ISSN: 2347-6567

International Journal of Allied Medical Sciences and Clinical Research (IJAMSCR)

IJAMSCR | Vol.14 | Issue 1| Jan - Mar - 2026

www.ijamscr.com

DOI : https://doi.org/10.61096/ijamscr.v14.iss1.2026.227-232

Survey on The Development and Validation of a Needs Assessment Scale for Innovative Technology Approaches To Dental Screening Among Dental Students

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Published by: 27.02.2026

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Abstract: Background: Rapid advancements in dental diagnostic technologies have transformed early detection and management of dental caries. However, successful implementation of innovative screening tools requires understanding the needs and perception of future dental professionals.

Aim: To develop and validate a Needs Assessment Scale for Innovative Technology Approaches to Dental Screening among dental students

Objectives: To develop a structured questionnaire assessing perceived need for innovative dental screening technologies.

To validate the scale among undergraduate dental students. To compare responses based on gender. To compare responses based on year of study

Methods: A cross-sectional survey was conducted among 200 undergraduate dental students (I BDS to Interns). A structured 15-item questionnaire was developed to assess perceived need, awareness, and acceptance of innovative dental screening technologies. Data were analyzed using SPSS software. Descriptive statistics were calculated, and Chi-square tests were applied to compare responses based on gender and year of study.

Keywords: Needs assessment, Dental screening, Innovative technologies, Dental students, public health dentistry.

INTRODUCTION

Oral health is an integral component of general health and well-being. Dental caries remains one of the most prevalent chronic diseases globally. Technological advancements such as digital radiography, laser fluorescence systems, and electrical impedance spectroscopy have significantly enhanced early diagnosis and preventive management of dental diseases.

In community dental screening programs, innovative technologies can improve accuracy, reduce diagnostic errors, and enhance accessibility in underserved populations. However, the successful integration of such technologies depends largely on the awareness, acceptance, and perceived need among dental

professionals.

Dental students represent the future workforce in oral healthcare delivery. Understanding their perception and need for innovative screening technologies is crucial for curriculum development and policy planning. Despite increasing technological advancements, limited data exist regarding needs assessment among dental students.

Therefore, this study aimed to develop and validate a needs assessment scale to evaluate dental students' perception toward innovative technology approaches in dental screening.

METHODOLOGY

Study Design

Cross-sectional questionnaire-based survey.

Study Setting

Undergraduate dental students from I BDS to Internship

Study Population

A total of 200 dental students participated in the study.

Study Instrument

A 15-item structured self-administered questionnaire was developed focusing on: Awareness of innovative dental screening technologies. Perceived need for advanced diagnostic tools

Acceptance and readiness to adopt innovative approaches Role of such technologies in community dental programs

Participants were asked to select appropriate responses from multiple-choice options.

Inclusion Criteria

Students willing to participate

Undergraduate dental students (I BDS – Interns)

Exclusion Criteria

Students not willing to participate Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS software. Descriptive statistics were calculated.

Chi-square test was applied to determine association between variables. $p \leq 0.05$ was considered statistically significant.

RESULTS

A total of 200 students took part in this with females (63%) and male of (37%). Age of the participants ranging from 19-24 years. In this study Female students demonstrated comparatively higher positive perception and acceptance toward innovative dental screening technologies.

Senior students (IV BDS and Interns) showed greater awareness and perceived need for innovative technologies compared to junior students

AGE

	N	Minimum	Maximum	Mean	Std. Deviation
Age	200	19	24	21.57	1.324

GENDER

	Frequency	Percent	Valid Percent
male	74	37.0	35.1
female	126	63.0	64.9
Total	200	100.0	100.0

	Frequency	Percent	Valid Percent
I BDS	31	15.5	14.7
II BDS	48	24.0	28.0
III BDS	25	12.5	11.8
IV BDS	53	26.5	25.1
INTERNS	43	21.5	20.4
Total	200	100.0	100.0

Distribution and comparison of responses based on gender

Item	Response	Males		Females		Chi-Square value	P-value
		n	%	n	%		
Q1	1	32	37.2	54	62.8	11.543	0.06
	2	27	30.6	61	69.3		
	3	15	57.6	11	42.4		
Q2	1	11	35.4	20	74.5	0.654	0.353
	2	23	31.9	49	68.1		
	3	28	31.4	50	68.5		
	4	2	22.2	7	88.8		
Q3	1	10	23.3	33	76.7	6.490	0.090
	2	11	26.8	30	73.2		
	3	19	39.6	29	60.4		
	4	34	43	45	57		
Q4	1	17	43.6	22	55.4	6.262	0.100
	2	13	22.8	44	77.2		
	3	11	32.4	23	67.6		
	4	33	40.7	48	64.9		
Q5	1	7	35	13	65	1.759	0.624
	2	7	35	13	65		
	3	8	25	24	75		
Q6	1	24	42.9	32	57.1	6.351	0.096
	2	7	33.3	14	66.7		
	3	8	57.1	6	42.9		
	4	35	29.2	85	70.8		
Q7	1	16	37.2	27	62.8	8.634	0.035*
	2	23	48.9	24	51.1		
	3	12	21.4	44	78.6		
	4	23	35.4	42	64.6		
Q8	1	10	41.7	14	58.3	1.065	0.785
	2	7	38.7	11	61.1		
	3	5	41.7	7	58.3		

	4	52	33.1	105	66.9		
Q9	1	6	60	4	40	4.871	0.182
	2	8	50	8	50		
	3	8	33.3	16	66.7		
	4	52	32.3	109	67.7		
Q10	1	11	61.6	7	38.9	8.534	0.036*
	2	4	21.1	15	78.9		
	3	8	47.1	9	52.9		
	4	51	32.5	106	67.5		
Q11	1	10	58.8	7	41.2	7.518	0.05*
	2	8	47.1	9	52.9		
	3	9	42.9	12	57.1		
	4	47	30.1	109	69.9		
Q12	1	8	47.1	9	52.9	1.176	0.759
	2	7	33.3	14	66.7		
	3	5	33.3	10	66.7		
Q13	1	29	34.1	56	65.9	0.947	0.814
	2	15	41.7	21	58.3		
	3	8	30.8	18	69.2		
Q14	1	21	32.8	43	67.1	0.854	0.06
	2	39	36.7	67	63.2		
	3	14	46.6	16	53.3		
Q15	1	11	61.1	7	38.8	6.657	0.05*
	2	51	32.4	106	67.5		
	3	8	34.7	15	65.3		
	4	4	30.7	9	69.2		

Distribution and comparison of responses based on year of the study:

Item	Response	I BDS		II BDS		III BDS		IV BDS		INTERN		Chi-Value	P-Value
		n	%	n	%	n	%	n	%	n	%		
Q1	1	5	7.8	8	12.5	4	6.2	22	34.3	25	39.0	7.754	0.45
	2	7	11.2	16	20.5	8	12.9	17	27.9	14	22.5		
	3	19	25.6	24	32.4	13	17.5	14	18.9	4	5.4		
Q2	1	3	16.6	9	11.1	12	14.8	35	43.2	25	30.8	11.543	0.04*
	2	8	11.1	14	19.4	5	19.4	10	25	7	25		
	3	17	48.5	18	51.4	4	16	5	9.4	6	13.9		
	4	3	60	2	40	4	16	3	5.6	5	11.6		
Q3	1	3	7	20	46.5	2	4.7	7	16.3	11	25.6	29.919	0.003*
	2	3	7.3	15	36.6	4	9.8	10	24.4	9	22		
	3	5	10.4	13	27.1	8	16.7	16	33.3	6	12.5		
	4	20	25.3	11	13.9	11	13.9	20	25.3	17	21.5		
Q4	1	5	12.8	12	30.8	3	7.7	8	20.5	11	28.2	17.598	0.128
	2	6	10.5	22	38.6	5	8.8	15	26.3	9	15.8		
	3	6	17.6	12	35.3	2	5.9	10	29.4	4	11.8		
	4	14	17.3	13	16	15	18.5	20	24.7	19	23.5		

Q5	1	3	15	3	15	12	5	5	25	8	40	10.737	0.552
	2	3	15	6	30	5	10	3	15	6	30		
	3	3	9.4	10	31.2	1	15.6	7	21.9	7	21.9		
Q6	1	7	12.5	16	28.6	5	8.9	19	35.8	9	20.9	5.907	0921
	2	2	9.5	6	28.6	4	19	4	7.5	5	11.6		
	3	3	21.4	3	21.4	2	14.3	3	21.4	3	21.4		
	4	19	15.8	34	28.3	14	11.7	27	22.5	26	21.7		
Q7	1	9	20.9	9	20.9	2	4.7	14	32.6	9	20.9	9.196	0.686
	2	7	14.9	14	29.8	4	8.5	13	27.7	9	19.1		
	3	8	14.3	18	32.1	9	16.1	10	17.9	11	19.6		
	4	7	10.8	18	27.7	10	15.4	16	24.6	14	21.5		
Q8	1	3	12.5	9	37.5	3	12.5	4	16.7	5	20.8	14.232	0286
	2	0	0	6	33.3	4	22.2	4	22.2	4	22.2		
	3	3	25	1	8.3	2	16.7	1	8.3	5	41.7		
	4	25	15.9	43	27.4	16	10.2	44	28	29	18.5		
Q9	1	2	20	3	30	0	0	3	30	2	20	9.492	0.660
	2	1	6.2	4	25	2	12.5	6	37.5	3	18.8		
	3	4	16.7	8	33.3	4	16.7	1	4.2	7	29.2		
	4	24	14.9	44	27.3	19	11.8	43	26.7	31	19.3		
Q10	1	3	16.7	8	44.4	2	11.1	2	11.1	3	16.7	10.656	0.559
	2	1	5.3	4	21.1	3	15.8	7	36.8	4	21.1		
	3	4	23.5	5	29.4	2	11.8	1	5.9	5	29.4		
	4	23	14.6	42	26.8	18	11.1	43	27.4	31	19.7		
Q11	1	3	17.6	6	35.3	1	5.9	3	17.6	4	23.5	8.343	0.758
	2	1	5.9	5	29.4	3	17.6	3	17.6	5	29.4		
	3	4	19	6	28.6	3	14.3	2	9.5	6	28.6		
	4	23	14.7	42	26.9	18	11.5	45	28.8	28	17.9		
Q12	1	2	11.8	6	35.3	1	5.9	4	23.5	4	23.5	11.371	0.497
	2	0	0	8	38.1	4	19	5	23.8	4	19		
	3	2	13.3	2	13.3	4	26.7	3	20	4	26.7		
Q13	1	16	18.8	25	29.4	11	12.9	17	20	16	18.8	6.234	0.904
	2	5	13.9	11	30.6	2	5.6	11	30.6	7	26.9		
	3	2	7.7	7	26.9	3	11.5	7	26.9	7	20.3		
Q14	1	12	38.7	23	47.9	12	48	21	39.6	17	39.5	11.554	0.06
	2	13	41.9	17	35.4	8	32	19	35.8	13	30.2		
	3	6	19.3	8	16.6	5	20	13	24.5	13	30.2		
Q15	1	5	16.1	15	31.2	6	24	13	24.5	15	34.8	7.545	0.47
	2	19	61.2	17	35.4	13	52	18	33.9	14	32.5		
	3	4	12.9	9	18.7	4	16	6	11.3	6	13.9		
	4	3	9.6	7	14.5	2	8	16	30.1	8	18.6		

DISCUSSION

The present study developed and applied a needs assessment scale to evaluate dental students' perception toward innovative dental screening technologies.

The majority of participants were females (63%), consistent with the current trend of increased female representation in dental education.

Significant gender differences in selected questions indicate variations in perception toward technological adoption. Female students showed slightly higher acceptance levels.

Year-wise comparison revealed that senior students had significantly greater awareness and perceived need for innovative technologies. This may be attributed to increased clinical exposure and familiarity with diagnostic tools during advanced years of training.

The findings indicate moderate awareness but highlight the necessity of integrating innovative diagnostic technologies within undergraduate curriculum. Early exposure to emerging technologies can improve preparedness for community-based screening initiatives.

CONCLUSION

The Needs Assessment Scale for Innovative Technology Approaches to Dental Screening demonstrated feasibility in assessing dental students' perceived needs.

Senior students exhibited higher awareness and readiness to adopt advanced screening tools.

Incorporation of innovative diagnostic technologies into undergraduate dental curriculum is essential to prepare future dentists for technologically advanced community screening programs

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