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Measuring the short-term effects of incorporating academic service learning throughout a dental hygiene curriculum

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Simmer-Beck M, Gadbury-Amyot C, Williams KB, Keselyak NT, Branson B, Mitchell TV. Measuring the short-term effects of incorporating academic service learning throughout a dental hygiene curriculum.

Abstract: *Objectives:* Academic service learning (ASL) provides the venue for dental hygiene education to take oral healthcare services directly into communities while at the same time promoting professional responsibility within the student bodies. The purpose of this study was to quantitatively examine the change in pre-existing attitudes and behaviours of dental hygiene students following the incorporation of ASL activities throughout a five-semester dental hygiene curriculum. *Methods:* Seventy-seven first-year dental hygiene students who participated in ASL from the graduating classes of 2008–2010 participated in the study. A survey instrument developed by Shiarella, based on Schwartz's Helping Behaviors Model, was used to assess students' attitudes towards community service. Additionally, questions were developed using Shinnamon's Methods and Strategies for Assessing Service-Learning in the Health Professions. *Results:* Internal estimates of reliability for scales (Cronbach's α) were all >0.8. The results revealed statistically significant improvements over time in enhanced learning ($P = 0.0001$), self-awareness ($P = 0.0001$), sense of volunteerism ($P = 0.013$), impact on career choices ($P = 0.001$) and decrease in personal costs ($P = 0.0001$). There were no significant changes in other subscales over time. Further investigating these domains revealed minimal to no changes in attributes of service learning. *Conclusion:* Service learning integrated into the dental hygiene curriculum can enhance learning and improve students' self-awareness, sense of volunteerism, career choices and perception of personal costs. In concert with the literature on ASL, these experiences throughout the curriculum have potential for increasing students' awareness of community need and their roles as oral health professionals.

Key words: access to care; civic engagement; community-based education; dental hygiene; dental hygiene education; dental hygiene profession; service learning

Introduction

Revised Accreditation Standards for Dental Education Programs, a collaborative effort between the American Dental Association's Commission on Dental Accreditation (ADA-CODA) and the American Dental Education Association (ADEA) Commission on Change and Innovation (CCI) CODA Task Force, were adopted on 6 August 2010 and are slated for implementation no later than 1 July 2013 (1). Specific to this project is

Standard 2, Educational Programs, and specifically Standard 2–25, Clinical Services. Standard 2–25 states 'Dental education programs must make available opportunities and encourage students to engage in service learning experiences and/or community-based learning experiences'. The intent statement reads: '*Service learning experiences and/or community-based learning experiences are essential to the development of a culturally competent oral health care workforce. The interaction and treatment of diverse populations in a community-based clinical environment adds a special dimension to clinical learning experience and engenders a life-long appreciation for the value of community service*' (2). Accreditation standards such as these are steering dental hygiene educational programme goals, objectives, learning activities and evaluation of outcomes.

Academic service learning (ASL) is a form of experiential education that combines well-thought-out community activities with preparation and reflection (3–5). In contrast to community service that tends to be ill-defined, ASL targets specific course objectives which link academic coursework with community service. ASL is recognized for augmenting in-depth comprehension of the subject matter and fostering awareness of complex social issues (3). Dental hygiene programmes have incorporated ASL into their curriculum to better prepare students to work with interprofessional teams while providing care to patients who lack access to care (6–11). Traditionally, dental and allied dental educators incorporated experiential learning 'through clinical rotations in community health centres, hospitals and private practices located in healthcare provider shortage areas' (8). Academic dental and dental hygiene institutions have been called upon to serve as safety nets for the underserved and contributors to the well-being of their communities through accessible oral healthcare services. ASL provides the venue for dental education to take oral healthcare services directly into communities while at the same time promoting professional responsibility within their student bodies.

The literature shows that students in ASL courses, when compared with students in programmes with no service options, exhibit heightened proficiency in problem-solving and overall critical thinking aptitude (3). However, researchers acknowledge that research into the outcomes of effects of service learning is lacking (3, 10, 12, 13). Using Schwartz's model of altruistic helping behaviour, the investigators of the present study hypothesized that incorporating ASL experiences throughout a dental hygiene curriculum would have a positive impact on dental hygiene students' perspectives and attitudes regarding normative helping behaviours, connectedness, personal costs, awareness, benefits, self-awareness, seriousness, career benefits, intentions, sense of individual responsibility, volunteerism, enhanced learning and career choices during a students' programme of study.

The purpose of this study was to quantitatively examine the change in pre-existing attitudes and behaviours of dental hygiene students following the incorporation of ASL activities throughout a five-semester dental hygiene curriculum.

Methods

This study utilized a pretest/post-test design allowing students to serve as their own control. Ninety (n = 90) first-year dental hygiene students from the entering classes of 2006–2008 were recruited for this study during their first semester in the programme. Students volunteering to participate in this study (n = 77) completed the consent form approved by the UMKC Social Sciences IRB. Students completed the initial questionnaire in November of their first semester of the dental hygiene curriculum and again at the end of the programme, just prior to graduation. The demographics of the sample are described in Table 1. The students were predominantly female Caucasians with a mean age of 26 and a mean grade point average of 3.3. The majority of students (87.5%) reported they had previously participated in an unpaid community service project. The level of commitment was predominately one time a year (23%) and two to four times a year (52.9%). Twenty-five percentage of the students reported working while attending school. Throughout the five-semester dental hygiene programme, the students participated in numerous ASL projects. Table 2 provides a layout of the types of projects that were completed each semester and the total number of individuals in the community who benefited from the service learning activities.

Schwartz's Helping Behaviors Model (14) served as the theoretical foundation for this study. This model posits helping behaviours as being comprised of several components: normative helping behaviours; connectedness; awareness; intentions; diversity; seriousness; and career/specialization choices. The survey instrument developed by Shiarella (15), based on Schwartz's Helping Behaviors Model, was used to assess students' attitudes towards community service. Shiarella's instrument established psychometrics on 46 items assessing community service attitudes on eight subscales. All items use a seven-point response format (16).

Additionally, questions were developed using Shinnamon's Methods and Strategies for Assessing Service-Learning in the Health Professions (17). Shinnamon's instrument uses a five-

Table 1. **Demographics of dental hygiene students (total enrolment for graduating classes of 2008, 2009 and 2010; n = 79*)**

Gender	*n* (%)
Female	76 (96%)
Male	3 (4%)
Racial/ethnicity background	
Caucasian	68 (86%)
Black	3 (4%)
Hispanic	3 (4%)
Native American	1 (1%)
Asian American	3 (4%)
Not reported	1 (1%)
Age at graduation	Mean (SD)
	26 (4.6)
GPA	Mean (SD)
	3.3 (0.3)

*May not add up to 100% due to rounding.

Table 2. **Service learning activities completed each semester***

Semester 2	Semester 3	Semester 4	Semester 5	Total number of individuals in community touched
Provide oral health education programme at an elementary school.	Complete a 2-week oral health field experience at a community-based health centre. Students provide direct patient care and present an oral health programme in the community.	Adopt an elementary school to complete screenings, apply fluoride varnish and provide classroom education. Provide education and/or screenings at community sites that provide services to individuals with disabilities and older adults.	Participate in MDHA Lobby Day, in collaboration with MDHA members, and speak to state legislators about important oral health issues in the state. Complete a community-based practicum (optional).	Class of 2008 = 2786 Class of 2009 = 5250 Class of 2010 = 4990
	Provide comprehensive preventive oral health care to individuals with disabilities, individuals with HIV+ status, individuals with head or neck cancer and individuals waiting for a transplant.			
		Provide comprehensive preventive oral health care, using portable equipment, to children in a school-based mobile clinic.		

*Based on a five-semester dental hygiene curriculum.

point Likert scale asking students their level of agreement with 25 statements. For the purpose of this study, the Likert scale was ordered such that higher numerical values were associated with stronger agreement. It was designed to assess students' change in perceptions and attitudes over time upon completing multiple ASL courses across their academic programme. Both instruments are public domain and have no restrictions. A summary of the survey questions that were used for each subscale can be found in Table 3. Appendices S1 and S2 (Supporting information) provide copies of the surveys that were used.

Data were entered into Statistical Package for Social Sciences (SPSS) software for descriptive and inferential analyses. Psychometric characteristics of the measures were assessed for internal consistency estimates of reliability using Cronbach's α and subscale scores computed by summing item-level scores. Wilcoxon signed-ranks test was used to assess the change over time for the subscale scores. A $P < 0.05$ was used as the critical value for determining statistical significance.

Results

Internal consistency estimates of reliability (Cronbach's α), for the survey instrument developed by Shiarella, were computed on subscales as defined by Shiarella (15). Principal components analysis, with varimax rotation, was used to identify underlying domains for the identification of subscales for Shinnamon's instrument. Subsequently, internal consistency estimates of reliability were computed on identified subscales. All alphas were ≥ 0.8, suggesting satisfactory internal consistency of items in the subscales reported for our sample. Distributional characteristics of the subscales were explored and determined to conform to non-parametric assumptions.

Wilcoxon signed-ranks test was used to analyse individual students' change in domain scores over time. Enhanced learning, self-awareness, volunteerism, career choices and perception about the personal costs associated with participation in ASL all changed significantly over the 2-year training programme. Individual responsibility, seriousness, connectedness, benefits, career benefits, normative helping behaviours, awareness and intentions were not statistically significant. Table 4 provides further description of the data by reporting the change in both median values and interquartile ranges.

For assessing service-learning activities, students reported an overall improvement in the degree to which activities had a positive impact. Enhanced learning increased significantly ($P = 0.0001$) from students' first semester to their completion of the programme. Students reported that participating in ASL activities helped them gain a better understanding of course materials and that the activities helped them build their dental hygiene skills. Self-awareness also increased significantly over the 2-year period ($P = 0.0001$), suggesting that students felt participating in ASL activities made them more aware of the roles of health professionals in other disciplines, their own biases, the needs of the community and how they could become more involved within the community and clarify their career choice. The results for the volunteerism subscale showed a statistically significant ($P = 0.013$) increase, suggesting that students intend to continue community involvement specifically in dental hygiene. Students also showed a statistically significant increase in their leadership and communication skills (Career Choice) ($P = 0.001$) over time. Students reported they believed that participating in service learning activities during their tenure in the dental hygiene programme improved both leadership and communication abilities in real-world contexts. With respect to changes in attitudes about community service, there was less of an impact.

Concern about the personal costs of service activities ($P = 0.0001$) decreased over time. Data revealed the majority of dental hygiene students, *entering* the dental hygiene programme, expected to have less time for schoolwork, fewer opportunities to make money in a paid position, less energy, less time to work, less free time and less time to spend with families if they volunteered in their community at a minimum

Table 3. **Summary of survey questions**

Methods and Strategies for Assessing Service-Learning in the Health Professions (17)
1 Enhanced learning
The community participation aspect of the courses helped me see how the course material I learned can be used in everyday life.
Participation in service learning helped me to better understand the material from my lectures and readings.
I feel I would have learned more from the courses if more time was spent in the classroom instead of in the community.
My service learning was not directly linked to building dental hygiene skills.
Doing work in the community helped me to define my personal strengths and weaknesses.
2 Self-awareness
Service learning made me more aware of the roles of health professionals in other disciplines besides my own.
The community participation aspect of service learning showed me how I can become more involved in my community.
Service learning helped me to become more aware of the needs in the community.
Performing work in the community helped me clarify my career/specialization choice.
During this experience, I became more comfortable working with people different from myself.
Service learning made me more aware of some of my own biases and prejudices.
3 Volunteerism
I was already volunteering before this service learning experience.
I will continue involvement specifically within dental hygiene.
4 Career choices
Participating in the community helped me enhance my leadership skills.
The work I performed in the community enhanced my ability to communicate my ideas in a real-world context.
5 Sense of individual responsibility
I have a responsibility to serve the community.
I will integrate community service into my future career plans.
I can make a difference in the community.
Community Service Attitudes Scale (15, 16)
1 Costs
I would have less time for my schoolwork.
I would have forgone the opportunity to make money in a paid position.
I would have less energy.
I would have less time to work.
I would have less free time.
I would have less time to spend with my family.
2 Seriousness
Lack of participation in community service will cause severe damage to our society.
Without community service, today's disadvantaged citizens have no hope.
Community service is necessary to making our communities better.
Community service is a crucial component of the solution to community problems.
The more people who help, the better things will get.
3 Connectedness
I am responsible for doing something about improving the community.
It's my responsibility to take some real measures to help others in need.
It is important to provide a useful service to the community through community service.
It is important to me to have a sense of contribution and helpfulness through participating in community service.
It is important to me to gain an increased sense of responsibility from participating in community service.
I feel an obligation to contribute to the community.
Other people deserve my help.
It is critical that citizens become involved in helping their communities.
4 Benefits
I would be contributing to the betterment of the community.
I would experience personal satisfaction knowing that I am helping others.
I would be meeting other people who enjoy community service.
I would be developing new skills.
5 Career benefits
I would make valuable contacts for my professional career.
I would gain valuable experience for my resume.
6 Normative helping behaviours
It is important to help people in general.
Improving communities is important to maintaining a quality society.
I can make a difference in the community.
Our community needs good volunteers.
All communities need good volunteers.
Volunteer work at community agencies helps solve social problems.
Volunteers in community agencies make a difference, if only a small difference.
College student volunteers can help improve the local community.
Volunteering in community projects can greatly enhance the community's resources.
Contributing my skills will make the community a better place.
My contribution to the community will make a real difference.
7 Awareness
Community groups need our help.
There are people in the community who need help.
When I meet people who are having a difficult time, I wonder how I would feel if I were in their shoes.
I feel bad that some community members are suffering from a lack of resources.
I feel bad about the disparity among community members.
There are needs in the community.
There are people who have needs which are not being met.
8 Intentions
I want to do this activity.
I will participate in a community service project in the next year.
I will seek out an opportunity to do community service in the next year.

of two times a month for a minimum of 2 h for the duration of a semester. Data revealed dental hygiene students felt this was less likely by the completion of their programme of study. No other changes were observed.

Table 4. **Student survey results and change over time**

	At entry median (IQR)	At graduation median (IQR)	Sig (*P*)	Median change
Enhanced learning*	10.0 (1.5)	12.0 (1.0)	0.0001	2.0
Self-awareness*	21.0 (2.5)	24.0 (2.0)	0.0001	3.0
Volunteerism*	7.0 (1.0)	8.0 (1.5)	0.013	1.0
Career choices*	6.0 (1.0)	8.0 (1.0)	0.001	2.0
Individual responsibility	12.0 (1.5)	13.0 (1.0)	0.075	1.0
Health Professions Schools in Service to the Nation (HPSISN) Student Assessment (17) Scale values: 1 = Strongly disagree; 5 = Strongly agree				
Costs*	30.0 (7.0)	26.0 (10.5)	0.0001	4.0
Seriousness	27.0 (8.0)	28.0 (5.8)	0.080	1.0
Connectedness	47.0 (10.8)	48.0 (8.0)	0.254	1.0
Benefits	19.0 (2.0)	19.0 (2.0)	0.784	0.0
Career benefits	18.3 (2.5)	18.2 (2.0)	0.159	0.0
Normative helping behaviours	67 (9.0)	66.5 (8.8)	0.73	0.5
Awareness	44 (7.0)	43.0 (6.0)	0.601	1.0
Intentions	18.0 (4.0)	18.0 (3.0)	0.930	0.0
Community service attitudes scale (15) Scale values: 1 = Extremely unlikely; 7 = Extremely likely				

*Statistically significant.

Discussion

Faculty and administrators at the University of Missouri-Kansas City (UMKC) embrace the concept of extending opportunities, on a regular basis, for students to engage in meaningful service activities that collectively benefit the student and the community. As a result of this, well-designed ASL activities are integrated throughout the UMKC dental hygiene curriculum and are an integral component of the students' educational experience.

Outcomes for the community involved a significant number of individuals being positively impacted by the dental hygiene students' service learning activities. The activities provide much needed preventive oral health care, education and referrals for children and adults who lacked access to care. The Division of Dental Hygiene receives numerous gestures of appreciation and accolades for this involvement. At the 2010 accreditation site visit, the Division of Dental Hygiene received special recognition from the site visitors for their efforts with ASL.

Future research is needed to examine the outcomes associated with student learning, benefits to the community and changes in attitudes and behaviours. Longitudinal design methods have been suggested to examine the outcomes and sustainability (10). This is the first study, to our knowledge, that has empirically examined, across a dental hygiene curriculum, the impact of ASL on dental hygiene students' perspectives and attitudes regarding normative helping behaviours, connectedness, awareness, intentions, diversity, seriousness and career/specialization during students' programme of study. The findings in this study are consistent with previous research from dental hygiene as well as other disciplines, suggesting well-structured service learning activities enhance learning and have been shown to instil a sense of self-awareness, civic responsibility (volunteerism), individual responsibility, ethics and professionalism in professional students while reflecting on a relevant vision of their role as healthcare professionals in the context of their community (7–11, 18–21).

The subscales related to enhanced learning, self-awareness, career choices and personal costs experienced the greatest degree of change over time. The change in enhanced learning for our sample is consistent with other service learning outcomes literature (8–11, 18). DeMattei *et al.* (9) reported that dental hygiene students working with children with special healthcare needs reported increased confidence. Moreover, they reported that they found their educational experiences valuable and appreciated the 'uniqueness of the learning environment and the diverse experiences they encountered' while working with the children with special healthcare needs.

Similarly, the change observed in self-awareness is consistent with other service learning literature (6, 7, 10, 18). In a qualitative study of student reflections following a service learning activity that mutually benefited children who lacked access to care and dental hygiene students, Keselyak *et al.* (18) illustrated how dental hygiene students were surprised to learn that so many children, in their own community, have unmet dental needs and stated 'this awareness helped students become familiar with the changing epidemiology of oral health risks among this diverse population in the community' (18). Performing work in the community also helped students clarify their career/specialization choices by increased self-awareness as well as improved leadership and communication skills. A study by Piskorowski *et al.* illustrated similar results where first career choices of dental student graduates correlated with the number of weeks the students spent in community-based dental education rotations. As the length of time in community-based dental education rotations increased from 3 to 5 weeks to 8 weeks, the number of dental students who planned to practise in a community-based dental clinic increased from 5.6% to 16.5% (22).

A repository of data is needed to follow the career choices and volunteer experiences of graduates to see whether ASL is

associated with elevated numbers of individuals who carry on normative helping behaviours, connectedness, awareness, intentions, diversity, seriousness and career/specialization by pursuing careers in alternative settings. Exit surveys from the dental hygiene programme in this study indicate that in the classes of 2008, 2009 and 2010, one graduate is employed full-time with the U.S. Public Health Service, two graduates are employed full-time in federally qualified health centres, and one graduate is providing dental hygiene care in a school-based setting 1 day a week using a Kansas extended care permit I (allowing the dental hygienist direct patient access).

One of the limitations of this study was the small, homogenous sample (only 77 subjects from the same institution). Therefore, it may not be appropriate to generalize the results to other student populations, programmes or locations. Future studies are needed where data are collected using the prescribed survey instruments at other institutions and with dental as well as dental hygiene students. Another limitation is this study examines the changes that occurred during a students' tenure in the UMKC dental hygiene programme. It cannot be assumed that these changes will be carried into the professional workforce. Further research is needed to examine students who have graduated and are currently practising dental hygiene to see whether the described changes continue after the student is employed in a dental hygiene setting.

One additional consideration that may have affected the results of this study is the ceiling effect. The UMKC admissions committee attempts to select dental hygiene students who are engaged in their community and have an awareness of civic responsibility. The majority of students in this study previously participated in an unpaid community service project. Therefore, some students may have scored higher on the pretest, ultimately resulting in the less quantifiable attitudinal and behavioural changes.

Clinical relevance

Scientific rationale for the study

Academic service learning activities purport changing attitudes and behaviours in professional students. The outcomes of this teaching methodology need to be examined in dental hygiene students to determine its success at developing a culturally competent workforce that appreciates the value of community service.

Principal findings

Continuous academic service learning enhanced students' learning, awareness of community needs and their roles as oral health professionals.

Practical implications

Incorporating academic service learning into dental hygiene curricula enhances learning and instils a sense of civic and professional responsibility in dental hygiene students that will be carried into their career.

Conclusion

The largest change in perceptions over time was related to enhanced learning, self-awareness and perceived personal costs followed by career choices and volunteerism. In concert with the literature on ASL, these experiences throughout a 2-year dental hygiene curriculum resulted in students' increased awareness of community need and their roles as oral health professionals.

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Supporting information

Additional supporting information may be found in the online version of this article.

Appendix S1. Methods and strategies for student assessment.

Appendix S2. Community service attitudes scale.