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RESEARCH ARTICLE

Developing a learners' attitude scale for the 'Diploma in Agri Inputs (DAI)' program in open and distance learning (ODL)

Kathiresan S[1*], Balasubramaniam P[2], Sriram N[3], Gangai Selvi R[4] & Shanmugam P S[5]

[1] Department of Agricultural Extension and Rural Sociology, Tamil Nadu Agricultural University, Coimbatore 641003, Tamil Nadu, India

[2] Directorate of Open and Distance Learning, Tamil Nadu Agricultural University, Coimbatore 641003, Tamil Nadu, India

[3] Directorate of Research, Tamil Nadu Agricultural University, Coimbatore 641003, Tamil Nadu, India

[4] Department of Physical Sciences and Information Technology, Tamil Nadu Agricultural University, Coimbatore 641003, Tamil Nadu, India

[5] Department of Pulses, Tamil Nadu Agricultural University, Coimbatore 641003, Tamil Nadu, India

*Email: kathiresan.phdext2021@tnau.ac.in

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Abstract

Attitude is a relatively enduring and general evaluation of an object, person, group, issue, or concept on a dimension ranging from negative to positive. It plays a vital role in the persuasion of one's behaviour concerning a particular psychological object. The present study aims to measure the attitude of learners towards the "Diploma in Agri Inputs (DAI)" programme offered through Open and Distance Learning (ODL) mode in Tamil Nadu Agricultural University (TNAU). To accomplish this, a standardized attitude scale was developed using Likert's summated raring approach, which followed the steps of item collection, relevancy test, item analysis, reliability test, and validity test. A total of 45 statements were collected, of which 25 were retained after editing. The statements were sent to Judges to judge its proper relevancy with a 5-point continuum. Finally, 14 statements were selected equal to or greater than the "t" value of 1.75. The reliability coefficient was found to be 0.82, which showed the scale's reliability. The developed attitude scale will be useful for researchers and extension functionaries in similar studies. Moreover, results revealed that most (70.86 percent) ODL learners had highly favourable attitudes towards the DAI programme. The reason might be the various attracting factors of the DAI programme, such as the teaching-learning process, Knowledge generation through Personal Contact Programme (PCP) classes, Affordable fees, Course duration, Practical exposure to diagnosing pests and diseases, Advanced study material, Student -centred learning, Success stories of agripreneurs and 'Fertilizer dealership license'.

Keywords

Attitude scale; Diploma in Agri Inputs (DAI); Open and Distance Learning (ODL); Likert's summated rating scale; Reliability

Introduction

Education is crucial and corrective in balancing the socio-economic structure of the country. Open, and Distance Learning (ODL) system is a system wherein teachers and learners need not necessarily be present either at the same place or at the same time and is flexible regarding modalities and timing of teaching and learning as also the admission criteria without compromising necessary quality considerations (Department of Higher Education, Ministry of Education, Government of India). Universities promote distance learning

courses for students living in far and remote locations, in addition to employed students, to facilitate their pursuit of higher education. Total enrolment in distance education mode was 45.73 lakhs, with 20.06 lakhs females and 25.67 lakhs males enrolled at various levels through universities. In the last 3 years (2020, 2021 and 2022), there was a humongous growth (13.42 %) in enrolment, which displays the broader scope of distance learning across India. The Undergraduate level has the highest percentage of distance enrolment, accounting for 64.7% of the total. PG level accounts for 26.6% of total enrolment in distance learning. Around 47.3% of university enrolment is done through distance education (1). The enrolment details of distance education in India are given in Fig. 1

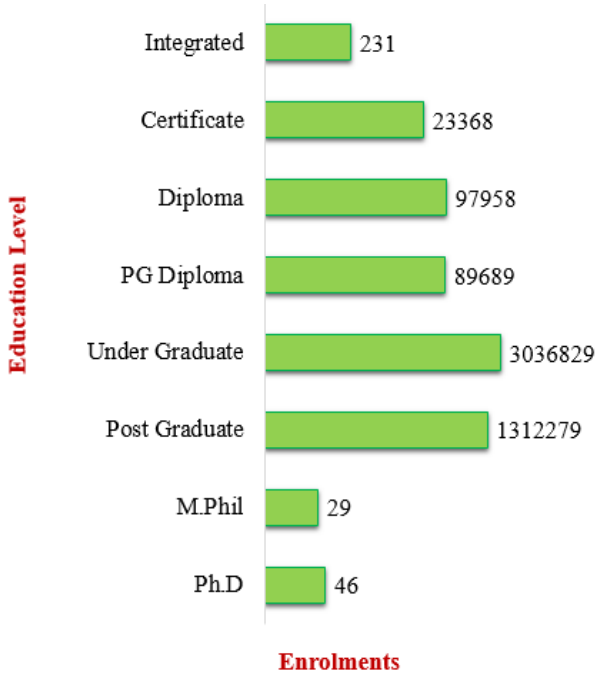

Fig 1. Enrolments in Universities and its Constituent Units through Distance Education Mode in India (2022)

The Directorate of Open and Distance Learning (DODL), TNAU, Tamil Nadu, India

The Directorate of Open and Distance Learning (DODL) was established at Tamil Nadu Agricultural University (TNAU), India, in April 2005, a pioneering attempt among the State Agricultural Universities (SAUs) in India. The primary objective of the DODL is to impart technical know-how and do-how on agri technologies and agribased industries to various segments of learners who lack opportunity in campus-based education. TNAU-DODL has offered different courses, such as Diploma in Agri Inputs (DAI), Certificate courses, Diploma courses, Online certificate courses, Special certificate courses and Crash courses for the past 2 decades. Fig 2 displays the enrolment status of the various ODL courses in TNAU-DODL.

The courses are skill-oriented, and the learners are encouraged and trained to start a business. Thereby, they can improve their economic status and the standard of living. TNAU-DODL has made successful entrepreneurs through various courses such as a Diploma in Agri Inputs (DAI), Bachelor of Farm Technology (B.F.Tech) and Coconut production technology, Tea plantation management, Sericulture, Sugarcane production technology, Mushroom production, Beekeeping, *etc*. Fig. 3 displays the number of successful entrepreneurs who emerged by studying various ODL courses in TNAU-DODL during 2005-2023.

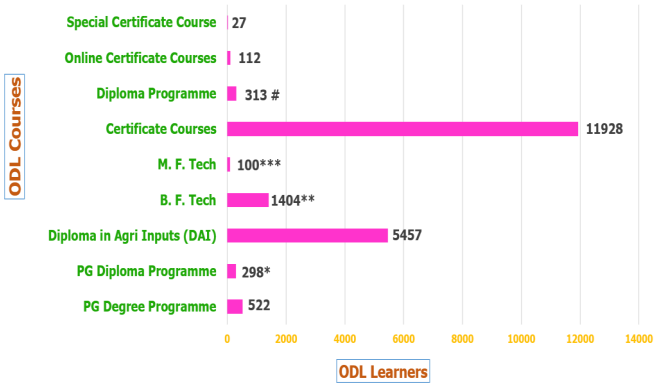

Fig 2. Student Enrolment Status of ODL Courses in TNAU-DODL (2005-2023)

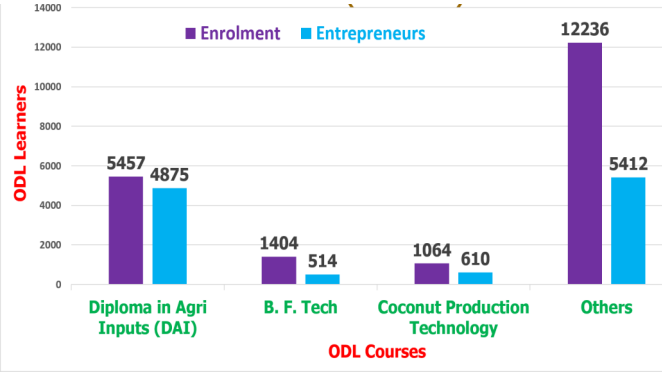

Fig 3. Successful entrepreneurs from TNAU-DODL through ODL courses

Diploma in Agri Inputs (DAI) programme in TNAU-DODL

Over the years, there have been significant enrolments in all the diploma and certificate courses and the most notable course is 'Diploma in Agri Inputs (DAI)', which has had higher enrolments for the past 7 years. In 2015, the Indian government amended the Fertilizer Order and Pesticide, highlighting the Diploma in Agriculture as the basic educational qualification for the agri inputs dealership. Hence, considering this and based on the needs of the existing input dealers, the TNAU-DODL has designed 'Diploma in Agri-Inputs (DAI)' course and has been offered since 2016 through various ODL study centres including research stations, agricultural colleges, and research institutes, KVKs. The primary objective of the DAI programme is to benefit the stakeholders by acquiring a "Fertilizer Dealership Licence, " a mandate specified in the Fertilizer Control Order - 2015 for applying for the licence. The DODL offers DAI courses for those aspiring for knowledge updation, self-employment and entrepreneurship development. The primary target groups are farmers, rural youths, government and private employees, field service providers from local communities, unemployed youth, entrepreneurs, NGOs and school dropouts. The students enrolment details of the DAI programme are given in Table 1.

Need of the study

Over the years, many DAI learners have passed out and started their entrepreneurial venture through Agri-inputs shops with a fertiliser dealership license'. Agri-input dealers play a significant role in ensuring farmers access to the

Table 1. Students Enrolment Details of DAI Programme (2016-2024)

S. No.	Academic Year	Number of Enrolments
1.	2016-2017	1905
2.	2017-2018	423
3.	2019-2020	238
4.	2020-2021	616
5.	2021-2022	833
6.	2022-2023	721
7.	2023-2024	708

essential agricultural inputs required to improve agricultural productivity in their respective farms. They are expected to provide basic extension services to farmers, creating an invaluable source of knowledge and advice for farmers. The DAI programme facilitates the learners with its impressive course design, teaching-learning process and practical exposure to serve the farming community. For ODL agriculture courses to be implemented successfully, the students' ongoing participation and a positive attitude are critical components in achieving high enrolment rates. With the support of research studies on ODL agriculture courses, we should improve those aspects if the students have negative attitudes toward the teaching-learning process, course study materials, course curriculum and practical exposure to diagnostic measures. Keeping this in mind, the research study entitled "Developing a Scale to Measure the Attitude of Learners towards the 'Diploma in Agri Inputs (DAI)' Programme offered through Open and Distance Learning (ODL) Mode" was undertaken.

Research Methodology

Construction of Attitude Scale

The summated rating method was applied to construct the attitude scale, a widely used technique for scale development (2). This technique represents various aspects of a belief using multiple statements instead of a single statement intended to reflect the actual behaviour (3-5). To construct the attitude scale, the following procedures were followed:

Collection of statements

The statement is defined as anything that is said about a psychological object (6, 7). At first, 45 items or statements were collected with the help of relevant literature and experts` opinions of the concerned discipline. Using the criteria outlined by Edward and Kilpatrick (1948), the ambiguity was removed by editing and 25 statements were ultimately chosen since they were determined to be unambiguous (8).

Judges rating and item selection

All the statements gathered might not be equally relevant for assessing attitudes towards DAI programme. To find out the relevance and screening for inclusion in the final scale, the enlisted statements were sent to the judges to judge the degree of 'Strongly Agree' to 'Strongly Disagree' of each statement on the five-point continuum. For each statement, the judges were requested to provide their responses as Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (DA) and Strongly Disagree (SDA) with respective scores of 5, 4, 3, 2 and 1.

The frequency distribution of scores based on all of the statements responses was considered. Then, 25% of the high-value (High) scores and 25% of the lowest-value (Low group) were taken. These two groups were used as criterion groups to determine the t-value of individual statements.

Calculation of 't' value

To evaluate the individual statement, the critical ratio, i.e. t-value, which is a measure of the t-unit to which a given statement differentiates between the high and low group of respondents for each statement, was calculated by using the following formula:

$$t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\frac{\Sigma(X_H - \bar{X}_H)^2 + \Sigma(X_L - \bar{X}_L)^2}{n\,(n-1)}}} \quad \text{Eqn.01}$$

Where,

$$\Sigma(X_H - \bar{X}_H)^2 = \Sigma X_H^2 - \frac{(\Sigma X_H)^2}{n} \quad \text{Eqn.02}$$

$$\Sigma(X_L - \bar{X}_L)^2 = \Sigma X_L^2 - \frac{(\Sigma X_L)^2}{n} \quad \text{Eqn.03}$$

$\bar{X}_H$ - The mean score on a given statement for the high group

$\bar{X}_L$ - The mean score on a given statement for the low group

ΣX_H^2 - Sum of squares of the individual score on a given statement for high group

ΣX_L^2 - Sum of squares of the individual score on a given statement for low group

ΣX_H - Total scores on a given statement for high group

ΣX_L - Total scores on a given statement for low group

n - Number of respondents in each group

The resultant "t" value measured how well a given statement distinguished between high and low groups. Generally, a "t" value of 1.75 or above denotes a considerable difference in the average response between the high and low groups to a given statement.

Reliability of scale

A scale may only be considered reliable when applied to the same sample consistently yields the same results. The "Test-Retest" method was used to determine the scale's reliability. The scale is administered to a fresh group of 60 respondents (Excluding the sample area) (9-11). After 15 days, the scale was again administered to the same respondents and thus, two sets of scores were obtained. The scale is considered reliable, as proved by its reliability coefficient of 0.82.

Validity of scale

The scale's validity was examined for content validity by determining how well the scale's content reflected the domain subject matter under study (12, 13). As all the possible items covering the universe of content were selected by discussing with experts and subject matter specialists, reviewing the literature and adhering to the judges ratings, it was presumed that the developed scale satisfied the content validity.

Scoring procedure

The items on the attitude scale were provided with 5 points psychological continuum (i.e.) Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (DA) and Strongly Disagree (SDA) with weights of 5, 4, 3, 2 and 1 respectively to know the level of ODL learners attitude towards DAI programme. The attitude score of the respondents could be obtained by summing up the scores for all the items on the scale (14-17).

Research location

The Directorate of Open and Distance Learning (DODL) of Tamil Nadu Agricultural University (TNAU) was 'purposively' selected for the study as it provides the 'Diploma in Agri Inputs (DAI)' programme from 2016 through various ODL study centres across Tamil Nadu *viz*., DODL (Coimbatore), AC and RI (Echangottai), AC and RI (Killikulum), AC and RI (Madurai), AC and RI (Vazhavachanur) ADAC and AI (Trichy), TRRI (Aduthurai), ORS (Tindivanam), NPRC (Vamban), GRS (Theni), ARS (Virinjipuram), RRS (Vridhachalam), KVK (Papparapatti), KVK (Sandhiyur), RRS (Paiyur), KVK (Thirupathisaram), ARS (Kovilpatti), HRS (Ooty) and CRS (Srivilliputhur). Among these ODL study centres, about 7 ODL study centres were 'purposively' selected for the study as those ODL study centres have 'higher enrolments' (2016-2021) in the 'Diploma in Agri Inputs (DAI)' Programme. The selected ODL study centres are (1) The Directorate of Open and Distance Learning (DODL), Coimbatore (2) Anbil Dharmalingam Agricultural College and Research Institute (ADACandRI), Trichy (3) Agricultural Research Station (ARS), Virinjipuram (4) Tamil Nadu Rice Research Institute (TRRI), Aduthurai (5) Regional Research Station (RRS), Vridhachalam (6) Soil and Water Management Research Institute (SWMRI), Kattuthottam (7) National Pulses Research Centre (NPRC), Vamban.

Sampling procedure and data collection

About 50 learners were selected from each ODL study centre through the 'Simple Random Sampling' method, and the total number of respondents was fixed at 350. The sample size has been determined with the help of the Taro Yamane Formula and the calculation is given below:

$$n = \frac{N}{1+Ne^2} \qquad \text{Eqn.03}$$

$$n = \frac{1569}{1 + 1569\ (0.05)^2}$$

n = 318.74

Where,

n = Sample size

N = Population size

E = Error (0.05) reliability level 95%

Since 318 is the minimal number needed, the study's sample size was 350 from seven ODL study centres, with 50 participants from each ODL study centre. The primary data were collected from the respondents through personal interviews and telephone calls using the well-prepared questionnaire. The selected ODL study centres and their enrolment details are given below:

Results and Discussion

Construction of Attitude Scale

After completing item collection, item analysis and relevancy test (Relevance percentage, relevancy weightage and mean relevancy score), the t value was calculated for all the statements to finalize the attitude scale (18-20). The calculated t values for each statement are given in Table 3.

The final attitude scale was developed by selecting 14 statements with the highest t values equal to or greater than 1.75 from the 25 statements employed for the item analysis (21, 22).

Overall Attitude of ODL Learners towards the Diploma in Agri Inputs (DAI) Programme

The overall attitude of the ODL Learners towards the DAI programme is the degree of positive or negative feelings towards the teaching-learning process, knowledge acquisition, entrepreneurial orientation, decision-making ability, capacity building, communication network and practical exposure. The results of the overall attitude of the learners on the DAI programme are given in Table 4.

It can be seen from Table 2 that nearly three-fourths (70.86 per cent) of the DAI learners had highly favourable attitudes, followed by 18.00 percent and 11.14 per cent had moderately and less favourable attitudes, respectively.

Based on these findings, we can conclude that the majority (70.86 per cent) of the DAI learners had a highly favourable attitude toward the DAI programme. This positive attitude can be attributed to various factors such as fertilizer dealership license, Knowledge acquisition through the Personal Contact Programme (PCP), Affordable course fee, Duration of the course, Practical exposure to diagnosing pests and diseases, Advanced study material, Student-centred learning and Success stories of agripreneurs. Just 11.14 percent of respondents had a less positive attitude, which a few things like a lack of online learning opportunities, lower business profits and better location-specific business plans can explain.

Response Analysis on Attitude of ODL Learners towards DAI Programme

It could be seen from the table 5 that majority of DAI Learners had favourable attitude on statements such as "The DAI programme will pave way for obtaining a 'Fertilizer dealership license' after completion of the course (100.00%)", “The DAI programme provides an opportunity to gain sufficient knowledge about TNAU crop boosters and how they should be handled (95.43%)”,“The affordable course fee allows us to enrol in the DAI course (94.57%)”, “The Personal Contact Programme (PCP) classes in the course provide us with a wealth of knowledge regarding the mechanisms involved in diagnosing agricultural pests and diseases (94.00%)”,“I am able to handle the commercial enterprise in effective manner because of the training and guidance given by the experts during my course period (91.43%)”,“The DAI training fosters positive relationships between the input dealers and the farming community (86.29%)”, “We acquired sufficient knowledge with regard to Pradhan Mantri Fasal Bima Yojana (PMFBY) and Weather Based Crop Insurance

Table 2. The selected ODL Study Centres and its Enrolment Details of DAI Programme (2016-2021)

S. No.	ODL Study Centres	Number of Student Enrolments	Number of Respondents Selected
1.	DODL, Coimbatore	352	50
2.	ADAC and RI, Trichy	256	50
3.	ARS, Virinjipuram	241	50
4.	TRRI, Aduthurai	198	50
5.	RRS, Vridhachalam	192	50
6.	SWMRI, Kattuthottam	187	50
7.	NPRC, Vamban	143	50

Table 4. Distribution of respondents according to their attitude toward the DAI programme (n=350)

S. No.	Attitude	Frequency	Percentage
1.	Less favourable (42-48)	39	11.14
2.	Moderately favourable (48-54)	63	18.00
3.	Highly favourable (54-60)	248	70.86
	Total	**350**	**100.00**

Table 3. Calculated t-values of the statements on the Attitude of ODL learners towards the DAI programme

S. No.	Statements	t- value
1.	The DAI programme will assist the input dealers for scaling up the business	2.00**
2.	The input dealers acquires more expertise on farm operations through the DAI programme.	0.89
3.	I am able to handle the commercial enterprise in effective manner because of the training and guidance given by the experts during my course period.	2.75**
4.	The DAI training fosters positive relationships between the input dealers and the farming community.	2.12**
5.	The level of income has been increased in business after successful completion of the DAI programme.	0.70
6.	The DAI programme enables the strong communication network between input dealers, farmers, scientists and extension agents.	2.00**
7.	The DAI programme prepared the agri input dealers to handle all the obstacles in the business.	0.44
8.	The DAI programme will pave way for obtaining a 'Fertilizer dealership license' after completion of the course.	2.12**
9.	The PCP classes in the course provide us with a wealth of knowledge regarding the mechanisms involved in diagnosing agricultural pests and diseases.	2.12**
10.	The DAI programme offers a wealth of knowledge regarding pest and disease diagnostic measures for location specific crops.	0.70
11.	The management of stocks is significantly influenced by the Seed Act and Seed Rules.	0.50
12.	The topics of 'business plan' and 'feasibility study' are enlightening and helpful in formulating effective strategies in agri-business.	2.12**
13.	The DAI instructors disseminate knowledge regarding SWOC analysis and its significance to start the business.	0.89
14.	The DAI programme encourages capacity building on newest innovations in farming	5.00**
15.	The DAI programme gives motivation to make appropriate decisions throughout crucial business times.	4.24**
16.	The Programme failed to assist the farming community in receiving high quality services.	1.00
17.	Farmers and steady business owners will undoubtedly receive larger returns from the adoption of DAI.	2.00**
18.	I don`t think the teaching-learning process of the DAI programme is satisfactory.	0.89
19.	The DAI Programme has an impact on input dealers` confidence while interacting with farmers.	1.41
20.	The DAI programme will reshape the input holders into a center of knowledge for the farming community.	2.12**
21.	The affordable course fee allows us to enrol in the DAI course.	2.00**
22.	The DAI programme enhanced input dealers` understanding of the Seeds Act, Seeds Rule, Insecticide Act, Insecticides Rules, Seeds (Control) Order and Fertilizer (Control) Order.	0.50
23.	We acquired sufficient knowledge with regard to Pradhan Mantri Fasal Bima Yojana (PMFBY) and Weather Based Crop Insurance Scheme (WBCIS) through the DAI programme	2.12**
24.	The DAI programme will not help in solving the field level problem of farming community.	0.70
25.	The DAI programme provides an opportunity to gain sufficient knowledge about TNAU crop boosters and how they should be handled.	2.00*

Table 5. Statement-wise response of learners on attitude towards the DAI programme (n=350)

S. No.	Statements	Favourable Attitude				Neutral		Unfavourable Attitude			
		SA		A		UD		DA		SDA	
		F	%	F	%	F	%	F	%	F	%
1.	The DAI programme will assist the input dealers for scaling up the business	140	40.00	112	32.00	60	17.14	29	8.29	9	2.57
2.	I am able to handle the commercial enterprise in effective manner because of the training and guidance given by the experts during my course period.	193	55.14	127	36.29	17	4.86	11	3.14	2	0.57
3.	The DAI training fosters positive relationships between the input dealers and the farming community.	143	40.86	159	45.43	31	8.86	11	3.14	6	1.71
4.	The DAI programme enables the strong communication network between input dealers, farmers, scientists and extension agents.	93	26.57	110	31.43	93	26.57	35	10.00	19	5.43
5.	The DAI programme will pave way for obtaining a 'Fertilizer dealership license' after completion of the course.	298	85.14	52	14.86	0	0	0	0	0	0
6.	The Personal Contact Programme (PCP) classes in the course provide us with a wealth of knowledge regarding the mechanisms involved in diagnosing agricultural pests and diseases.	242	69.14	87	24.86	9	2.57	7	2.00	5	1.43
7.	The topics of 'business plan' and 'feasibility study' are enlightening and helpful in formulating effective strategies in agri-business.	135	38.57	112	32.00	42	12.00	23	6.57	38	10.86
8.	The DAI programme encourages capacity building on newest innovations in farming	110	31.43	121	34.57	72	20.57	21	6.00	26	7.43
9.	The DAI programme gives motivation to make appropriate decisions throughout crucial business times.	74	21.14	127	36.29	98	28.00	20	5.71	31	8.86
10.	Farmers and steady business owners will undoubtedly receive larger returns from the adoption of DAI.	72	20.57	84	24.00	89	25.43	47	13.43	58	16.57
11.	The DAI programme will reshape the input holders into a center of knowledge for the farming community.	85	24.29	143	40.86	54	15.43	34	9.71	34	9.71
12.	The affordable course fee allows us to enrol in the DAI course.	229	65.43	102	29.14	11	3.14	3	0.86	5	1.43
13.	We acquired sufficient knowledge with regard to Pradhan Mantri Fasal Bima Yojana (PMFBY) and Weather Based Crop Insurance Scheme (WBCIS) through the DAI programme	95	27.14	166	47.43	38	10.86	25	7.14	26	7.43
14.	The DAI programme provides an opportunity to gain sufficient knowledge about TNAU crop boosters and how they should be handled.	179	51.14	155	44.29	0	0	12	3.43	4	1.14

SA - Strongly Agree; **A -** Agree; **UD** - Undecided; **DA -** Disagree; **SDA -** Strongly Disagree

Scheme (WBCIS) through the DAI programme (74.57%)",“The DAI programme will assist the input dealers for scaling up the business (72.00%)",“The topics of 'business plan' and 'feasibility study' are enlightening and helpful in formulating effective strategies in agri-business (70.57%)",“The DAI programme encourages capacity building on newest innovations in farming (66.00%)",“The DAI programme will reshape the input holders into a center of knowledge for the farming community (65.14%)",“The DAI programme enables the strong communication network between input dealers, farmers, scientists and extension agents (58.00%)",“The DAI programme gives motivation to make appropriate decisions throughout crucial business times (57.43%)".

Conclusion

The scale was developed to measure the attitude of ODL learners towards the DAI programme. At first, 45 statements were collected from various pieces of literature and experts' opinions. After some refinements, the number of statements was reduced to 25. Among the 25 statements, only 14 statements with the highest t values were selected for the final attitude scale, while the remaining statements were rejected. The reliability coefficient for the constructed attitude scale was 0.82, which indicates that the attitude scale developed was reliable and valid. Hence, the researcher can adapt this scale appropriately and use it for comparable studies in the future with suitable modifications.

From the findings of the overall attitude of the learners towards the DAI programme, we can conclude that the majority (74.67 per cent) of ODL learners had a highly favourable attitude towards the Diploma in Agri Inputs (DAI) programme. The reason might be the various attracting factors of the DAI programme, such as the teaching-learning process, Knowledge generation through Personal Contact Programme (PCP) classes, Affordable course fee, Duration of the course, Practical exposure to diagnosing pests and diseases, Advanced study material, Student-centred learning and Success stories of agripreneurs and 'Fertilizer dealership license'. The Diploma in Agri Inputs (DAI) programme of TNAU -DODL has achieved significant enrollment over the years due to its various attractive factors that are prime reasons for learners favourable attitude towards the course. The key takeaway from this research study is the impressive design of the DAI course and its entrepreneurial opportunities that will pave the way for gaining highly favourable attitudes from the learners. Moreover, the developed attitude scale will be useful for researchers and extension functionaries in similar studies with or without modifications. It covers all the aspects of the ODL courses, including the teaching-learning process, communication network, effective business plan, capacity building, decision-making and agricultural schemes.

Therefore, the need of the hour is for all the ODL study centres to work together on designing the various ODL courses with entrepreneurial opportunities to increase student enrolments and favourable attitudes in Open and Distance Learning (ODL) modes of education across countries.

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Authors' contributions

SK: Conceptualization, Data curation, Writing - original draft. PB: Conceptualization, Supervision, Funding acquisition, Writing - review and editing. NS: Conceptualization, Writing - review and editing, Methodology, Supervision, Validation. RGS: Software, Formal analysis. PSS: Resources, Validation, Visualization.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interest to declare.

Ethical issues: None.

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