

ORIGINAL ARTICLE

Incorporating special needs simulations into allied dental education curriculum to encourage inclusion, understanding, and empathy: A mixed method study

Amanda R Reddington LDH, MHA, CDA, EFDA¹ | Sean O Weir MSOTR, CBIS²

¹Dental Assisting and Dental Hygiene,
University of Southern Indiana,
Evansville, Indiana, USA

²Assistant Professor & Program and Chair
Occupational Therapy Assistant Program,
University of Southern Indiana,
Evansville, Indiana, USA

Correspondence

Amanda R Reddington LDH, MHA, CDA,
EFDA, Dental Assisting and Dental
Hygiene, University of Southern Indiana,
Evansville, IN, USA.

Email: arreddingt@usi.edu

Abstract

Objectives: Allied dental practitioners increasingly encounter demands specific to treating patients with special needs and disabilities. New standards by the Commission on Dental Accreditation require dental and allied dental graduates to have didactic and skill-based competencies to ensure awareness of and effective treatment and recommendations for these patients. This study sought to determine if adding a special needs simulation activity into allied dental students' curriculum would increase the student's awareness of and comfort level when treating patients with special needs.

Methods: This mixed-methods study measures student perceptions specific to the efficacy of adding special needs simulations into the allied dental program curriculum. Graduating dental assistants and dental hygienists (n = 65) participated and were paired within their cohort. Didactic instruction specific to the diagnoses of cerebrovascular accident (CVA), macular degeneration, rheumatoid arthritis, schizophrenia, and hearing impairment was provided. Following formal classroom instruction, pairs of students participated in simulation stations, one for each of the listed diagnoses. A pre-/postsurvey was given to evaluate any changes in student perceptions of patients with special needs, and a Student Evaluation of Educational Quality (SEEQ) postsurvey provided to evaluate their perception of the educational activity.

Results: All 65 participants completed the pre- and postsurveys for a 100% response rate, and 61 (93.8%) completed the SEEQ. SPSS software was utilized to run a Wilcoxon Signed Ranks Test to determine significance for each pre-/postsurvey question to determine any statistically significant ($p < .05$) differences. Means and standard deviations were calculated for each survey item including SEEQ.

There were significant differences for each question, and, overall, in participant's perceptions from the presurvey to the postsurvey. Most notable were the

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positive changes related to the participants' ability to relate to persons with special needs, their awareness of various special needs, and their increased knowledge of available adaptive oral health equipment.

Conclusion: In conclusion, students feel better prepared to treat clients with special needs after guided instruction within their respected dental hygiene and/or dental assisting programs. The incorporation of lecture and lab content through simulated activities enhances their perceptions, confidence, and preparedness to effectively treat, accommodate, and educate special needs patient's.

KEYWORDS

dental care for disables, patient trust, patient-provider interaction, patients with disabilities, patients with special needs, professional behavior

1 | INTRODUCTION

The number of people around the world with disabilities has increased over time, with the World Health Organization (WHO) reporting that approximately 15% of the earth's population (over one billion people) is affected.¹ This statistic is higher in the United States, where the Center for Disease Control (CDC) estimates that 26% of American adults have some sort of disability.² As the life expectancy for this population continues to lengthen, the possibility of dental professionals providing care for patients with disabilities increases.³ Despite this fact, there are still many dental professionals who do not feel prepared to provide care for this diverse patient population.^{4,5}

Major changes in access to dental care for patients with disabilities began with the American Disability Act (ADA) of 1990. This act strived to reduce barriers, increase equity in all aspects of their life, and protect them from discrimination.⁶ This act was so profound that it eventually led to a change in the American Dental Association code of conduct, prohibiting providers from denying care based on a disability.⁷ Changes continued when the ADA Amendments Act of 2008 became law. Despite the act being in effect for over 30 years, and the law for almost 15 years, dental care is still recognized as one of the greatest unmet health care needs facing persons with a disability.⁸ It is possible that the lack of available dental care is related to a reduction in dental provider confidence when treating patients with disabilities. This idea is supported by the fact that up to 75% of dental professionals have reported not feeling prepared, and 60% were not confident when treating patients with special needs.⁹

The Commission on Dental Accreditation (CODA) includes the terminology for special needs instead of disability in its program standards. CODA defines special needs as "those patients whose medical, physical, psycho-

logical, cognitive, or social conditions make it necessary to consider a wide range of assessment and care options to provide dental treatment for that individual. These individuals include, but are not limited to, people with cognitive and/or developmental disabilities, complex medical conditions, and significant physical limitations and vulnerable older adults.¹⁰" CODA has recognized the importance of preparing dental professionals for a career of treating patients with special needs and has implemented accreditation standards to provide the support needed to incorporate this training into the curriculum. In 2004, dental hygiene standards 2-12 and predoctoral standard 2-24 came into effect, stating that both groups must be competent in assessing the treatment needs of patients with special needs. These standards later evolved, stating that dental hygienists must display competency in providing (dental hygiene care) for special needs patients, and dentists must display competence in assessing and managing the treatment of special needs patients.¹⁰ It was not until 2019 that the topic of special needs was incorporated into dental assisting accreditation standards with the inclusion of standard 2-14, which only includes a familiarity level for patients with special needs.⁹

Despite early attempts by CODA to increase dental professionals' familiarity and competency when providing care for special needs patients, it is well documented that dental professionals still report not being comfortable and confident in this area.^{4,5} It can be difficult to find literature referring to the perceptions of allied dental professionals. What is available either pertains to dentists or is outdated and cannot be compared to newer graduates that received education including the new CODA standards. No peer-reviewed sources were found relating to dental assistants' perceptions of treating special needs patients. The aim of this study was specific to allied dental students, seeking their perceptions of treating patients with special needs

and whether the addition of simulation activities could have a positive impact on those perceptions.

2 | MATERIALS AND METHODS

This 2-year study was approved by the University of Southern Indiana (USI) Institutional Review Board (1753391-1 and 1755832-1) prior to the facilitation of the special needs activity.

This study was conducted during the spring 2021 and 2022 semesters at the University of Southern Indiana, which served as the sponsoring institution. USI houses a vast number of health professions including but not limited to accredited programs in dental assisting, dental hygiene, occupational therapy, and occupational therapy assistant. Each year, a session was offered to graduating dental assisting and dental hygiene cohorts, with each cohort completing the research activity independently. The researchers conducting this study were full-time faculty members of the dental assisting and hygiene and occupational therapy assistant programs at the University of Southern Indiana.

The study was constructed with a mixed-methods study design with the following components: pre- or post-surveys, faculty didactic instruction, interactive student simulations, and facilitated group discussion.

Convenience sampling was utilized to recruit participants within the study; all $N = 65$ participants were students enrolled in the USI Dental Assisting or Dental Hygiene programs. All students completed this study at the conclusion of their respected programs, the dental assisting cohort completed the assessment as the final exam project for DTAS 175 preventative dentistry and the dental hygiene students completed it as part of a clinical seminar session. Of the 65 students, 22 were in their second and final professional semester in the dental assisting Associate of Science program, and 43 students, were enrolled in the final semester of their dental hygiene Bachelor of Science degree program.

Informed consent was obtained from each participant within the study prior to the facilitation of the research activity. Participants were instructed to complete an adapted version of the Vainio, Krouse, and Inglehart¹¹ Special Needs Awareness Survey for Allied Dental Professionals as a presurvey. No survey tools aimed toward allied dental students were found, causing researchers to adapt one aimed for dental school graduates. Researchers selected the Vainio, Krouse, and Inglehart¹¹ survey because of the question content and formatting. Vainio, Krouse, and Inglehart¹¹ assumed the validity of the survey tool due to a piloted first draft. Provided feedback from the Multicultural Affairs Committee at the University of Michigan School of Dentistry contributed to the constructed final

draft per Vainio, Krouse, and Inglehart. Minimal modifications to adapt the wording towards allied dental students were made. This presurvey consisted of a Likert-scale, with questions related to assessing the awareness of students' comfort level and understanding when completing oral care specific for persons with special needs.

Upon completion of the aforementioned documents, all participants engaged in a formal 30-min lecture of educational content via in-class instruction, specific to the following criteria: etiology, presentation of illness, and common treatment approaches for the following specific diagnoses: cerebrovascular accident (CVA), macular degeneration, rheumatoid arthritis, schizophrenia, and hearing impairment.

Next, students were paired in small groups of two and completed five different objective-structured simulations. Some of the simulation designs utilized in this study were adapted by utilizing best practices from an American Dental Education Association-sponsored webinar¹² and from other online sources specifically geared towards health professions students.^{13,14} Other simulations (vision impairment and schizophrenia) utilized simulation equipment purchased for higher education health professions educational programs. The "Hearing disturbing voices simulation" utilized is an established auditory hallucination simulation program,¹⁵ supported by the literature to effectively imitate the cognitive, unpleasant emotions, and perceptual challenges¹⁶ of patients experiencing auditory hallucinations, all while increasing the student clinician's empathy.¹⁷ At each station, participants spent between 5 and 7 min, and were required to simulate both the patient with special needs and the dental professional to allow for an understanding of both perspectives. All necessary supplies and a handout were provided at each station. The handout reviewed the diagnosis and paraphrased information discussed during the 30-min lecture. The handout also provided detailed instructions for how to simulate the diagnosis and instructions for the roleplay activity.

Station 1: Rheumatoid Arthritis- Participants simulated rheumatoid arthritis by placing paper clips between the second knuckles of each finger and then wrapping a rubber band around all four digits. The oral health practitioner provided instructions for traditional C-shaped flossing with no modifications. The simulation participants attempted to complete the oral health care routine as directed by the practitioner. Postsimulation, the participants discussed challenges for both the patient and the oral health care provider.

Station 2: Macular Degeneration- Participants simulated macular degeneration by wearing simulation glasses. The oral health practitioner provided instructions for cleaning and/or applying denture adhesive with no modifications. The participant with the simulated special need attempted to complete the oral health care routine as directed.

Postparticipation, the participants discussed challenges for both the patient and the oral health care provider.

Station 3: CVA- Participants simulated CVA by restricting the use of their dominant hand to simulate hemiplegia. The oral health practitioner provided instructions for brushing their teeth including opening a container of toothpaste with no modifications. The participants with the simulated special needs attempted to complete the oral health care routine as directed. Postsimulation, participants discussed challenges for both the patient and the oral health care provider.

Station 4: Hearing impairment- Participants simulated hearing impairment by wearing ear plugs. The patient with hearing impairment was asked to step outside of the classroom and use their cellular phone to call their oral health care provider partner and attempt to schedule a dental appointment. Postparticipation, participants discussed challenges for both the patient and the oral health care provider.

Station 5: Schizophrenia- Station was an optional station due to its triggering nature. All students who wished to participate in this station signed an additional consent form before beginning the activity. After signing the consent, faculty emailed participants a link to a free online “hearing disturbing voices” simulation. Participants were given a pair of headphones and were asked to listen to the recording for approximately 5 min as they walked around the building. Once back in the classroom, participants attempted to write down all steps to their morning routine.

Postcompletion of the simulated activities, students reviewed the experience and completed a facilitated debrief session. This session was semistructured where faculty provided further explanation of diagnoses, sought discussion of student perceptions, and reviewed potential adaptations for treatment and oral care devices.

Participants were then requested to complete the Special Needs Awareness Survey for Allied Dental Professionals as a postsurvey. Furthermore, participants were requested to complete the adapted Student Evaluation of Educational Quality (SEEQ) Standardized Instrument. The SEEQ survey was selected based on its reliability when evaluating educational experiences and its validity when assessing the student experience during this project. The surveyed item responses were Likert scale options from 5 = strongly agree to 1 = strongly disagree.

Following the collection of the data, the survey responses were entered into a Microsoft Excel spreadsheet. SPSS software was utilized to analyze the ordinal data. The nonparametric Wilcoxon Signed Ranks Test was used to calculate each Special Needs Perception survey question to determine if differences between pre- and postintervention responses illustrated statistical significance at the alpha value of $p < .05$. Means and standard

deviations were calculated for each survey item included in the SEEQ survey.

3 | RESULTS

Of the $N = 65$ participants, all students completed the pre- and postsurveys for a 100% response rate, and 61 (93.8%) completed the SEEQ. However, not all questions were answered by every individual. Researchers were unable to remove individual surveys since all participants were anonymous, causing them to remove these questions from the entire cohort of data.

To further examine results, we separated results by program and by academic year. Statistics remained significant regardless of program or cohort. Due to this, researchers chose to report combined results supported by a larger n (Table 1).

There were significant differences for 18 of the 19 questions overall related to the participants' perceptions from the presurvey to the postsurvey. Most notable were the positive changes related to the participants' ability to relate to persons with special needs, their awareness of various special needs, and their increased knowledge of available adaptive oral health equipment.

During the facilitated large group discussion, common themes centered around increased awareness of the definition of special needs and the commonality of various diagnoses. During one session, dental assisting students discussed that prior to this event, they traditionally thought of a special need as being only related to significant physical limitations or impairment. They elaborated and explained that they typically only associated those patients who utilize a wheelchair, have Down syndrome, or have other visual disabilities. They had not considered less obvious or some mental illness as a special need.

Facilitated large group discussions allowed students to express their perceptions as a patient and as an oral health care provider. When acting as the patient, students expressed stress and disappointment when they were not able to properly perform the oral care asked of them. When acting as the oral health provider, they expressed the potential frustration specific to the lack of ability to perform the oral care task. However, after participating as both the patient and the provider, they better understand the importance of adapting oral health care recommendations to accommodate each specific patient's need. This is supported by the statistically significant change of question #4 & #6 “I feel comfortable communicating with special needs patients” and “I feel comfortable making oral hygiene modification recommendations to special needs patient.”

TABLE 1 Special needs awareness survey for allied dental professionals pre- and postresults.

Question	Survey	n	M	SD	p-value	Question	Survey	n	M	SD	p-value
1	PRE	42	3.63	1.07	<.001	11	PRE	65	4.58	0.57	.294
	POST	42	4.68	0.50			POST	65	4.68	0.62	
2	PRE	65	3.97	0.77	<.001	12	PRE	65	3.63	1.08	.022
	POST	65	4.66	0.51			POST	65	4.08	1.05	
3	PRE	65	4.06	0.73	<.001	13	PRE	48	3.67	0.76	<.001
	POST	65	4.71	0.49			PRE	48	4.43	0.66	
4	PRE	45	3.52	1.01	<.001	14	PRE	65	3.88	0.80	<.001
	POST	45	4.48	0.69			POST	65	4.62	0.58	
5	PRE	65	3.06	1.04	<.001	15	PRE	64	4.43	0.63	.012
	POST	65	4.4	0.68			POST	64	4.71	0.49	
6	PRE	62	3.68	0.86	<.001	16	PRE	64	4.52	0.62	.022
	POST	62	4.59	0.53			POST	64	4.75	0.47	
7	PRE	65	3.55	0.85	<.001	17	PRE	48	3.23	0.94	<.001
	POST	65	4.54	0.59			POST	48	4.52	0.77	
8	PRE	65	4.18	0.73	<.001	18	PRE	65	3.68	0.85	<.001
	POST	65	4.62	0.63			POST	65	4.69	0.53	
9	PRE	65	3.98	0.87	<.001	19	PRE	65	3.69	0.86	<.001
	POST	65	4.51	0.79			POST	65	4.71	0.52	
10	PRE	65	3.89	0.73	0.22						
	POST	65	4.18	0.92							

Notes. •This survey was modified from its original form. Original survey citation: Vainio L, Krouse M, Inglehart M. Patients with special needs: dental students' educational experiences, attitudes, and behavior. *JDE*. 2011 Jan 1; 75(1): 13-22.

1. I have training to identify patients with special needs.
2. I am aware of different types of special needs.
3. I am aware of barriers that limit dental care for patients with special needs.
4. I feel comfortable communicating with special needs patients.
5. I can relate to patients with a special need.
6. I feel comfortable making oral hygiene modification recommendations to special needs patients.
7. My classes prepared me well for treating patients with special needs.
8. I believe that my dental assisting/hygiene program has an honest interest/concern for treating patients with special needs.
9. The dental assisting/hygiene program provides an environment that is sensitive to learning about/ treating patients with special needs.
10. The curriculum should include more education about treating patients with special needs.
11. It is very important to educate students about the treatment of patients with special needs.
12. I would like to have more time as a student before I feel comfortable treating patients with special needs.
13. I feel comfortable treating patients with special needs.
14. I feel comfortable having patients with special needs as part of my patient population.
15. I will include/treat special needs patients in my future professional life.
16. I will alter my treatment and/or oral health recommendations based on each special need.
17. I am aware of resources available to patients with special needs.
18. I am aware of adaptive oral health equipment.
19. I am familiar with ways to adapt current oral health equipment for patients with special needs.

In addition to positive pre-post surveys outcomes, SEEQ results showed that students in all cohorts valued the activity and felt that it ranked highly out of all in-class activity programs provided in their respected program (Table 2). This was also supported by student-written comments which included: "I liked the interactive aspect. It made me more empathetic for these patients," "This was very interesting; I enjoyed it" and "Fun way to learn."

4 | DISCUSSION

Qualitative and quantitative data showed that incorporating a special needs simulation into allied dental curriculum can increase students' awareness of and comfort level when treating patients with special needs. While this is encouraging, limitations did exist that prevented the potential for a larger student impact. Scheduling the activity was a barrier. Due to the schedule of the course

TABLE 2 Student evaluation of educational quality (SEEQ) of a special needs education activity.

	DH Students		DA Students		DH and DA Students	
	N	Mean response*	n	Mean response*	n	Mean response*
Learning						
This activity was stimulating and challenging	43	4.30	18	4.06	61	4.23
I learned something valuable from this activity	43	4.67	18	4.61	61	4.67
My interest in treating patients with special needs has increased as a result of this activity	43	4.58	18	4.44	61	4.54
I have learned and understood the material relevant to this activity	43	4.77	18	4.67	61	4.74
Enthusiasm						
Instructors were enthusiastic about the activity	43	4.84	18	4.89	61	4.85
Instructors were dynamic and energetic in conducting the activity	43	4.88	18	4.89	61	4.89
Organization						
Explanation of the activity was clear	43	4.74	18	4.83	61	4.77
Materials for the activity were well prepared and explained	43	4.65	18	4.83	61	4.70
Objectives for the activity aligned with what was actually covered	43	4.77	18	4.83	61	4.79
Group Interaction						
Instructors encouraged student participation in group discussion	43	4.84	18	4.83	61	4.84
Students were able to openly express ideas and share knowledge or ask questions throughout the activity	43	4.86	18	4.83	61	4.85
I learned valuable information or perspective from working with different students in this activity	43	4.81	18	4.83	61	4.82
Individual Rapport						
Instructors were friendly with students participating in the activity	43	4.86	18	4.83	61	4.85
Instructors made students feel welcome and asking for help during the activity	43	4.86	18	4.78	61	4.84
Breadth						
Instructors provided enough background on concepts covered in the activity in class prior to the activity	43	4.79	6	4.78	61	4.79
Instructors adequately discussed current concepts related to the activity pertinent to dentistry	43	4.81	6	4.83	61	4.82
Overall**						
Compared with other class activities, this activity is:	43	4.79	6	4.94	61	4.84
Compared with other instructors, these instructors are:	43	4.84	6	4.94	61	4.87
As an overall rating, these instructors are:	43	4.88	6	4.94	61	4.90

Notes: survey adapted from Standardized SEEQ instrument from https://teaching.usask.ca/documents/seeq/Standardized_SEEQ_Instrument_at_UofS.pdf.

*Surveyed item responses were Likert scale options from 5 = strongly agree to 1 = strongly disagree.

**Overall item responses were based upon 5 = very good, 4 = good, 3 = average, 2 = poor, 1 = very poor.

curriculum and the researchers' academic schedules, this activity was included in the spring semester, occurring shortly before graduation. Researchers are looking into the opportunity to introduce this activity either in the fall semester or earlier in the spring semester. This would allow students more time to practice the skills learned in a clinical setting.

The limited diagnoses we were able to simulate were also a barrier that limited the potential impact of this study. The specific diagnoses utilized in the activity were selected based on the ability to simulate, and the fact that

the diagnosis would routinely be seen in a dental setting. While schizophrenia may not be present as often as the others, hearing disturbing thoughts could be simulated, and we were able to relate those feelings to feelings of anxiety and depression, which will routinely be encountered. Researchers plan to critically analyze possibilities to develop more effective simulation activities for other common diagnoses such as autism spectrum disorders.

The low-fidelity nature of the simulations is also a limitation. The current simulations have been shown to have a statistically significant impact; however, researchers

hypothesize that if the simulations were more accurate, the activity would have a broader impact. Researchers plan to consult with individuals diagnosed with the simulated special needs for future simulation design. Researchers also continue to seek funding options to purchase simulation equipment that would allow for higher-fidelity simulations.

The low participant “n” and the simulation only occurring at one facility are also limitations of the study. Researchers plan on continuing this activity within future cohorts, which will allow for a larger participation group, and expanding to other dental assisting and hygiene programs. The researchers are also planning to replicate this activity with local dental assisting and dental hygiene professionals at their regional association meetings. The researchers plan to compare the data collected from practicing professionals and students.

5 | CONCLUSIONS

Researchers and faculty at the University of Southern Indiana observed an opportunity to engage dental hygiene and dental assisting students as they prepare for a career of providing oral care for people with various special needs. While this study has been successful, there is still more education and awareness that needs to occur around the United States to increase access to dental care for all patients. Through engagement in this study, these future dental practitioners will be able to advocate for and treat their patients in a holistic approach.

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How to cite this article: Reddington AR, Weir SO. Incorporating special needs simulations into allied dental education curriculum to encourage inclusion, understanding, and empathy: A mixed method study. *J Dent Educ*. 2023;1-7. <https://doi.org/10.1002/jdd.13386>