International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Development of a Scale to Measure the Attitude of Teachers Towards Online Teaching of Veterinary Education

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Abstract

The study focused to develop an attitude scale to measure the attitude of teachers towards teaching in veterinary science through online platforms during the COVID-19 pandemic. Likert's technique was used to develop the attitude scale. Overall 91 initial statements were selected which were later scrutinized and only 40 relevant statements were retained after consultation with the supervisor, and subject matter specialists. A total of 140 experts were contacted, with some being reached in person and others via email. Out of these, 30 experts responded within 45 days. After acquiring relevance scores, 18 statements were chosen and administered to 40 teachers from the non-sampling area. Finally, 14 statements comprising 5 positive and 9 negative were kept. The scale's validity and reliability reflect its accuracy and consistency in producing results. The Cronbach's Alpha reliability of the final scale was measured at 0.780. The scale evaluated various aspects, including ease of use, digital competency, drawbacks, effectiveness, and potential improvements in the online teaching of veterinary education. Findings reveal mixed attitudes, with notable concerns about students' engagement, practical skill development, and the overall efficacy of online veterinary education. This attitude scale will provide valuable insights for educational institutions offering veterinary education aiming to enhance the effectiveness of veterinary education through online platforms and support educators effectively during future challenges like the COVID-19 pandemic.

Keywords: Attitude Scale, Veterinary, Teacher, Online Teaching, Covid-19

Introduction

Education plays a crucial role in one's life, serving as the foundation for future success and opening up numerous opportunities [2]. It fosters ways of thinking, feeling, and behaving that contribute to personal and communal success and satisfaction [2]. Education is a socially structured and regulated process, continually transferring significant experiences from one generation to the next [10]. The primary method of obtaining education is through formal training within educational institutions [10].

Since the onset of Coronavirus disease 2019 (COVID-19), the crisis has significantly impacted global educational structures, particularly affecting the most at-risk learners. This disruption has widened inequalities and worsened an existing education crisis. Colleges and school closures have varied, with some countries having no closures and others experiencing closures for more than a full school or college year [11]. At least one-third of students were unable to continue learning remotely due to a lack of connectivity and devices [15]. The crisis has affected various aspects of life, including the financial sector, academic systems, and schools [24]. The closure of institutions necessitated that students stay at home, leading to significant changes in how these institutions operate. This situation has accelerated the adoption of online platforms in institutions around the world [4]. In this context, digital platforms have become essential for providing effective foundational education to students. These platforms facilitate the delivery of educational content to every student, irrespective of the environmental, social, or financial challenges posed by COVID-19.

With the increasing dependence on digital methods, it is crucial to enhance the quality of virtual instruction and education. Consequently, this study aims to evaluate teachers' attitudes toward veterinary education through digital platforms to improve academic performance in the face of future challenges similar to the COVID-19 outbreak. The COVID-19 outbreak greatly altered daily routines, causing educational institutions to quickly switch from in-person to virtual formats to maintain their operations. This shift necessitated adjustments from both teachers and students to new teaching and learning methods. However, evaluating the effectiveness of education and assessment systems in this new paradigm has become crucial. This educational challenge has spurred research into the behavioural patterns of teachers and their impact on online education. Given the pivotal role of attitude in shaping behaviour and social action, understanding teachers' attitudes toward online education is paramount. Currently, there is a lack of suitable scales in the veterinary field to measure the attitude of teachers towards the teaching of veterinary education through online platforms. Therefore, developing a new scale is necessary.

Several researchers have extensively examined attitudes to delve into this critical psychological characteristic [13]. Allport described attitude as a cognitive and physiological state shaped by experience, which influences how individuals respond to related objects and situations in a guiding or dynamic way [1]. Morgan (1934) emphasizes that attitude encompasses thoughts, feelings, and actions or reactions, serving as a pivotal element in how humans prepare to engage with specific subjects or objects. It acts as a cognitive stance that directs behaviour and mould responses to new experiences. Thurstone, as cited by [5], characterizes attitude as an emotional response or the degree of positive or negative sentiment towards psychological objects [17], which can be symbols, phrases, people, institutions, or ideas. This concept gauges' individuals' inclinations, feelings, prejudices, biases, ideas, and fears concerning particular topics, encompassing a spectrum from favourable to neutral or unfavourable perspectives. This study aimed to develop a scale to measure teachers' attitudes towards veterinary education through online platforms.

Methodology

Attitude scales, essential tools for quantifying attitudes, play a crucial role in accurately assessing individuals' social attitudes. These scales consist of statements about an issue and assign numerical values that reflect respondents' favourable or unfavourable judgments. Pioneering contributions from Thurstone, Likert, and Guttman have profoundly influenced techniques for constructing attitude scales. In the present research, the researcher employed the summated rating method [26] to construct the intended scale. This approach involves the collection of attitude statements, each considered to have approximately equal value. Respondents express their degree of agreement or disagreement with these statements, and responses are assigned different scores. This method was opted to prevent relying on a single statement for a concept. By using multiple statements to cover various aspects, it provides a more complete evaluation. The procedure followed to develop the scale for assessing teachers' attitudes toward veterinary education through online platforms is outlined below.

Collection of attitude statements

The components of an attitude scale are referred to as statements [3]. A statement can be defined as any assertion made about a psychological object [25]. Selecting items is a crucial step in developing a valid and reliable scale [6]. Compilation of a set of items and statements designed to gauge the attitudes of teachers towards online teaching of veterinary education, with input from experts in veterinary science was carried out. Initially, a preliminary list of 91 statements was prepared, including 51 positive and 40 negative ones, ensuring their relevance to the study's context and respondents. These statements were crafted to effectively convey either a positive or negative attitude.

Editing of Statements

The statements were meticulously reviewed based on the fourteen evaluative criteria and methodological standards established by [14, 26, 16, 6]. This process led to the elimination of 51 statements, resulting in a final set of 40 statements, comprising 19 positive and 21 negative statements (Table 1).

Table 1. Selection of statements based on judges relevancy

Sl. No.	Statements	RP			RW	MRS
		Most relevant	Relevant	Not relevant		
1	I can conduct online classes comfortably and confidently.	70.00	23.33	6.67	0.88	2.63
2	Online teaching enhances the quality of teaching & learning.	33.33	66.67	0.00	0.78	2.33
3	Online teaching-learning makes study easy and flexible for both teachers and students.	73.33	26.66	0.00	0.91	2.73
4	Online teaching is comparatively easy than traditional classroom teaching.	40.00	33.33	26.67	0.71	2.13

5	I think online teaching makes teacher digitally sound in their profession.	73.33	26.67	0.00	0.91	2.73
6	Online teaching increases the attention of students towards class.	13.33	66.67	20.00	0.64	1.93
7	Student's actual attendance cannot be monitored through online platforms.	70.00	30.00	0.00	0.91	2.71
8	Teaching through online platforms augment creative idea of teaching process in educators.	20.00	70.00	10.00	0.70	2.10
9	Students can learn at their own pace via online learning platforms.	26.66	73.33	0.00	0.75	2.26
10	Online teaching is more interesting than classroom teaching.	6.67	66.67	26.67	0.60	1.80
11	Students participate more actively during online teaching.	0.00	63.33	36.67	0.54	1.63
12	Online teaching is very good platforms for teachers and students.	60.00	40.00	0.00	0.87	2.60
13	I find online teaching is a burden for the teacher.	0.00	36.67	63.33	0.46	1.37
14	Online teaching can't provide practical skills to the students.	96.67	3.33	0.00	0.99	2.97
15	I find online teaching is monotonous.	23.33	76.66	0.00	0.74	2.23
16	Online teaching increases workloads of teacher.	36.67	63.33	0.00	0.79	2.37
17	I find difficulty to deliver the online class.	3.33	63.33	33.33	0.56	1.70
18	Extra preparation is needed to conduct online class effectively.	0.00	50.00	50.00	0.50	1.50
19	I find difficulties to manage student during online class.	0.00	16.67	83.33	0.39	1.17
20	I find difficulties to grasp student's attention in online class.	90.00	10.00	0.00	0.97	2.90
21	I feel online teaching is stressful to my physical and mental state.	36.67	63.33	0.00	0.79	2.37
22	Opportunity of interaction with each of the students is limited through online platforms.	20.00	80.00	0.00	0.73	2.20
23	Discussion with students through online platforms is not effective as conventional classroom.	80.00	20.00	0.00	0.93	2.80
24	I get distracted in online teaching than conventional classroom teaching.	3.33	43.33	53.33	0.50	1.50
25	Students do not develop knowledge of subject through online classes.	70.00	30.00	0.00	0.90	2.70
26	I believe online teaching may not lead to an improvement in student's performance.	43.33	56.67	0.00	0.81	2.43
27	Practical skills of teacher get reduced due to online teaching.	56.67	30.00	13.33	0.81	2.43

28	I feel more comfortable in classroom teaching than online teaching.	56.67	16.67	26.67	0.77	2.30
29	I consider online learning is difficult for students.	43.33	43.33	13.33	0.77	2.30
30	Face-to-face classroom teaching is better than teaching through online platforms	73.33	26.66	0.00	0.91	2.73
31	Sincerity of the students in online class and exam can't be ensured.	70.00	30.00	0.00	0.90	2.70
32	Online teaching can't be effective due to various technical constraints/barriers.	93.33	6.67	0.00	0.98	2.93
33	Proper organization of the content can be done in online class to sustain student's interest in learning.	16.60	76.66	6.60	0.70	2.10
34	Well organised motivating atmosphere can be created in the online class to bring students' focus on the topic.	33.33	40.00	26.67	0.69	2.07
35	I face no difficulties in delivery of the presentation of the content through online platforms.	40.00	30.00	30.00	0.70	2.10
36	Student's evaluation can be done effectively through online mode.	20.00	33.33	46.67	0.58	1.73
37	Clarifying the doubts of the students related to the subject matter is difficult for teacher through online platforms.	70.00	10.00	20.00	0.83	2.50
38	Reconstruction through pictures and simulated videos in online class can inculcate practical skills more effectively.	20.00	70.00	10.00	0.70	2.10
39	Development of concept of subjects can be done more effectively in online teaching than physical classroom teaching.	16.67	40.00	43.33	0.58	1.73
40	Diagnostic and treatment skills of the students can be developed effectively through online teaching.	13.33	30.00	56.67	0.52	1.57

***RP-Relevancy Percentage, MRS-Most Relevancy Score and RW-Relevancy Weightage score**

Experts' rating of attitude statements

Acknowledging that not all statements might be equally relevant for measuring attitudes toward online teaching, the statements were reviewed by a professional panel to assess the statements as per their relevancy. This panel included specialists from universities and institutes in the relevant field. The researcher distributed the statements to 140 experts, and 30 responded within 45 days. Experts were asked to evaluate each statement's relevance on a 3-point scale: 3 for most relevant, 2 for relevant, and 1 for not relevant, with reverse scoring applied to negative statements. Based on their feedback, the researcher analyzed the statements.

The formula used by [22] was utilised in this paper to measure the relevancy score for each statement. The formula is as follows:

Relevancy Percentage (RP): The proportion of respondents who rated the statements as "most relevant" and "relevant," expressed as a percentage.

$$RP = \frac{FS}{\text{No. of Respondents}} \times 100$$

Where,

- FS = The frequency score for "most relevant" and "relevant"

Relevancy Weightage (RW) refers to the proportion of actual scores received compared to the highest possible scores for each statement.

$$RW = \frac{AS}{MPS}$$

Where,

- AS represents the actual scores obtained for the statement.
- MPS denotes the maximum possible scores obtainable for the statement.

The Mean Relevancy Score (MRS) is determined by averaging the scores given by each respondent and then dividing by the number of judges who participated.

$$MRS = \frac{\text{Actual score obtained for items}}{\text{No. of judges responded}}$$

Using these metrics, statements with a relevancy percentage greater than 70%, relevancy weightage above 0.7, and an average relevancy score exceeding 2 were considered for the final scale (see Table 1). As a result, 18 statements were chosen, revised, and rewritten based on expert feedback.

Item Analysis

Item analysis is crucial in the Likert method for developing an effective and consistent attitude measurement scale. The primary aim of item evaluation is to identify statements that effectively distinguish between different criterion groups. In this study, the 18 statements selected based on expert feedback were given to a random sample of 40 teachers actively engaged in online veterinary education during the COVID-19 pandemic, from an area not previously sampled. Respondents rated each statement on a 4-point Likert scale: for positive statements, scores were assigned as 4 for strongly agreeing, 3 for agreeing, 2 for disagreeing, and 1 for strongly disagreeing, the score was reversed for negative statements. The total score for each respondent was calculated by summing their scores across all items. Respondents were then ranked in decreasing order based on their total scores. The highest 25% of respondents were categorized as the higher group, while the lowest 25% were designated as the lower group [22]. These two groups served as reference groups for evaluating individual statements, following the methodology suggested by [6]. From the initial 40 respondents, 10 respondents from the higher group and the lower group were used as reference groups for the item analysis. The 't' value was computed for each statement. This ‘t’ value measures how well a particular statement differentiates between the higher and lower groups. This process ensures that only the most effective items are included in the final scale.

$$t = \frac{X_H - X_L}{\sqrt{\frac{S_H^2}{n_H} + \frac{S_L^2}{n_L}}}$$

Where,
X_H = the average score for the higher group on a particular statement
X_L = average score for the lower group on the same statement
S^2_H = variance of responses from the higher group for that statement
S^2_L = variance of responses from the lower group for that statement

Result and discussion

Finalization of Attitude Statements

Following the calculation of the 't' value of 18 statements (Table 2), only 14 statements with 't' values of 1.75 or above were selected. This process followed [6] guideline, which suggests excluding items/statements with "t" values below 1.75. Selection aims to retain items/statements with the highest distinguishing power and remove all those with inadequate distinguishing ability and uncertain validity. So, the final scale was developed consisting of these 14 statements (Table 3) after following all the criteria suggested by [23,22].

- The "t" value must exceed 1.75.
- The statement should introduce a unique concept, avoiding overlap with other statements.
- The statement should be clear and concise.

Additionally, to reduce response bias, it is recommended that 10 per cent of the indicators be negatively worded [7].

Table 2. 't' value of statements

Sl. No.	Statements	't' value
1	I am comfortable and confident in conducting online classes through online platforms.	1.40
2	Teaching through online platforms makes teaching process easier and more flexible.	1.96
3	Teaching through online platforms increases teacher's digital proficiency in teaching process.	1.89
4	Student's actual attendance cannot be monitored through online platforms.	0.72
5	Teaching through online platforms augment creative idea of teaching process in educators.	0.49
6	Students have the flexibility to learn the recorded lecture at their own pace anytime through online platforms.	3.20
7	Teaching through online platforms fails to impart practical skills to students.	4.81
8	Teaching through online platforms is monotonous.	5.30
9	Holding students' attention during class through online platforms proves challenging for me.	7.83
10	Interaction with every student is limited through online platforms.	2.68

11	Discussion through online platforms is less effective than face-to-face classroom discussion. (-)	4.74
12	Students do not acquire complete comprehensive understanding of the subject through online platforms.	5.19
13	Face-to-face classroom teaching is better than teaching through online platforms.	4.438
14	Students' sincerity in class and exam cannot be ensured through online platforms.	4.09
15	Technical constraints hinder the effectiveness of teaching through online platforms.	2.25
16	Well-organized motivating atmosphere can effectively captivate students' interest and concentration in class through online platforms.	0.55
17	Addressing all student doubts proves challenging for teacher through online platforms due to time limits.	4.33
18	The incorporation of 3D pictures, simulated videos, recorded videos of actual practical/case can enhance practical learning through online platforms.	2.46

Table 3. Statements selected for final inclusion in the attitude scale

Sl.No.	Statements	SA	A	DA	SDA
1	Teaching through online platforms makes teaching process easier and more flexible.				
2	Teaching through online platforms increases teacher's digital proficiency in teaching process.				
3	Students have the flexibility to learn the recorded lecture at their own pace anytime through online platforms.				
4	Teaching through online platforms fails to impart practical skills to students.*				
5	Teaching through online platforms is monotonous.*				
6	Holding students' attention during class through online platforms proves challenging for me.*				
7	Interaction with every student is limited through online platforms.*				
8	Discussion through online platforms is less effective than face-to-face classroom discussion.*				
9	Students do not acquire complete comprehensive understanding of the subject through online platforms.*				
10	Face-to-face classroom teaching is better than teaching through online platforms.				
11	Students' sincerity in class and exam cannot be ensured through online platforms.*				
12	Technical constraints hinder the effectiveness of teaching through online platforms.*				
13	Addressing all student doubts proves challenging for teacher through online platforms due to time limits.*				

14	The incorporation of 3D pictures, simulated videos, recorded videos of actual practical/case can enhance practical learning through online platforms.				

***Negative statements, SA: Strongly agree, A Agree, DA: Disagree, SDA: Strongly disagree**

Refinement of the Scale

The developed scale underwent additional refinement procedures to verify its reliability and validity.

Reliability

Reliability refers to the consistency with which a measurement tool produces similar results across different assessments when used with the same sample [18]. [9,19] describe reliability as the precision or correctness of a measurement tool. To ensure the scale's reliability, extensive testing and validation processes were conducted, confirming the tool's ability to provide consistent and reproducible results.

Cronbach's alpha coefficient was utilized to measure of internal consistency of the scale. For exploratory studies, Cronbach's alpha above 0.6 and up to 0.7 are generally considered acceptable [9,12]. Using SPSS, the Cronbach's alpha coefficient was found to be 0.78, demonstrating the scale's strong reliability. This high coefficient confirms that the tool is highly effective for measuring teachers' attitudes toward veterinary education through online platforms, which is essential for developing a robust attitude scale [20].

Validity

The content validity of the scale was rigorously calculated to ensure it thoroughly covers teachers' attitudes toward online veterinary education. Content validity refers to how well a measurement tool represents the intended content domain [21]. The scale was carefully crafted based on an extensive literature review and expert consultations, ensuring it fully addressed teachers' attitudes towards online veterinary education. Consequently, the scale is confirmed to have strong content validity. This meticulous process guarantees that the final scale is both reliable and valid for measuring teachers' attitudes, providing a comprehensive assessment of the perceived benefits and challenges of online teaching.

The developed attitude scale offers valuable insights into teachers' perspectives on online veterinary education during the COVID-19 outbreak. The results reveal both the perceived benefits and significant challenges, especially in maintaining engagement, ensuring effective learning, and addressing practical skill development. This scale can serve as a useful tool for educational institutions, particularly veterinary schools, to evaluate and enhance online teaching strategies, thereby improving support and resources for teachers.

Authorship Contribution Statement

Keshab Jamatia: Conducted the research, collected and analyzed primary data, and wrote the manuscript with input from all co-authors.

Debasis Ganguli: Supervised the overall research work, edited the manuscript, and drafted the final version.

Debasish Saha: Contributed to drafting the manuscript and designing the tables.

Santanu Bera: Provided critical feedback and comments on the manuscript.

Uttam Sarkar: Assisted with data analysis and contributed to the interpretation of results.

Acknowledgements

The authors would like to express their sincere gratitude to the Dean and faculty members of WBUAFS Kolkata, the Principal and faculty members of CVSc & AH Agartala, Tripura, and the faculty members of CVSc Khanapara, Assam, for providing the necessary facilities to conduct this research. We also extend our heartfelt thanks to the experts from various institutes across the country for their invaluable cooperation and prompt responses during the study.

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