Knowledge and Awareness among Undergraduate Dental Students Regarding Simex in Dental Education System

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ABSTRACT

The Simex is a dental training system that applies new technology in a motorized dental simulator. The purpose of this study was to understand the usability satisfaction of the Simex dental education and evaluation system by dental scholars and dentists at Tohoku University.

In this study, the Tohoku University IRB prosecution number was 2020–3-. The number of subjects accepted was 59 at Tohoku University and divided into 4 groups based on times of clinical experience(Group A 0 times; Group B 1e2 times; Group C 2e5 times; Group D at least 5 times), and an aggregate of 58 usability questionnaires were collected. Subjects completed the Timex Usability Satisfaction Questionnaire after operating the SimEx EPED Inc., Kaohsiung, Taiwan) course, which contained 16 questions.

Results: Among the 58 questionnaires collected by Tohoku University, there were 19 undergraduate scholars (4th and 6th grade), 12 post-graduate scholars, 14 residents, and 13 dentists. Significant differences between Group A and Group B, and between Group A and Group D, were set up ($P< 0.05$). The same results were attained for the "experience satisfaction indicator". In the particulars where significant differences were set up, longer clinical experience tended to affect lower scores.

Conclusion: From these results, we can conclude that the SimEx education and evaluation system facilitates scholars' tone-literacy, and this system is veritably useful for uninterrupted study and clinical skill training for dentists, especially for scholars and inferior dentists with high usability satisfaction.

Keywords: Dental Simulation Technology, Dental Training System, Simex, Simex Training, Simulation-Based Education.

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Crossref Doi: https://doi.org/10.36437/irmhs.2025.8.2.E

Introduction

Dental education is substantially composed of three corridors, that is the lectures (PBL literacy) part, the simulation laboratory course, and the clinical skill training. Of this three corridors, the simulation laboratory course and clinical training are the most important structures of preclinical literacy in dental education. Because simulation-grounded clinical skill training is the first step in getting a good clinical guru. Since the phantom head simulator was introduced to clinical skill training of dental education in 1894, simulation training systems have been bettered in numerous ways to ameliorate the effectiveness of dental education, especially clinical chops training, and are presently used in numerous dental education settings. Since the late 1990s, development toward dental education operations of virtual reality (VR) and computer-supported simulators has progressed, and in the early 2000s, simulation systems using new technologies, similar as Dent Sim, began to appear and to be used in dental education.

The Simex is another dental training system that applies new technology in a motorized dental simulator developed by EPED Inc. This technology can give the best-computerized training system for dental scholars and dentists who need tone training. The optic positioning system that makes up this simulator provides accurate 3D real-time feedback on the optimal tooth angle and depth, and the expansive software assignments (dental surgery, endodontics, crown & ground, pediatric dentistry) give scholars digital guidance and simulation for easy self-study and practice. Courses and assignments can be customized, designed, and upgraded for specific systems.

This simulator also allows for objective computer-grounded assessment, and preceptors can fluently set and punctuate scoring probabilities. In addition, digital reports allow scholars to assess their progress and better ensure that they are achieving their literacy pretensions. It is said that evaluation reports with numerical values and explanations can grease tone literacy and comparisons, and can also ameliorate the delicacy of clinical practice. In addition, the recorded information can be used to check progress and identify crimes, thereby perfecting chops.. Through the digital dental simulator and clinical terrain, scholars can fluently tone-practice and anticipate to gain important clinical experience and delicacy.

Materials and Methods

a) **Study design and area:** A cross-sectional study was carried out at the tertiary care teaching hospital Khammam.
b) **Study Population:** The health care students including those of III year IV year and Interns who responded to the offline paper print questionnaire survey.
c) **Study Instrument:** A self-administered questionnaire was designed based on knowledge attitude and awareness of the advanced technology and had a total of 13 questions. Each participant has to fill in their demographic data like Name, age, and year of study. Participants had to select one option from the answers provided against questions the questions were based on knowledge attitude and awareness among dental students.
d) **Pilot Study:** A pilot study was conducted on a group of students to assess the validity and reliability of the study.
e) **Sampling Method:** The sampling method used is a convenience method.
f) **Inclusion Criteria:** The students who were interested in the study and who were willing to participate.
g) **Exclusion Criteria:** Students who are not willing to participate.
h) **Statistical Analysis:** Data from the filled questionnaire was collected in a tabular form in an Excel worksheet and evaluated for analysis. The analysis was performed by SSPS version 29.

Results

Distribution and comparison of responses based on gender:

Item	Response	Males		Females		Chi-Square value	P value
		n	%	n	%		
Q1	1	6	8.9	12	9.0	7.315	**0.007***
	2	58	83.5	112	84.2		
	3	3	4.4	6	4.5		
	4	0		3	2.2		
Q2	1	8	12.6	16	21.6	2.750	0.432
	2	23	33.3	49	36.7		
	3	32	42.5	65	40.5		

	4	4	11.2	3	8.8		
Q3	1	45	40.7	83	59.3	1.920	0.589
	2	7	29.2	17	20.8		
	3	16	47.1	18	22.9		
	4	6	42.9	15	17.1		
Q4	1	16	33.3	26	66.7	0.697	0.874
	2	23	36.4	65	63.6		
	3	25	39.1	45	60.9		
	4	3	42	7	58		
Q5	1	1	2.5	7	7.5	2.930	0.402
	2	8	7.1	24	32.9		
	3	6	6.4	9	60		
	4	52	86.4	102	59.6		
Q6	1	51	42.6	109	57.4	3.720	**0.06**
	2	5	21.7	18	18.3		
	3	6	22.4	3	6.3		
	4	5	20.3	3	6.3		
Q7	1	54	78.0	111	60.8	1.489	0.475
	2	11	20.7	16	29.3		
	3	1	1.2	0	0		
	4	1	1.2	6	12.1		
Q8	1	38	56.7	76	57.1	3.980	0.05*
	2	29	43.3	57	42.8		
Q9	1	43	71.2	104	68.8	0.671	0.413
	2	24	35.8	29	21.8		
Q10	1	14	20.8	36	27.0	7.241	0.065
	2	53	62.9	97	57.1		
Q11	1	2	3.3	13	6.7	2.655	0.448
	2	5	6.4	14	9.6		
	3	9	30	21	20		
	4	51	61.8	85	58.2		
Q12	1	18	26.8	60	45.2	6.418	0.003*
	2	49	73.1	73	54.8		
Q13	1	42	62.6	83	57.2	2.311	0.510
	2	25	37.3	50	37.5		

P≤0.05 is statistically significant

Distribution and comparison of responses based on year of the study

Item	Response	III BDS		IV BDS		INTERN		Chi-Value	P-Value
		n	%	n	%	n	%		
Q1	1	5	10.4	4	5.4	0	0	3.998	0.06
	2	39	81.2	41	55.4	75	96.1		
	3	3	6.2	2	2.7	2	2.5		
	4	1	2.0	1	1.3	1	1.2		
Q2	1	6	24	1	40	9	36	28.554	**0.06**
	2	3	16.7	2	22.2	33	61.1		
	3	2	20	1	10	7	70		
	4	37	38.8	70	43.1	29	18.1		
Q3	1	31	39.3	58	41.4	27	19.3	21.445	**0.08**
	2	4	16.7	6	25	14	58.3		
	3	12	35.3	2	35.3	10	29.4		
	4	1	7.1	8	57.1	27	35.7		
Q4	1	5	27.8	7	38.9	28	33.3	27.128	**0.246**
	2	2	9.1	6	27.3	14	63.6		
	3	7	30.4	6	26.1	10	43.5		
	4	34	39.3	55	43.3	26	17.3		
Q5	1	3	6.2	4	5.4	2	2.5	12.714	**0.048***
	2	5	10.4	6	8.1	7	8.9		
	3	2	4.1	12	16.2	9	11.5		
	4	38	79.1	52	70.2	50	64.1		
Q6	1	33	74.7	43	76.5	47	74.7	2.257	0.323
	2	7	10.4	7	10.4	9	9.1		
	3	5	7.6	8	11.6	14	17.6		
	4	3	5.4	6	9.6	8	8.6		
Q7	1	34	64.6	44	56.7	47	65.4	2.712	0.607
	2	8	29.6	10	14.7	9	13.3		
	3	1	1.8	6	12.7	14	18.7		
	4	5	13.5	14	18.6	8	8.6		
Q8	1	9	18.7	10	13.5	9	11.5	34.979	**0.06**
	2	39	81.3	64	86.5	69	88.4		
Q9	1	41	86.1	60	71.2	44	56.4	14.651	**0.08**
	2	7	5.8	14	28.8	34	43.5		
Q10	1	15	31.2	15	20.2	28	35.8	12.306	0.055

	2	33	68.7	59	79.7	51	65.3		
Q11	1	6	40	5	33.3	4	26.7	33.408	**0.076**
	2	3	13.6	3	13.6	16	72.7		
	3	7	23.3	12	40	11	36.7		
	4	37	39.5	54	43.8	45	17.1		
Q12	1	9	18.7	21	28.9	25	32.0	14.996	**0.474**
	2	39	81.2	53	71.6	53	67.9		
Q13	1	34	70.8	59	79.7	52	66.6	14.977	**0.748**
	2	14	29.1	15	20.2	26	33.3		

P≤0.05 is statistically significant

Discussion

For the undergraduate scholars targeted in this study, we named fourth-, fifth-, and sixth-time scholars. Undergraduate dental education in Khammam is a six-time course, the clinical course will start from the fourth time. This is the reason we targeted scholars for the fourth time.

In the results of questions regarding the "experience satisfaction indicator ", significant differences between Group A and Group B, and between Group A and Group D were set up(P< 0.05). From the answers of Q2 and Q6, there was a difference in experience satisfaction about Simex between pupil and inferior dentistry, elderly dentistry. Also, for Q3, a significant difference was set up between not only pupil and inferior dentistry, but also between inferior dentistry and elderly dentistry (Figs. 6 and 7). This suggests that the SimEx education and evaluation system can record the training process and is excellent for objective evaluation and grading of training results.

In dental education, "skills training " is needed for scholars to master and embody the use of instruments and outfit and their clinical skill enhancement. The traditional tutoring and evaluation in clinical chops training tended to calculate the subjectivity of the educator, and there was a lack of learning support styles and objective, standardized evaluation styles that were acclimatized to each pupil's capacities and individuality. 2, 3 Effective feedback provision is an important factor of the literacy circle of clinical chops training, including simulation, feedback, evaluation, and so on.4, 5 likewise, effective feedback is also essential for effective tone-assessment in perfecting pupil educational issues.

The SimEx dental education and evaluation system can give scholars accurate 3D real-time feedback, digital guidance, and simulation, as well as objective computer-grounded assessment, easing pupil tone-study and self-assessment, and perfecting clinical chops. These could be the reasons why for Q1 and Q4, all groups scored 4 or advanced. Thus, this system is promising to give standardized assessments and personalized, standardized, and diversified clinical skills education content; it is anticipated to lead to substantiated literacy optimized for individual scholars and realize quality assurance in clinical chops training of dental education. Likewise, the use of the Simex system will enable scholars to tone literacy and self-assessment, which is anticipated to contribute to the enhancement of educational goods.

Conclusion

The sample size was small, no comparison was made between subjects using the SimEx system and those with the traditional simulator system, and only one model case was used for training, and so on. It is unknown whether the results will generalize to other samples, and thus, to conduct unborn exploration in further different samples is necessary. In addition, a relative study of the effectiveness of the traditional simulator system

and the Timex dental education and evaluation system will be conducted.

Within the limitation of this study, we can conclude that the usability satisfaction of the Timex dental education and evaluation system is high among scholars and inferior dentists. It can be concluded that the SimEx dental education and evaluation system facilitates scholars' self-learning, and this system is veritably useful for uninterrupted study and clinical skill training for dentists, especially for scholars and inferior dentists.

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How to cite this Article: M. Ravi Verma, K. V. N. R. Pratap, T. Madhavi Padma, V. Srujan Kumar, Surbhit Singh S. Nikhila Reddy; Knowledge and Awareness among Undergraduate Dental Students Regarding Simex in Dental Education System; Int. Res. Med. Health Sci., 2025; (8-2): 39-44; doi: https://doi.org/10.36437/irmhs.2025.8.2.E
Source of Support: Nil, **Conflict of Interest:** None declared.
Received: 12-01-2025; **Revision:** 18-03-2025; **Accepted:** 25-03-2025