

Keywords: Attitude, e-resources, Internet, Reliability and students

Introduction

Information and Communication Technology (ICT) is widely considered as the most important revolution humankind has experienced since the industrial revolution and the development of movable type printing techniques. Impact of Information and Communication technology during the past few decades have brought radical and constructive changes in every aspect of human life. Today, the noble application of ICT in knowledge generation and communication have brought the users and knowledge closer, the way information is gathered, stored, organized, accessed, retrieved and consumed are really productive and more user friendly. The traditional environment has been rapidly changing to an electronic one and the demand for Internet and e-resources among the academic and research community has increased manifold over the years being the most popular source of undertaking research. However, the literature review reveals that, there is a dearth of studies on use of e-resources and internet in context of academics, researchers and students not only in India but also across the globe. "E-resource" is a broad term that includes a variety of publishing models, including OPACs, CD-ROMs, online

databases, e-journals, e-books, internet resources, print-on-demand (POD), e-mail publishing, wireless publishing, electronic link and web publishing, etc. In this context, the term primarily denotes "any electronic product that delivers collection of data be it in text, numerical, graphical, or time based, as a commercially available resource" (Bavakenthy *et al.*, 2003) [2].

Realizing the importance of the e-resources most of the universities in India liberally investing to provide access to these resources to support learning, teaching and resources. Use of Internet by research scholars, is an important area of study in today's information environment. The Internet has now-a-days become an important component in academic institutions as it plays a pivotal role in meeting the information and communication needs of institutions. It makes possible to access a wide range of information, such as up-to-date research reports, from anywhere in the world. It also enables scholars and academic institutions to disseminate information to a wider audience around the globe through having web sites and a way to search them and organize the output (Madhusudhan, 2007) [9].

Usage or adoption behavior of any technology is mainly

affected by the attitude held by people towards it. Attitude may be defined as the degree of positive or negative effects associated with some psychological object (Thurstone, 1929). The objective for the present study has been conceptualized e-resources in Agriculture universities of Uttar Pradesh. By measuring attitude of its students towards e-resources, it will provide input to the policy makers for desirable change in the existing position of e-resources. Under many circumstances, researcher is not able to find an adequate scale to measure an important concept. In this type of situation it is essential to develop a new scale which serves purpose of study. Keeping in view all the aforesaid circumstances, an attempt has been made to develop a scale which measures the attitude of students towards e-resources in Agriculture universities of Uttar Pradesh.

Materials and Methods

In the context of this part, the schedule was constructed to measure the attitude of postgraduate scholars towards e-resources. Attitude is a predisposition or a tendency to respond positively or negatively towards a certain idea, object, person, or situation. The response may also be towards the psychological objects like e-resources and the degree of positive or negative feeling of students may be ascertained towards it. For developing the attitude scale, Likert method of summated rating scale (1932) [8] was followed in the present study as it offers opportunities to select statements based on their discriminating power. The methodological procedures for Likert's methods of summated rating scale (1932) [8] for measuring the attitude of students towards e-resources for academic and research work have been discussed as below. Similar methodology was used by (Mukherjee *et al.* 2018) [11].

Defining the construct

A construct is a concept with added meaning, deliberately and consciously invented or adopted for a special scientific purpose (Kerlinger 1973) [7]. The construct is a proposed attribute of a person that often cannot be measured directly, but can be assessed using a number of indicators or manifest variables. In the present study construct was attitude of students towards e-resources for academic and research work.

Collection of items

The items are making up attitude scale are known as statements. A first step in developing a scale is a list of statements were gathered from books, bulletins, articles, journals and consultation with scientist, experts as well as field experiences of researchers. A preliminary list of 66 statements, 46 of which were positive and 20 of which were negative, was created with consideration for the items' suitability or applicability to the study's field.

Editing of statements

The statements were meticulously revised using the standards recommended by Edwards (1957) [6] and Likert (1932) [8]. Every statement was carefully examined to make sure it measured what it was supposed to. Statements that were deemed unclear, unnecessary, or in odds with the recommended standards were eliminated. Six of the original 66 statements were removed. The proforma contained the

remaining sixty statements, forty of which were positive and twenty of which were negative. These claims were presented in a way that suggested either a favorable or unfavorable view.

Results and Discussion

Statement relevancy test: A panel of experts examined the gathered statements to assess their applicability and screen them for inclusion in the final scale. Lastly, a Google form poll was used to send the 60 statements on a three-point continuum—Highly relevant, Relevant, and Least relevant—with scores of 3, 2, and 1, respectively, and reverse scoring for the negative comments. These statements were also personally sent to all 66 judges. These judges were subject matter experts from KVKs, scientists from SAUs, ICAR Research Institutions, and specialists in extension education. Everyone was asked to assess each statement critically for relevance, make any required changes, and add or remove statements as needed. Out of 66 responses, 31 expert or judge responses were taken into account for the analysis of Mean Relevancy Score and Relevancy Weightage. Following study, the statements were revised in light of the experts' feedback and criticism. The following formula was used to calculate the Mean Relevancy Score (MRS) and Relevancy Weightage (RW) for each of the chosen indicators separately:

$$\text{Relevancy Weightage (RW)} = \frac{(\text{Highly relevant} \times 3) + (\text{Relevant} \times 2) + (\text{Least Relevant} \times 1)}{\text{Maximum Possible Score}}$$

$$\text{Mean Relevancy Score (MRS)} = \frac{(\text{Highly relevant} \times 3) + (\text{Relevant} \times 2) + (\text{Least Relevant} \times 1)}{\text{Number of judges}}$$

RW's computed value fell between 0.51 to 0.86. Statements with a relevancy weight of greater than 0.74 were chosen. The calculated MRS value fell between 1.53 to 2.60, and items with an MRS of 2.25 or above were chosen for item analysis. Consequently, 33 statements in all were chosen for the item analysis.

Item analysis (calculation of 't' value)

The purpose of an item analysis is to find those items that form an internally consistent scale and to eliminate those items that do not (Spector 1992). The item analysis provides information about how well each individual item relates to the other items in the analysis. Forty postgraduate and doctoral students from several departments in non-sample fields were given the chosen thirty-three assertions. These respondents were asked to rate how favorable or unfavorable they felt about each of the following statements: Strongly agree, Agree, Undecided, Disagree, and Strongly disagree. Positive statements received scores of 5, 4, 3, 2, and 1, respectively, while negative statements received reverse scores. The sum of the scores for each statement was used to determine each respondent's overall score. For 33 assertions, each respondent could receive a maximum score of 150 and a minimum score of 30. The respondents' overall individual scores were sorted in descending order. Ten non-sample area students with the highest overall score and ten non-sample area students with

the lowest total score, or the upper and lower 25% of the judges, were chosen. The method provided by Edwards (1957) [6] was used to determine the critical ratio, or t value, which is a measure of the degree to which a particular statement distinguishes between the high and low groups of responses.

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

Where,

$$\sum(X_H - \bar{X}_H)^2 = \sum(X_H)^2 - \frac{(\sum X_H)^2}{n} \text{ and } \sum(X_L - \bar{X}_L)^2 = \sum(X_L)^2 - \frac{(\sum X_L)^2}{n}$$

t = t value of particular statement

$\bar{X}_H$ = Mean score on given statement of the high group

$\bar{X}_L$ = Mean score on given statement of the low group

$\sum(X_H)^2$ = Sum of squares of the individual score on a given statement for high group

$\sum(X_L)^2$ = Sum of squares of the individual score on a given statement for low group

$\sum X_H$ = Summation of scores on given statement for high group

$\sum X_L$ = Summation of scores on given statement for low group

n = Number of respondents in each group

$\sum$ = Summation

Table 1: Finding the "t" value to assess how a high group's mean response to an attitude statement differs from that of a low group

Sample statement	Response category	Low group				High group			
		X	F	Fx	fx ²	X	f	fx	fx ²
	Strongly agree	5	1	5	25	5	5	25	125
	Agree	4	8	32	128	4	5	20	80
	Undecided	3	1	3	9	3	0	0	0
	Disagree	2	0	0	0	2	0	0	0
	Strongly disagree	1	0	0	0	1	0	0	0
		Σ	10	40	162	Σ	10	45	205
			n_L	$\sum X_L$	$\sum X_L^2$		n_H	$\sum X_H$	$\sum X_H^2$

Where, X = score allocated to the type of responses; f = Frequency

$$\bar{X}_L = \frac{\sum X_L}{n_L} = \frac{40}{10} = 4, \quad \bar{X}_H = \frac{\sum X_H}{n_H} = \frac{45}{10} = 4.5$$

$$\sum(X_H - \bar{X}_H)^2 = \sum(X_H)^2 - \frac{(\sum X_H)^2}{n} = 205 - \frac{(45)^2}{10} = 2.5$$

$$\sum(X_L - \bar{X}_L)^2 = \sum(X_L)^2 - \frac{(\sum X_L)^2}{n} = 162 - \frac{(40)^2}{10} = 2$$

$$t = \frac{4.5 - 4}{\sqrt{\frac{2.5 + 2}{10(10-1)}}} = \frac{0.5}{0.22} = 0.27$$

Final item selection

For the final item selection, the crucial ratio (or "t" value) of the pertinent assertions was computed. The calculated "t" values varied from -2.06 to 3.827. Statements having a "t" value of 1.75 or higher were then chosen to be included in the attitude scale since they showed a significant difference between the high and low groups of respondents (Table 2). In this way, 17 statements in all—14 positive and 3 negative—were kept in the final scale to gauge postgraduate and doctoral students' attitudes toward e-resources.

Table 2: List of attitude statements towards e-resources with their respective 't' value

SN.	Items	't' value	Decision
1.	e-resources are good substitutes for conventional resources	NS	Rejected
2.	e-resources are unable to meet the increasing demands of scholars*	2.06	Selected
3.	Timely information is obtained through e-resources	NS	Rejected
4.	Maximum use of e-resources for academic purposes	2.875	Selected
5.	Poor internet connectivity in the hostel & campus area restrict the application of e-resources*	NS	Rejected
6.	e-journals are offering information in large quantities to scholars	NS	Rejected
7.	e-resources improve the results of the student in competitive exam or academic exams	NS	Rejected
8.	Practical use of e-resources like e-books, e-journal can give desire and relevant information	2.647	Selected
9.	It is helpful in preparation of lecturer's notes and handouts with the use of library EIR (electronic information resources)	NS	Rejected
10.	Electronic information resources(EIR) offer today's students different opportunities from their predecessors	3.539	Selected
11.	Using EIR (electronic information resources) is not as exciting as using print resources	0.188	Selected
12.	The information needed can be delivered from the most appropriate source to the user	NS	Rejected
13.	e-resources are appropriate for preparation of academic assignments and credit seminars	NS	Rejected
14.	e-resources do not enhance decision making capacities of students	NS	Rejected
15.	e-resources inspire to discover & thinking innovative ideas and strategies	NS	Rejected
16.	Misuse of internet has adverse effect on scholars	NS	Rejected

17.	Seeking information through internet is easy process	3.827	Selected
18.	Providing e-resources by username and password can be easily hacked by anyone	2.083	Selected
19.	e-resources are useful in improving our professional competence by providing appropriate knowledge about that particular profession	3.478	Selected
20.	e-resources allow users to access and modify the information in their desired format	2.058	Selected
21.	e-resources are cheaper than the print documents	NS	Rejected
22.	e-resources have the potential to conserve fragile/precious original materials	2.80	Selected
23.	e-resources are very effective in providing current information in their respective disciplines	3.649	Selected
24.	Training programmes help students to utilize the e-resources effectively and efficiently	NS	Rejected
25.	e-resources help to contact the authors /editors through email for further information	3.438	Selected
26.	Availability of e-resources is limited to certain sections due to non-availability of internet	NS	Rejected
27.	e-resources help to provide reference materials anytime for successful completion of assignments	3.36	Selected
28.	e-resources have made teachers /Instructors lazy?	NS	Rejected
29.	Continuous use of this service may lead to eye-sight problems	NS	Rejected
30.	Different e-resources enable the user easy search of required information	1.76	Selected
31.	e-resources are updated easily with new articles and journals	2.89	Selected
32.	e-resources are useful to update the knowledge globally	2.21	Selected
33.	e-resources help the readers to access the information quickly compared to print material	2.758	Selected

NS= Non-significant

Standardization of the scale: The current scale was standardized using the split half method and content validity for ensuring its reliability and validity respectively.

Reliability of scale: According to Haladyna (1999) and De Von *et al.* (2007), reliability is the capacity of a scale to measure a characteristic consistently and the conceptual coherence of the items. The scale's dependability was assessed using the split-half approach. Nine odd-numbered statements and eight even-numbered statements made up each of the two sets of 17 statements. A group of forty farmers were given these two sets of statements on a five-point scale (Strongly Agree, Agree, Undecided, Disagree, and Strongly Disagree). Positive comments received a score of 5,4,3,2,1, while negative statements received a score of 1,2,3,4,5. Two sets have a Pearson product moment correlation of 0.584. The split half technique of scale dependability is shown by this coefficient. The split half reliability was converted to full test reliability using the following prophetic formula (Spearman-Brown, 1910) ^[12]:

$$R = \frac{2r}{1+r} = \frac{2 \times 0.584}{(1 + 0.584)} = 0.74$$

Where, R= Reliability coefficient of the whole scale
r = Estimated correlation between two halves (Pearson r)
The reliability coefficient of the test was found to be 0.74, which was significant at the 1 per cent level ($P < 0.01$). One of the major limitations of the split-half method is that it does not provide the same information as the correlation between two equivalent forms administered at different points in time (Cronbach, 1946) ^[5]. To overcome this limitation, Cronbach's alpha was used, as it is interpreted by many researchers as the average of all possible split-half correlations (Cortina, 1993) ^[4]. Cronbach's alpha also assumes that the average covariance among non-parallel items is equal to the average covariance among all parallel items. Therefore, in the present study, standardized Cronbach's alpha was also employed to obtain greater stability and accuracy, using the following formula:

$$\text{standardized} = \frac{Kr}{[1 + (K - 1)r]}$$

Where, K = Number of statements in scale

r = Mean of the K (K-1)/2 non-redundant correlation coefficients

The split half test reliability coefficient was calculated by using Cronbach's Alpha in Excel and SPSS. The value of Cronbach's alpha calculated and found to be 0.759 which means scale is consistent in measurement.

Content validity of scale

The methodical analysis of the test's content to ascertain if it sufficiently covers a representative sample of the behavior domain to be assessed is known as content validity (Anastasi, 1968) ^[1]. According to the assessment's goal, it makes it possible to utilize the tool to make decisions based on the results and/or draw suitable and relevant conclusions (Messick, 1989; Moss, 1995) ^[10, 1]. Through a thorough assessment of the literature, expert consultation, and judges' comments, the information pertaining to attitude toward e-resources was fully covered in the current study. The experts' recommendations were appropriately included in the scale. As a result, it was anticipated that the scale would have adequate content validity. Additionally, the scale value differences for nearly all of the chosen statements demonstrated strong discriminating power, which strengthened the measure's validity. As a result, the scale can be regarded as having a reasonable level of content validity. In order to reduce response bias, 17 statements were chosen to gauge postgraduate and Ph.D. students' attitudes about e-resources. These statements were structured so that positive and negative statements occurred at random.

Administration and scoring of attitude scale

There were seventeen assertions in the final scale. According to Likert (1932) ^[8], these statements were scored on a five-point continuum: strongly agree, agree, uncertain, disagree, and strongly disagree. Positive statements received scores of 5, 4, 3, 2, and 1, respectively, while negative statements received reverse scoring. As a result, a respondent's overall attitude score for e-resources could be anywhere from 17 and 85. Students who scored higher on the scale had a more positive attitude toward e-resources.

Attitude is a multifaceted component of personality that encompasses beliefs, values, behaviours, and motivations. It plays a vital role in shaping internal cognitions, beliefs, and thoughts about people, objects, or situations, and influences the way individuals behave toward a particular object or person.

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