

# Innovations in Dental Hygiene Education

## Online Dental Hygiene Degree Completion Program: Outcomes of a longitudinal study

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### Abstract

**Purpose:** Examining the long-term outcomes of education programs delivered online can help assess the impact of the program on graduates and the value of the delivery format. The purpose of this study was to measure the overall outcomes of an online dental hygiene degree completion program and identify key alumni outcomes.

**Methods:** A 35 item electronic survey was delivered via email to all graduates (2009-2017) of an online degree completion program based in Ann Arbor, Michigan, two years following program completion. Survey items included Likert scale, closed and open-ended questions focusing on career characteristics, leadership, scholarly activities, evidence- and community-based practices, professional confidence, and transformative learning. Descriptive and inferential statistics were used to analyze the data.

**Results:** Of the nine alumni cohorts (n=75), 50 graduates participated in the survey for a response rate of 67%. Eighty-two percent of respondents felt they had more career options after graduation and reported post-degree career activities that included dental hygiene instruction (36%), public health (32%), and administration (14%). There was a statistically significant increase in the instructor/educator role of the participants post-graduation ( $p = 0.000$ ). The majority (94%) indicated the program improved their competency in areas of leadership and evidence-based practice and all (100%) indicated a greater responsibility to use their professional skills to address oral health disparities in their communities

**Conclusion:** Graduates of the online degree completion program reported ongoing activities in key areas of leadership, evidence- and community-based practice. Future research should focus on ensuring that program goals reflect the evolving dental hygiene profession and program delivery practices meet the needs of the working professional student.

**Keywords:** dental hygiene education, e-learning technology, distance education, online learning, degree completion

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### Introduction

The dental hygiene profession has been advocating for the baccalaureate-prepared hygienist as the entry-level degree for several decades.<sup>1</sup> As oral health care is integrated into total health care, the profession recognized it must position itself for these changes and cultivate graduates who are able to advance and explore diverse and evolving roles. According to the Commission on Dental Accreditation 2018-19 dental hygiene education program survey, there are 327 entry-level dental hygiene programs in the United States (US).<sup>2</sup> Of those programs, only 51 (15%) confer a bachelor's degree in dental hygiene, 8 (2%) programs confer other baccalaureate degrees, 265 (81%) confer an associate's degree or certificate, and 1 (.3%) confer another degree. The profession has recognized

the need to create a path for associate degree-prepared dental hygienists to complete the remaining academic credits towards a baccalaureate degree. Degree completion programs offer the associate-prepared dental hygienist a mechanism for completing their bachelor's degree and expanding their professional opportunities beyond clinical practice in roles such as educator, researcher, entrepreneur, public health professional, administrator, and corporate management.<sup>3</sup>

Historically degree completion programs have been structured as face-to-face courses offered on a traditional college campus. Face-to-face degree completion programs have been available in the US for decades. Limitations of the

on-campus delivery method have been its lack of support for the working professional who needed to balance educational goals with employment and/or personal commitments. Traditional delivery models often required the professional to relocate to be closer to campus. Educational courses delivered primarily or fully online have offered increased access to higher education for a variety of professions.<sup>4</sup>

Dental hygiene education programs have established distance or online programs to allow working professionals access to the necessary coursework for a bachelor's degree.<sup>5</sup> Degree completion programs offered as hybrids (partially online) or fully online are becoming increasingly popular among associate degree or certificate-prepared dental hygienists as a way to remain in clinical practice, maintain personal responsibilities, and live in their community of choice, while pursuing their educational goals.<sup>4</sup> Out of the 51 degree completion programs in the US, 27 (55%) are fully online, 11 (25%) are hybrids, and 13 (20%) are face-to-face.<sup>6</sup>

In order to meet the demands of the working professional, University of Michigan Dental Hygiene (UM DH) launched a fully online, degree completion "E-Learning" program in 2008. The intent of this new design was to create program goals and a curriculum consistent with expanded roles and career opportunities, to focus on development of future leaders in the profession, and to prepare dental hygienists to work as members of multidisciplinary health care teams (Table I). The 2005 ADHA report *Dental Hygiene: Focus on Advancing the Profession* provided the foundation for the program goals, competencies, and 11-course framework.<sup>7</sup> Program goals were also crafted to align with the missions of the University and the School of Dentistry. Equally important was the assimilation of technology into the course design and delivery process. Equitable access to technology, computer literacy, and seamless technology interface were considered as vital to the program development as the educational andragogy.<sup>8</sup>

**Table I. UM DH Degree Completion E-Learning program goals and competencies**

Program Goals	Competency Domains
Develop leaders in the dental hygiene profession.	Professional Development and Leadership
Prepare dental hygienists to work as members of multidisciplinary health care teams and in alternative practice settings.	Professional Communication Health Promotion and Disease Prevention
Prepare dental hygienists for expanded roles and career opportunities.	Evidence-Based Practice Community-Based Oral Health

At the time the UM-DH E-Learning program was developed, it is important to note that the existing face-to-face courses were not simply adapted to fit the new online platform. The E-Learning program framework was created from the ground up and included original curriculum development, best-practices in online education and admissions, mixed-method evaluation, marketing plans, and faculty professional development focusing on online learning and teaching. Comprehensive information on the models and best practices used in developing the UM DH E-Learning program are provided in Gwozdek et al.<sup>5</sup> In 2012, a second report by Gwozdek et al. was published, evaluating the outcomes of the first two cohorts.<sup>9</sup>

Initial outcomes assisted the E-Learning program developers to better understand the more immediate impact of the program on student growth and their interaction with the curriculum and online environment. Although the outcomes of the first two cohorts were positive, longitudinal evaluations assessing student change over time can provide a more complete picture of the overall effectiveness of the educational program. The purpose of this study was to determine the longer-term outcomes of the UM DH Degree Completion E-Learning program by measuring its impact in three key areas: meeting programmatic goals, key graduate outcomes of the program, and graduate value of the online delivery option.

## Methods

This study was deemed exempt from Institutional Review Board (IRB) oversight by University of Michigan IRB for Behavioral and Health Sciences [HUM 00018836]. A 35-item, two-year post-graduation, electronic survey was pilot tested by five dental hygiene educators; survey modifications were made based on their feedback. The survey was disseminated via email to the 75 graduates from the nine cohorts (2009-2017) of the E-Learning program. Qualtrics® (Provo, UT) online survey software was used for distribution, collection, and storage of the anonymous survey data. Participants had two weeks to respond and were sent reminder emails each week.

### Survey Instrument

The survey instrument utilized qualitative and quantitative research strategies; items included demographic, numeric Likert scale, fixed response, and open-ended questions. Program impact was determined by assessing participant interaction with the program goals and competencies, specifically the competency domains

of *Professional Development and Leadership, Evidence-based Practice, and Community-based Oral Health*. Graduate outcomes were measured based on self-reported pre-and post-program activities and included: a) career and professional development characteristics, b) leadership, advanced education, and scholarly activities, c) evidence-based and community-based practice, d) professional confidence and credibility, and e) impact of online delivery method on learning.

### Statistical Analysis

Responses to open-ended questions were evaluated by three investigators to identify common themes and then coded. Seven key categories emerged from the responses. Many respondents indicated more than one key outcome; thus, one response could have been recorded into multiple categories. Descriptive and inferential statistics were obtained using SPSS® v24 (IBM; Armonk, NY) and Excel 2016 (Microsoft; Bellevue, WA). Chi-Square tests of independence were used to determine differences in distributions between numbers of hours reported participating in pre- and post-program professional roles. Statistical significance was set at  $p < 0.05$ .

## Results

The survey captured feedback from 50 of 75 alumni (n=75) from nine cohorts graduating from 2009 to 2017, yielding a response rate of 67%. All of the respondents were licensed dental hygienists in the US and female. Ages ranged from 21-55 years old. Prior to enrolling in the program, 57% had been practicing dental hygiene for less than five years, 16% for 6-9 years, and 28% for more than 10 years. While enrolled in the program, 93% worked full or part-time and 45% were caregivers for children. Eighty-seven percent of respondents were Michigan residents while they were in the program.

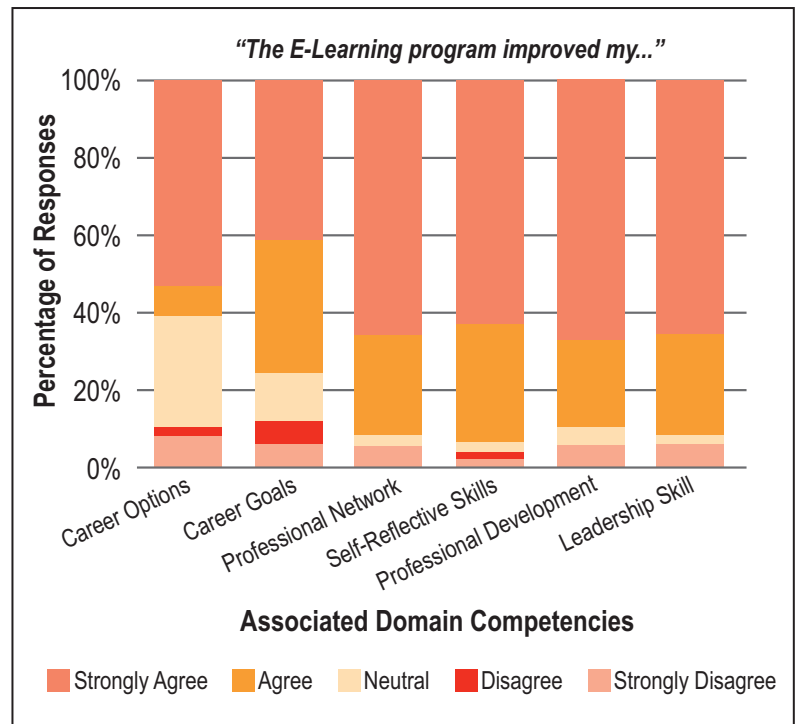
### Meeting Programmatic Goals

#### Professional Development and Leadership

Survey questions eliciting responses around the following areas: a) changes in post-program career or professional opportunities, b) professional networking, c) self-assessment/reflection, and d) leadership skills/activities were aligned with competencies in the *Professional Development and Leadership* domain (Figure 1). Eighty-two percent of respondents agreed/strongly agreed that they had more career options post program. Seventy-six percent believed the program helped them achieve their career goals with 92% feeling the program broadened their professional

network and increased their leadership skills. Ninety percent felt the program increased their commitment to professional development and lifelong learning.

**Figure 1. E-Learning program impact on professional development and leadership (n=49)**



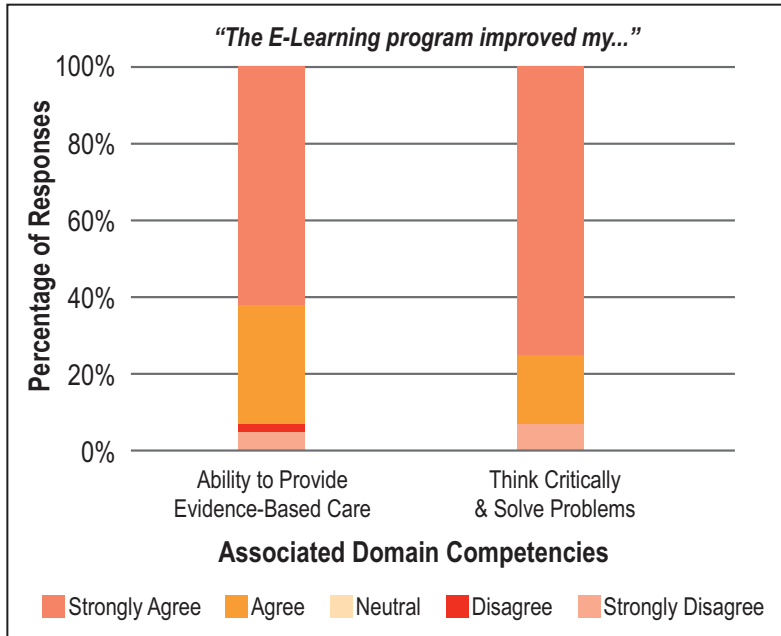
A majority of the respondents (94%) felt the program developed their reflective practice skills. Additionally, the vast majority rated the impact of the ePortfolio reflections completed at the end of each course positively (95%) and felt that the final self-presentation portfolio helped to make them feel “more confident” in their professional skills (97%). Most respondents (94%) agreed/strongly agreed that the program improved their leadership skills. Leadership positions reported by 26% of respondents included all levels of positions in their local, state and national professional associations, dental practices, and sales management positions. Association roles included chair of special interest group (SIG), faculty-student liaison, delegate, trustee, treasurer, secretary, vice president, and president. Respondents reported 24 experiences with scholarly activities during or post enrollment in the program including seven publications in national journals, eight national awards, two UM School of Dentistry awards, and seven national and international conference poster presentations.

#### Evidence-Based Practice

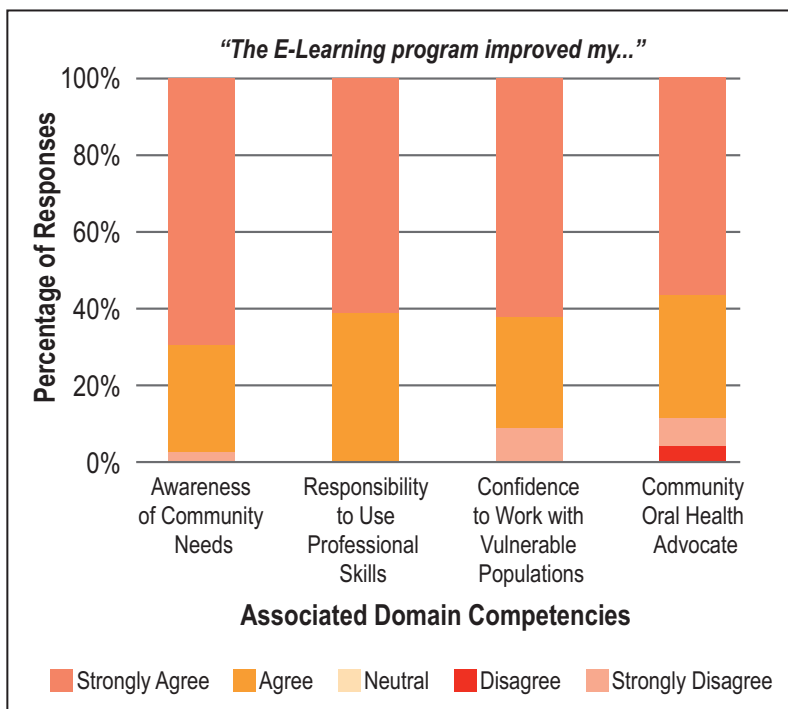
Survey questions eliciting responses regarding the use of evidence-based decision making in all dental hygiene practice settings and the ability to think critically and solve problems were aligned with competencies in the *Evidence-Based Practice* domain (Figure 2). The majority (94%) agreed/strongly agreed that the program increased

their ability to provide evidence-based, comprehensive patient care and that the program increased their ability to think critically, solve problems, and make decisions.

**Figure 2. E-Learning program impact on evidence-based practice (n=49)**



**Figure 3. E-Learning program impact on community-based practice behaviors (n=46)**



**Community-Based Oral Health**

Survey questions eliciting responses in the following areas: a) greater awareness of oral health needs in the community, b) sense of responsibility

to use professional skills to address oral health disparities in the community, c) confidence to work with vulnerable and underserved populations, and d) sense of self as a community oral health care advocate were aligned with competencies in the *Community-Based Oral Health* domain (Figure 3). Based on experiences in the E-Learning program, nearly all respondents agreed/strongly agreed (98%) that they developed a greater awareness of the oral health needs within their own community. As a result of the program, the majority of respondents also agreed/strongly agreed (91%) that they had developed greater confidence to work with elderly, culturally diverse, disadvantaged, and/or physically challenged populations.

**Pre- and Post-program Activities**

Respondents were asked to share the roles they were participating in two years prior and two years after the E-Learning program (Table II). Responses were recorded in terms of frequency of time spent (none, 1-16 hrs/wk, 17-31 hrs/wk, and 32+ hrs/wk). Over half the respondents (61%) identified as having been a student two years before the program and 35% still identified as being a student two years after the program. Those who identified as being a student post-program, indicated pursuing advanced areas of study including education technology, workforce development, dental health education, dental hygiene, public health, healthcare management, health information technology, clinical research, and business. Nearly three-quarter of these respondents chose online graduate programs and four chose institutions outside the state of Michigan.

Respondents reported increased participation (18% to 32%) in a range of public health-related roles including: clinical and administrative positions in Federally Qualified Health Centers (FQHCs), school-based programs, and mobile dental units; professional development for providers in treating vulnerable groups, and advocacy efforts at local and state policy levels. Chi-square test for significance identified a significant increase in respondents' participation in the role of dental hygiene instructor pre and post E-Learning program (6% to 36%,  $p = 0.000$ ).

**Key Graduate Outcomes**

An open-ended question eliciting perceptions of key outcomes of the E-Learning program was included and 80% (n=40) of the participants responded (Figure 4). Responses were themed into the following categories; leadership / professionalism / networking,

**Table II. Respondents pre and post-E-Learning program professional roles (n=50)**

Role	2 Years Pre-program				2 Years Post-program				p =
	Time spent in role/week								
	0 hrs/wk	1-16 hrs/wk	17-31 hrs/wk	32+ hrs/wk	0 hrs/wk	1-16 hrs/wk	17-31 hrs/wk	32+ hrs/wk	
Student	20	9	5	16	32	9	6	2	0.011
Clinician	16	7	14	13	8	9	10	23	0.061
Public health	41	6	1	2	34	10	3	3	0.074
Dental hygiene instructor*	47	3	0	0	32	9	6	3	0.000*
Research	46	3	0	1	44	6	0	0	0.504
Administrator	48	1	0	1	43	4	0	3	0.080
Non-oral health	36	7	4	3	40	7	1	2	0.407

\* indicates statistically significant changes from before enrollment to after enrollment. ( $p < .05$ )

expanded career opportunities, increased community involvement, increased self-confidence, advanced education opportunities, evidence-based information/research/practice (EBP), and improved communication skills/publications. Key outcomes in the categories of leadership/professionalism/networking and expanded career opportunities each received approximately one-half (53%) of the responses.

### ***Satisfaction with Online Delivery***

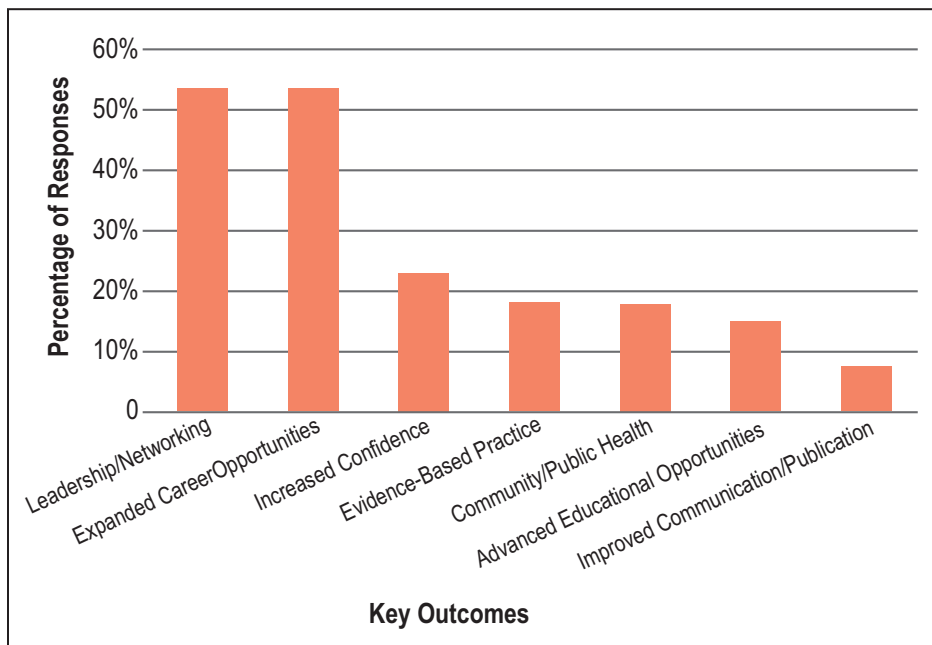
Survey items sought to determine the value of the delivery method of the E-Learning program (Figure 5). These questions whether the online delivery option had been beneficial to the graduate’s learning and, if so, why? Respondents were asked to choose all reasons that applied. All respondents indicated that the online delivery option was beneficial to their learning. Most respondents (86%) noted it allowed them to continue working while enrolled in the program. The ability to balance family responsibilities with educational goals (78%), and no need to commute to educational institution (68%) were common responses. In addition, others indicated that it allowed them to attend their preferred university instead of one geographically closer (14%) and identified that while the didactic work was online, there were extensive experiential learning (e.g. service-learning, student teaching) opportunities as well (14%). Recommendations for improving the program included assistance with job placement and additional courses in epidemiology and biostatistics.

### **Discussion**

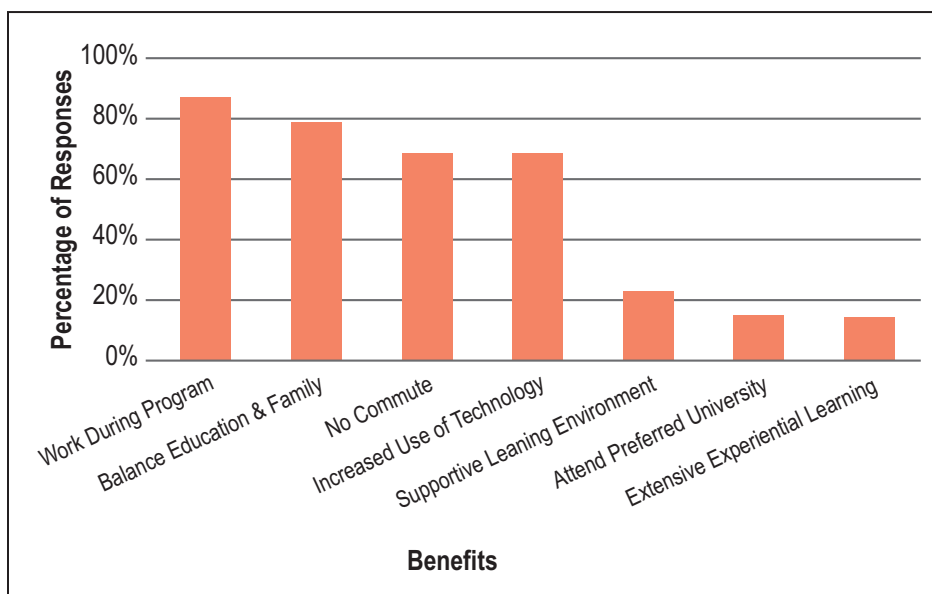
Outcomes of the study demonstrate that the E-Learning program was effective in meeting its programmatic goals by citing graduate activity in key competency domains two years following program completion. The Leadership/Professional Development and EBP domains were noted by many graduates as areas of increased involvement. However, the Community-Based Practice domain stood out with all respondents indicating a sense of professional responsibility in addressing disparities within their own communities. Nearly all participants stated that they had increased confidence working with vulnerable populations. This strong association with the community-based competencies could have been influenced by the experiential learning activities that took place during the community and capstone courses.

These activities, coupled with frequent self-assessment and critical reflection, may have augmented the students’ growth beyond simple attainment of competence in which they identify transformative changes in their perceptions, confidence, identity, skills, and pride. In the 2012 and 2015 evaluations of the E-Learning program’s first cohorts’ experiences, students indicated significant involvement and achievement with all domains/competencies.<sup>9,10</sup> Results from the current study show that graduates continue to interact with these domains and report a positive impact on their personal and professional lives.

**Figure 4. Key graduate outcomes of E-Learning program (n=38)**



**Figure 5. Benefits of online delivery option (n=50)**



## Effectiveness in Meeting Programmatic Goals

### *Professional Development and Leadership*

Graduates overwhelmingly reported that the program increased their leadership skills and commitment to professional development and lifelong learning. Participant's post-program activities indicated that nearly one-quarter had been successful in securing leadership positions. Additional key graduate outcomes related to professional development and leadership and expanded career opportunities were identified. The UM DH E-Learning Program's dedicated competencies in professional development and leadership and activities have been integrated through multiple courses may have

positively influenced graduate's post-program experiences. These findings align with the Smith et al. study of faculty perspectives on leadership curriculum in degree completion programs, that while stand-alone leadership courses have been thought to offer foundational skills, leadership-infused programs were shown to better prepare graduates for professional leadership roles.<sup>11</sup>

Within the *Professional Development and Leadership* domain, a majority of graduates indicated an improvement in self-reflective skills. Self-reflection is a life skill allowing individuals to improve their thought processes while critically assessing their experiences.<sup>12</sup> The UM DH E-Learning program incorporated a reflective ePortfolio throughout the program, providing an opportunity for students to reflect on four competencies of their choice at the end of each of the eleven courses. In addition, there were a number of strategically placed reflective assignments throughout individual courses. Allowing students to make connections between learning outcomes (competencies) and experiences fosters learning and knowledge transfer.<sup>13</sup> The evaluation of the first two cohorts demonstrated that the use of reflection and meta-reflection increased student professional competence and confidence.<sup>9,12</sup> Results of this study indicate that graduates continue to identify critical self-reflection as a highly used and valued skill.

### *Evidence-Based Practice*

Evidence-based decision making (EBDM) relies on the application of evidence to solve problems to provide the best possible patient care at all levels.<sup>14</sup> Nearly all participants reported that the E-Learning program increased their ability to provide evidence-based, comprehensive patient care, think critically, solve problems, and make decisions. Many respondents also reported continued use

of scholarly databases in and outside of clinical practice. These findings are consistent with the research of Kanji et al. of degree completion dental hygienists who reported a broader and more advanced knowledge base after completing their baccalaureate education.<sup>15</sup> This was reinforced by specific abilities in critical thinking, EBDM, and providing more comprehensive dental hygiene care. Similar to the first two cohorts of the UM DH E-Learning Program and Kanji et al., participants in this study noted that their expanded knowledge base and additional credentials led to more career opportunities such as in education, administration, public health, sales, and graduate degree studies. These outcomes are important in developing professionals who are prepared to meet future health care needs through utilization and integration of research into practice and other professional pursuits.

### ***Community-Based Oral Health***

Evolving practice settings have created additional demands for oral health care providers who are able to move outside of private practice to engage patients in community settings. Developing professionals who are prepared and willing to treat and advocate for vulnerable populations is a challenge for educational programs. High quality service-learning experiences have been identified in the literature as having important implications for generating civic minded providers.<sup>16,17</sup> One way that service-learning differs from volunteering is through the use of reflection allowing for students to explore their evolving moral reasoning, social responsibility, and impact on society. While many studies have demonstrated the positive influence service-learning experiences may have on students' appreciation of community health issues and their own professional responsibilities, there is evidence suggesting that these changes are short-term and do not extend into practice post-graduation.<sup>18,19</sup>

Integration of service-learning into the UM DH E-Learning curriculum provided students not only with experiential learning opportunities in their home communities, but also the chance to experience meaningful personal and professional growth facilitated by frequent critical incident and competency reflections. When asked two years after graduation about the dental hygienists' role in the community, UM DH E-Learning graduates continued to feel ties to the *Community-based Practice* competencies. Participants reported that the program improved their sense of professional responsibility, confidence to work with vulnerable populations, and helped them see themselves as community oral health advocates. The number of respondents spending time in public health related professional roles two years following graduation increased from pre-program hours suggesting a longer-term impact of these activities on these graduates.

### ***Professional Roles***

The positive long-term outcomes of the study speak to the impact of transformative learning on program participants. Positive changes in post-program professional roles most likely indicates that graduates experienced additional career opportunities due to their advanced education. The most significant increase in hours spent in professional roles was in the area of dental hygiene instruction/education. This is encouraging as it represents one of the UM DH E-Learning program competencies of preparing graduates for entry-level teaching positions in dental hygiene programs. In partnership with a dental hygiene program in their community, students participate in a seven-week student teaching practicum during their second year of the program. This competency also supports a workforce need among dental hygiene educational programs for new faculty to replace high numbers of retiring faculty.<sup>20</sup> Dental hygiene faculty who are committed to leadership, lifelong learning, and advocacy are indispensable for advancing the profession.

Over one third of the participants in this study indicated pursuing graduate degrees in a variety of disciplines and felt that the UM DH E-Learning degree completion curriculum adequately prepared them for advanced education opportunities. The diversity of majors chosen by graduates may be an indication of growing multidisciplinary demands of dental hygiene and health care in general. The choice to continue advanced education via programs offered online could also suggest that the participants found the online delivery model valuable in balancing personal needs with professional goals. Participation in these professional pursuits two years post graduation plays a significant part in demonstrating longer-term attainment of the UM DH E-Learning programmatic goals of developing leaders in the profession who are prepared for expanded roles in alternative practice settings.

Increased numbers of participants involved in clinical practice roles post-program was likely due to the number of UM DH E-Learning students who had completed their associate degree just prior to enrolling in the program and had not yet worked in clinical practice. The number of participants indicating administrator roles post-program increased from 2 to 7; however, data was not collected on the nature of those roles. Anecdotal data indicates graduates were employed in administrative positions in FQHCs and Michigan's Public Dental Prevention programs, a direct access workforce model.

### ***Value of Online Delivery***

The online delivery model was highly valued by the participants. Benefits of online learning identified by

respondents align with the needs of the working professional in accessing higher education or professional development opportunities. Dental hygienists face barriers to attaining their bachelor's degree in terms of access and affordability. Creating realistic educational pathways via part-time enrollment in programs delivered mostly or fully online can remove these barriers and improve upward career mobility. In addition, online learning arrangements facilitate the stability of the oral health care system in allowing practitioners to continue providing oral health care in their home communities rather than "transplanting" them into the communities of the educational institution.

### **Study Limitations**

Limitations include the fairly small total number of graduates from one institution and the self-reported nature of the data collection. Distributing the survey electronically presented challenges related to incorrect or unused alumni email addresses. The survey was the only evaluation instrument used in this study whereas focus groups, such as those used in the initial assessment of the first two cohorts, could have provided useful information.

### **Conclusion**

Results from this study demonstrate online or E-Learning models are a viable delivery option for dental hygiene degree completion programs. Graduates of the online degree completion program reported ongoing activities in key areas of leadership, utilization of evidence-based decision making, increased commitment to community-based oral care needs, and expanded employment opportunities. Study findings also contribute to the growing evidence supporting the baccalaureate degree for entry into the profession in order to effectively prepare dental hygienists with the knowledge, confidence, and values needed to explore diverse and changing professional roles. Additional research is warranted to ensure that degree completion program goals reflect the evolving dental hygiene profession and health care system and that program delivery practices meet the needs of the working professional student.

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