

Dental Students' Perceived Value of Peer-Mentoring Clinical Leadership Experiences

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Abstract: This pilot study compared second- and fourth-year dental students' perceived values of newly implemented clinical leadership experiences (CLEs) at one U.S. dental school during the 2012-13 academic year. In the CLEs, fourth-year (D4) students mentored second-year (D2) dental students during faculty-supervised patient treatment. The two cohorts' perceived value of the experiences was measured with questionnaires consisting of five-point Likert scale questions and open text responses. Out of a total of 114 D2 and 109 D4 students, 46 D2 students and 35 D4 students participated (response rates of 40.4% and 32.1%, respectively). While responses from both cohorts showed they highly valued the CLEs, the D2s perceived greater value: 4.07 (0.53) v. 3.51 (0.95), $p < 0.003$. Both cohorts reported feeling that D4s were prepared to mentor D2s, that the CLEs had educational benefits, and that the CLEs increased their comfort with peer communication. Theme analysis of open text questions revealed that the respondents perceived the D4s were more accessible than faculty and provided guidance and individual attention; the CLEs increased student comfort; the CLEs reinforced D4 skills, knowledge, and confidence; and the CLEs provided management, leadership, and collaborative work experience. Theme analysis also highlighted student concerns about a lack of program structure. Overall, the majority of both groups valued CLEs in their dental education. Particular advantages they perceived were increased comfort, guidance, and attention. Further program development should address student concerns. These results suggest that similar programs should be considered and/or expanded in other dental schools' curricula.

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Adult learning and andragogical principles suggest that educational models should involve active, experiential learning that is student-centered.¹⁻⁵ However, current teaching methods employed in dental education remain primarily teacher-centered and lecture-based.^{1,6} Thus, students are often learning in a non-active, passive manner.^{1,6,7}

New teaching methods, based on current evidence and theory, should shift our teaching practices (Figure 1).² A few newly developed methods utilizing these principles exist, such as the "flipped classroom" and problem-based learning (PBL), but they are largely used outside the clinical setting.^{6,8,9} For this study, we developed a series of clinical leadership experiences (CLEs) as peer-mentoring experiences that took place in a situational, clinical learning environment. Peer-mentoring has been shown to assist with students' professional development and career preparation.¹⁰⁻¹⁶ Peer-mentoring activities also increase students' clinical skill development, self-confidence, independence, and self-evaluation.¹²⁻¹⁷

Additionally, peer-mentoring activities such as CLEs lead to improvements in communication skills and student comfort.¹³⁻²⁰

In this study, second-year (D2) and fourth-year (D4) dental students at one U.S. dental school participated in CLEs during live, faculty-supervised patient care. In the CLEs, D4 students acted as mentors to D2 students for clinical procedures. We hypothesized that situational, clinical learning through CLEs would improve students' perceptions of their educational experiences. The aim of this pilot study was to identify differences in the perceived value of a CLE methodology by second- and fourth-year students.

Materials and Methods

This study was determined to be exempt from oversight by the University of Michigan Institutional Review Board (reference number HUM00075321,

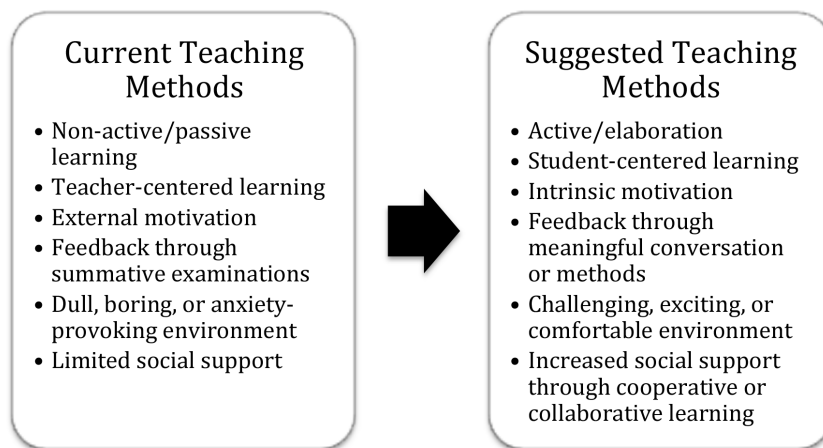


Figure 1. Moving teaching methodologies from passive to active styles

May 13, 2013). The potential participants were 223 D2 and D4 students during the 2012-13 academic year. While a power calculation was not possible for our pilot study, a similar study used a significantly smaller population size to measure perceived value.¹⁰

The peer-mentoring CLE program involved students in their final year of a four-year program mentoring second-year students during D2 patient treatment experiences in a faculty-supervised, clinical education setting. The D2s performed direct restorations, prophylaxis, and periodontal maintenance. The D4s provided mentorship by discussing treatment, offering advice, and answering questions. Mentorship could be provided in the treatment area or in private, depending on student needs and comfort. While supervising faculty were still required to evaluate and approve designated treatment segments, such as caries removal, preparation design, and final restoration, D4s were available before, during, and after treatment to mentor at their discretion or when requested by a D2 student.

A uniform, post-CLE questionnaire was used to collect categorical data regarding students' perceived value related to specific aspects of CLEs. The questionnaire was designed by two of the investigators. The other two investigators verified the questionnaire's ability to measure the desired information for validation—specifically, face validation. The questionnaire consisted of five-point Likert scale questions (1=strongly disagree to 5=strongly agree) and free text questions to capture detailed responses. Paper questionnaires were distributed to students dur-

ing April and May 2013, at the beginning of regularly scheduled classes. Participation was voluntary, and anonymity was guaranteed.

Ordinal data obtained from responses to the Likert scale questions were analyzed by calculation of means and standard deviations. Unpaired t-tests were used to compare the means to look for significant differences in perceived value between the cohorts. Statistical significance was set at $p < 0.05$. Three independent examiners performed thematic analysis on answers to the open questions. After independent analysis and code generation, we used the independently derived codes to collectively search for and evaluate potential themes in the data. Finally, upon delineation of themes, each theme and subtheme were defined and labeled for each qualitative question.

Results

A total of 223 (114 D2 and 109 D4) students were invited to participate in the study. The response rates were 40.4% (N=46) for D2 students and 32.1% (N=35) for D4 students.

Responses to the two statements about the overall value of CLEs showed higher means for the second-year than the fourth-year students: 4.07 vs. 3.51, respectively ($p < 0.003$) and 3.83 vs. 2.94, respectively ($p < 0.001$); both differences were statistically significant (Table 1). Responses to the two statements about acquired knowledge also showed higher means for the second-year than the fourth-year students but the differences were minimal: 4.17

vs. 4.14, respectively ($p < 0.861$) and 4.17 vs. 4.09, respectively ($p < 0.560$) (Table 2). The two statements about CLEs' helping with communication skills also showed higher means for the second-year than the fourth-year students: 4.22 vs. 3.74, respectively ($p < 0.003$) and 4.02 vs. 3.69, respectively ($p < 0.063$) (Table 3). The first statement, about students communicating with each other, was statistically significant. In the last set of Likert scale questions, responses to the two statements about whether CLEs prepared students for future practice showed higher means for the second-year than the fourth-year students: 3.93 vs. 3.66, respectively ($p < 0.179$) and 3.73 vs. 2.94,

respectively ($p < 0.001$) (Table 4). The second statement in this set, about CLEs preparing students for practice management, was statistically significant.

Each qualitative question yielded several themes, some requiring subthemes (Table 5). Thematic responses were grouped into categories of strengths, weaknesses, and future directions based on the majority of students responding to each question. Regarding strengths of the program, most D2s and D4s agreed that CLEs were useful because the D4s were more accessible than the faculty. D2s, specifically, responded that CLEs were useful because of increased guidance/more individual attention and

Table 1. Students' perceptions of value of clinical leadership experiences (CLEs) by year (D2 n=46; D4 n=35)

Category	Statement	D2 Mean (SD)	D4 Mean (SD)	p-value
Value of CLEs	CLEs are a valuable part of dental education.	4.07 (0.53)	3.51 (0.95)	0.003*
	We should include more CLEs in the dental curriculum.	3.83 (0.82)	2.94 (1.00)	0.001*

*A p-value of < 0.05 was considered statistically significant.

Table 2. Students' perceptions of acquired knowledge in clinical leadership experiences (CLEs) by year (D2 n=46; D4 n=35)

Category	Statement	D2 Mean (SD)	D4 Mean (SD)	p-value
Acquired knowledge	D4 students have enough knowledge and skill to mentor D2 students in clinical dentistry.	4.17 (0.68)	4.14 (0.91)	0.861
	CLEs have educational benefits for D2 and D4 students.	4.17 (0.49)	4.09 (0.78)	0.560

*A p-value of < 0.05 was considered statistically significant.

Table 3. Students' perceptions of communication skills gained in clinical leadership experiences (CLEs) by year (D2 n=46; D4 n=35)

Category	Statement	D2 Mean (SD)	D4 Mean (SD)	p-value
Communication skills	CLEs make students more comfortable communicating with one another.	4.22 (0.63)	3.74 (0.78)	0.003*
	CLEs make students more prepared to communicate with colleagues and employees.	4.02 (0.61)	3.69 (0.90)	0.063

*A p-value of < 0.05 was considered statistically significant.

Table 4. Students' perceptions of future practice preparation gained in clinical leadership experiences (CLEs) by year (D2 n=44; D4 n=35)

Category	Statement	D2 Mean (SD)	D4 Mean (SD)	p-value
Preparation for future practice	CLEs reinforce the D4 students' knowledge of clinical dentistry.	3.93 (0.63)	3.66 (1.06)	0.179
	CLEs help better prepare D4 students to manage a dental practice.	3.73 (0.82)	2.94 (1.00)	0.001*

*A p-value of < 0.05 was considered statistically significant.

Table 5. Summary of free text responses regarding strengths, weaknesses, and future directions of clinical leadership experiences (CLEs) by number of respondents

D2 Students	D4 Students
Which dental courses are useful for the CLEs?	
Pre-clinic courses (23)	Pre-clinic courses (15)
Clinical care (18)	Clinical care (12)
None (3)	None (5)
Other (1)	Other (4)
How well are D4s prepared to assist D2s with clinical dentistry in CLEs?	
Very prepared (29)	Very prepared (19)
Adequate (3)	Adequate (5)
Student dependent (3)	Not prepared (2)
Not prepared (2)	Student dependent (3)
N/A (1)	
What aspects of CLEs might be useful in preparation for private practice careers?	
Managing/working/leading others (20)	Managing/working/leading others (16)
Communication skills (17)	Communication skills (6)
Career benefits (4)	Don't see a connection/none (5)
Don't see a connection/none (2)	Increasing clinical confidence (4)
	Career benefits (1)
How well do D4 students perform as mentors in CLEs?	
Very well (29)	Very well (12)
Student dependent (10)	Student dependent (12)
Adequate (5)	D4s not helpful (3)
D4s not helpful (4)	N/A (2)
	Adequate (1)
What made CLEs useful for a D4 student?	
D4s (peers) are more accessible (16)	Reinforces D4 skill/confidence (13)
Increased guidance, more individual attention (15)	D4s (peers) are more accessible (9)
General comfort increased (11)	Increased guidance/individual attention (6)
Reinforces D4 skills, knowledge, confidence (1)	General comfort increased (4)
	Not helpful (3)
	Enjoyable experience (2)
	N/A (2)
What made CLEs challenging for a D4 student?	
Some D4s unhelpful (13)	Administrative issues (11)
No challenges perceived (11)	D4 authority unclear (10)
Administrative issues (8)	Experience not useful (6)
Experience not useful (4)	Some D4s unhelpful (3)
D4 authority unclear (3)	No challenges perceived (2)
Helpful for first restorations (1)	
What could make CLEs more useful for students?	
Nothing or N/A (14)	More clearly defined role (13)
More clearly defined role (8)	Assign regular pairs to build rapport (5)
Assign regular pairs to build rapport (7)	D4s with more training and interest (5)
D4s with more training and interest (3)	Give D4s more incentives (5)
Give D4s more incentives (3)	Nothing or N/A (1)
What requirements should D4s meet to participate in CLEs?	
Student in good standing (17)	Student in good standing (15)
Desire to participate (9)	Additional requirements necessary (5)
Nothing/N/A (5)	Desire to participate (3)
Additional requirements necessary (4)	Nothing/N/A (2)
Minimum number of sessions (3)	Minimum number of sessions (2)

an increase in general comfort. D4s reported CLEs were useful because they reinforced D4s' skills, knowledge, and confidence. Both groups reported feeling that D4s were prepared to mentor in CLEs. The majority of D2s responded that the D4s performed very well as mentors, including being helpful/comfortable. An approximately equal number of D4s reported that D4 students performed very well as mentors and that their performance was student dependent. D2 students also noted that D4 performance was student dependent, with some D4s performing better than others. Both groups perceived that CLEs were useful in the preclinical courses and in clinical care and agreed that CLEs helped prepare students for private practice through managing, working, and leading others, specifically through mentoring and teaching. D2s also reported that CLEs helped prepare students for private practice by improving communication skills.

Table 5 also shows student responses regarding weaknesses of the program. Some members of both cohorts noted that administrative issues made CLEs challenging. D2s were challenged by their perception that some D4s were unhelpful, although a large number of D2s did not perceive any challenges or weaknesses to the program. D4s noted challenges due to unclear D4 authority during CLEs. When asked about improving the program and future directions, 11 D2s had no suggestions, but seven expressed a desire to work in more regularly assigned partnerships or pairs in order to build better rapport. Both groups reported that CLEs would be more useful if their roles were more clearly defined and that a D4 student in good standing should be able to participate in CLE experiences, while some D2s also felt that a desire to participate should be important in selecting D4 mentors.

Discussion

Progressive efforts in dental education aim to improve student learning. This step involves moving away from methodologies that involve teacher-centered, monotonous, or passive learning techniques. Peer-mentoring, centered learning methodologies in medical schools in the United States and Europe have shown increased student comfort and the introduction of new skills and behaviors applicable to the practice of medicine.¹³⁻¹⁶ Using this educational evidence, theory, and the principles of adult learning, we created a novel teaching methodology to

promote leadership and communication in dental clinical education.

Rather than using traditional, didactic learning techniques, CLEs incorporate andragogical and adult learning principles and theories, as well as evidence-based learning techniques. In addition, CLEs include peer-mentoring in a situational learning setting. CLEs provide "real-world" experience for students to prepare them for their future careers.²¹ This study specifically examined the perceptions of CLEs of the fourth-year dental students who served as mentors and the second-year dental students who were mentored and compared the responses of the two cohorts.

The t-test comparison of the means showed differences between the cohorts regarding perceived value, and the free text responses revealed strengths of the program. In response to both statements related to the value of CLEs, significant differences were found, with the D2 cohort valuing the CLEs higher than the D4s. Both cohorts had consistently high ratings on the statement "CLEs have educational benefits for D2 and D4 students" (D2: 4.17 vs. D4: 4.09; $p < 0.560$) (Table 2). Responses did not differ significantly between the two cohorts. In response to the statement "CLEs make students more comfortable communicating with one another," significant differences between the D2 and D4 cohorts were found (4.22 vs. 3.74, respectively; $p < 0.003$) (Table 3). These results suggest that both cohorts recognized positive aspects of the program, but when evaluating overall program value, they felt CLEs had more value for students earlier in their dental education (D2) than toward the end of their studies (D4).

Regarding D4s as mentors, both cohorts showed consistently high values in response to the statement "D4 students have enough knowledge and skill to mentor D2 students in clinical dentistry" (D2: 4.17 vs. D4: 4.14; $p < 0.861$). The free text responses showed that D2s found the D4s more accessible and felt that the D4s' presence increased their comfort. This finding is consistent with Vygotsky's theory of social constructivism and the idea of scaffolding, as discussed by Knowles.³ Also, the D4s' presence led to the D2s' perception of receiving increased individual attention, which may have contributed to their increase in comfort. Significant differences between the D2s and D4s appeared regarding the statement "CLEs help better prepare D4 students to manage a dental practice" (3.37 vs. 2.94, respectively; $p < 0.001$). While the D2s' responses to this statement were higher than the D4s', the free text responses showed

that D4s found CLEs better prepared students for private practice through managing, working, leading, and mentoring others. Additionally, their perception that CLEs reinforced their knowledge and skills may lead to increased confidence prior to graduation.

The free text responses also allowed for the identification of weaknesses related to CLEs. The most commonly identified challenge in the program was that D4 student performance appeared to be dependent upon the student. Probably as a result, D2s felt that D4s' desire to participate should be a requirement in selecting mentors. This response, in combination with the agreement that D4 students have the knowledge and skill to participate as mentors, implied that the reason performance seemed student dependent was D4 students' motivation and interest, not their ability to mentor. This finding also implies that D4 training focused on mentoring and communication skills could minimize the variability between D4s as mentors. Some D2s expressed a desire to work in more regularly scheduled pairs in order to build rapport. Organizationally, such a structure may present a challenge for some programs.

Administrative issues and a lack of clearly defined roles challenged both D2 and D4 students in our program. These may be program-specific issues and may not be related to CLEs in general. A pre-CLE training or informational packet may provide more information on the roles and responsibilities of the students. Such additions should be distributed to both students and faculty to clear up any possible confusion.

Previous studies in nursing have mentioned the benefits that CLE-type activities have on students' professional development and preparation for future careers.^{10,12} Both the D2 and D4 cohorts in our study perceived that CLEs made students more prepared to communicate with colleagues and employees, as reflected by a lack of differences. The primary benefits identified by D2 students related to increased comfort. The D4 students also strongly expressed that the CLE experience allowed them to appraise their knowledge and skill level. These findings are consistent with a study by Goldsmith et al. of first- and third-year nursing students, in which the students described similar events as the "best" part of their program.²² Additionally, student comfort with other students (as compared to faculty) was mentioned in medical education literature in a study by Field et al.²³

Among limitations of the study, the response rate was relatively low, particularly for the D4 cohort (D2: 41.8%, D4: 31.8%), even though the question-

naires were distributed during regularly scheduled classes. At any given time, approximately one-third (36 students) of the fourth-year class are out of the building participating in external rotations. Thus, the cohort was limited to approximately 74 available students. In addition, the voluntary nature of the course selected for questionnaire distribution and its proximity to fourth-year students' graduation date may have impacted our sample size. The voluntary nature of this study also introduced the potential for selection bias.

While this study evaluated student perceptions, it did not attempt to evaluate faculty and staff perceptions of CLEs, which can be considered another limitation. This information could be beneficial for improving program organization and success. In addition, our study did not evaluate patients' perspectives on the program. A study by Daley et al. found that patients were pleased with "experiencing a student partnership" in a CLE-type experience.²⁴ Thus, it may be valuable to determine patients' perceptions of CLEs in a clinical dental setting in future research.

Conclusion

Situational, clinical learning experiences involving peer mentoring have been shown to increase professional development and career preparation for students in the fields of nursing and medicine. In our study, students' perceptions of the CLE method revealed potentially positive impacts on future dental practitioners. Overall, the D2 cohort reported finding higher perceived value in the CLEs than the D4 cohort. However, a lack of many significant differences between the cohorts in combination with the free text responses showed that both cohorts saw benefits to CLEs, such as increased comfort, increased peer communication, experience managing and leading others, and the ability to assess their own knowledge and skill. While challenges were perceived, such as administrative issues and variable D4 student performance, the overall positive reaction to this CLE program suggests that similar programs should be considered and/or expanded in predoctoral curricula.

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Disclosure

The authors reported no disclosures or conflict of interest.

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