ABSTRACT

KISER, JESSICA RENEE. Perceptions of Curriculum Change among Dental Hygiene Program Directors at Two Year Colleges: A Q Methodological Study. (Under the direction of Dr. James Bartlett and Dr. Michelle Bartlett).

Areas in the United States are experiencing limited access to dental care. A solution to this issue includes utilizing the dental hygiene workforce; however, changes to the existing dental hygiene curriculum will be needed. The purpose of this study is to determine the perceptions of dental hygiene program directors employed at two-year colleges towards curriculum change forces. Literature, informal interviews, professional associations, and web pages on forces influencing curriculum change were utilized to develop a set of statements. Eighteen dental hygiene program directors participated in a Q methodology study, sorting statements in a forced distribution on which forces motivate them to change the existing dental hygiene curriculum. Participants also completed a post-sort questionnaire to gather demographic data and to more deeply understand why they placed statements where they did in their individual sorts. Data analysis indicated five distinct and statistically significant viewpoints of dental hygiene program directors toward motivating forces for curriculum change. The viewpoints are Accreditation and Administration for Change, Student Success for Change, U.S. Population and Health Care for Change, External Professional Forces for Change, and Science and Practice for Change. The research findings can be used to influence practice and policy on curriculum change, as well as future research studies on curriculum change. Specifically, these research findings can be used in practice to ensure successful implementation of curriculum changes, as well as the creation of professional development programs for program directors and educators. In addition, these research findings may encourage policymakers to examine these influential forces when they make changes to accreditation standards and practice acts.
Perceptions of Curriculum Change among Dental Hygiene Program Directors at Two Year Colleges: A Q Methodological Study

by
Jessica Renee Kiser

A dissertation submitted to the Graduate Faculty of North Carolina State University in partial fulfillment of the requirements for the degree of Doctor of Education

Adult and Community College Education

Raleigh, North Carolina

2017

APPROVED BY:

_______________________________  __________________________
Dr. James Bartlett             Dr. Michelle Bartlett
Committee Co-Chair            Committee Co-Chair

_______________________________  __________________________
Dr. Sally Mauriello           Dr. Bradley Mehlenbacher
DEDICATION

This dissertation is dedicated to my family and friends. Your love and support during this educational journey have provided me with the strength to see the finish line.
BIOGRAPHY

Jessica Renee Kiser was born in Charlotte, North Carolina and spent most of her childhood and youth in Apex, North Carolina. She received a baccalaureate degree in dental hygiene from the University of North Carolina at Chapel Hill. While enrolled in the undergraduate program, Jessica had a desire to further her education and become a dental hygiene educator. She graduated from UNC Chapel Hill with a Master of Science degree in dental hygiene education and began working at Cape Fear Community College in Wilmington, North Carolina in 2006.

Jessica is an active member in her professional association, the American Dental Hygienists’ Association where she has held numerous leadership roles. Jessica is a past president of the local and state dental hygiene associations, and is currently serving as district trustee for the national association. She is also a regional trustee for Sigma Phi Alpha, the national dental hygiene honor society.

Jessica lives in Wilmington, North Carolina and enjoys an active lifestyle, the beach, reading, and traveling.
ACKNOWLEDGMENTS

There are numerous people who have assisted me on my educational journey for my EdD. I am extremely grateful for my family and friends, who supported me through this journey. Thank you for your love and encouragement.

I want to thank Dr. James Bartlett and Dr. Michelle Bartlett as my chairs, who provided guidance and feedback on my research project. I also want to thank my remaining committee members, Dr. Sally Mauriello, Dr. Brad Mehlenbacher, and Dr. Jun Tsuji for their flexibility, guidance, and feedback. A tremendous thank you to the dental hygiene program directors who completed the research study and those who provided extra time by participating in the focus groups.

I am appreciative to my colleagues, peers, and family members who read my dissertation to provide feedback. A huge thank you to my editor and cohort classmate Dr. Katherine Kandalec. Your insights, feedback, and formatting edits were greatly appreciated. I am also grateful for my cohort classmates, as you all were a part of this educational journey, especially my front row classmates, Chris, Erica, Jennifer, and Randy.
# TABLE OF CONTENTS

LIST OF TABLES .................................................................................................................. viii  
LIST OF FIGURES ................................................................................................................ ix  
CHAPTER ONE ..................................................................................................................... 1  
  Introduction ....................................................................................................................... 1  
  Nature of the Problem ....................................................................................................... 2  
  Problem Statement ........................................................................................................... 4  
  Purpose of the Study ........................................................................................................ 5  
  Theoretical Framework ...................................................................................................... 5  
  Conceptual Framework ..................................................................................................... 9  
  Research Questions .......................................................................................................... 10  
  Overview of Research Method ....................................................................................... 10  
  Significance of the Study ................................................................................................. 13  
  Limitations ....................................................................................................................... 13  
  Delimitations ................................................................................................................... 15  
  Definitions of Terms ....................................................................................................... 16  
  Chapter Summary ........................................................................................................... 17  
CHAPTER TWO: LITERATURE REVIEW .......................................................................... 19  
  Introduction ....................................................................................................................... 19  
  Colleges and Universities as Organizations .................................................................... 19  
  Change ................................................................................................................................ 21  
    Change theory ................................................................................................................. 21  
    Dealing with change ....................................................................................................... 22  
  Curriculum Change in Higher Education ....................................................................... 23  
    Defining curriculum ....................................................................................................... 23  
    Forces of curriculum change ....................................................................................... 24  
  The Past, Present, and Future of Dental Hygiene Education .......................................... 24  
  Curriculum Change in Dental Hygiene Education ............................................................ 26  
  Forces of Curriculum Change in Dental Literature .......................................................... 28
LIST OF TABLES

Table 1: Summary of curriculum change forces in dental and dental hygiene literature ........ 32
Table 2: Concourse statements for research on dental hygiene curriculum change forces .... 40
Table 3: Correlation matrix between sorts ........................................................................ 58
Table 4: Factor characteristics .......................................................................................... 60
Table 5: Flagged factor loadings ........................................................................................ 61
Table 6: Five Factor Solution for Dental Hygiene Program Directors’ Viewpoints Toward Curriculum Change .................................................................................................... 62
Table 7: Factor arrays ........................................................................................................ 64
Table 8: Sorted Z Scores for each statement by factor ...................................................... 68
Table 9: Consensus statements .......................................................................................... 72
Table 10: Distinguishing statements for Accreditation and Administration for Change ...... 74
Table 11: Highest and lowest ranked statements for Accreditation and Administration for Change ......................................................................................................................... 75
Table 12: Distinguishing statements for Student Success for Change ................................. 79
Table 13: Highest and lowest ranked statements for Student Success for Change ............. 80
Table 14: Distinguishing statements for U.S. Population and Health Care for Change ...... 84
Table 15: Highest and lowest ranked statements - U.S. Population and Health Care for Change ............................................................................................................................. 85
Table 16: Highest and lowest ranked statements for External Professional Forces for Change .. 89
Table 17: Distinguishing statements for Science and Practice for Change ......................... 92
Table 18: Highest and lowest ranked statements for Science and Practice for Change .......... 93
Table 19: Post-sort questionnaire ........................................................................................ 95
Table 20: Participant demographics ................................................................................... 96
Table 21. Institution characteristics of participating dental hygiene program directors ....... 97
Table 22: Distinguishing Statements for the Five Factors ................................................ 102
Table 23: Highest Ranked Statements for the Five Factors .............................................. 104
Table 24: Lowest Ranked Statements for the Five Factors .............................................. 105
LIST OF FIGURES

Figure 1: Schematic of Lewin’s force field analysis and three step change model. 8
Figure 2: Graphical representation of the conceptual framework 9
Figure 3: Research design 37
Figure 4: Sample Q sort Matrix 47
Figure 5: Model sort for Factor One 78
Figure 6: Model sort for Factor Two 82
Figure 7: Model sort of Factor Three 87
Figure 8: Model sort of Factor Four 90
Figure 9: Q sort from Factor Five 94
CHAPTER ONE

Introduction

The American Dental Hygienists’ Association (ADHA) is the professional association for the dental hygiene profession and is dedicated to transforming the profession in which dental hygienists are recognized as essential primary care providers to better serve the oral health care needs of the public (ADHA, 2015c). It is through this mission that the ADHA has implemented pilot projects to initiate change in the dental hygiene curriculum (ADHA, 2015d). Education is the foundation of the profession, and changes will be necessary to expand the role of dental hygienists to better serve the public’s oral health care needs (ADHA, 2015d).

As education changes, it is imperative to understand the forces that impact change from the educators’ point of view (Yeager, 1997). These forces come from several environments (Stark & Lattuca, 1997), and can influence change by driving or restraining the change (Lewin, 1947, 1951). Curriculum changes are also important to student success to ensure graduates are prepared to serve the public (ADHA, 2015d). Labor market data on graduates can be utilized to “assess program effectiveness” as well as necessary changes to the curriculum to ensure graduate success (Aspen Institute, 2014, p. 7). Therefore, a study is necessary to determine curriculum change forces in dental hygiene education.

The purpose of this study is to determine the perceptions of dental hygiene program directors toward curriculum change in two-year colleges. The need for curriculum change in response to the access to care issue in the United States (U.S.), as well as the oral health status of the population are discussed to provide a foundation to the study. Lewin’s Theory of change,
which includes force field analysis and a three-step model, is presented as the theoretical framework for the study.

**Nature of the Problem**

In 2000, the U.S. Surgeon General’s national call to action report addressed the poor oral health status and access to oral health care issues in America (U.S. Department of Health and Human Services [DHHS], 2000). This report was the first on oral health by the Surgeon General, and informed the public on the oral and systemic health link, documenting “that oral health is essential to general health and well-being” (DHHS, 2000, p. 95). While the Surgeon General’s Report provided data on the oral health status of the U.S., current data from the Center for Disease Control and Prevention (CDC) indicates 91% of adults between the ages of 20 and 64 had dental caries, also called tooth decay, and 27% of individuals have untreated dental caries (DHHS, 2015a). In reference to adults aged 65 and older, 96% had dental caries and almost 19% have untreated dental caries (DHHS, 2015a). Data show that 17.5% of children between the ages of five and 19 have untreated dental caries (DHHS, 2015b). In reference to tooth loss, 52% of adults between the ages of 20 and 64 did not have their full permanent dentition, while almost 19% of adults 65 and older were also missing teeth (DHHS, 2015a).

The Surgeon General’s report also discussed the access to care issues facing the U.S. (DHHS, 2000). Access is defined as “the timely use of personal health services to achieve the best possible health outcomes” (Institute of Medicine [IOM], 1993, p. 4). While this definition may be straightforward, access to oral health services is multidimensional, as services must be available and individuals must utilize the services (Gulliford, et al., 2002). Access to oral care issues arise not only when services are unavailable, but also when there are personal, financial,
and organizational barriers preventing the utilization of the services (Gulliford, et al., 2002).

Currently, over 46 million individuals live in a dental health professional shortage area (DHPSA) in the U.S. (DHHS, 2015c). High rates of DHPSAs are found in 31 states in the U.S., ultimately achieving only 40% or less of the state’s oral health needs (Oral Health America, 2014).

Access to oral health care has a significant impact on the healthcare system in the U.S. (Wall & Nasseh, 2013; Wall, Nasseh, & Vujicic, 2014). Individuals who lack access to an oral health care provider may seek treatment at emergency rooms (Wall & Nasseh, 2013; Wall, Nasseh, & Vujicic, 2014). Emergency room visits for dental related problems “increased from 1.1 million in 2000 to 2.1 million in 2010” (Wall & Nasseh, 2013, p. 3). Based on the 2010 data, it is estimated that 1.65 million visits to the emergency room for dental related problems could have been treated in dental clinics (Wall, Nasseh, & Vujicic, 2014). The emergency room visits in 2010 cost the healthcare system an estimated $867 million to $2.1 billion (Wall & Nasseh, 2013). The healthcare system could save approximately $1.7 billion if individuals are treated in dental clinics versus the emergency room for dental related problems (Wall, Nasseh, & Vujicic, 2014). To reduce healthcare costs, “solutions are needed to improve access and oral health (Wall & Nasseh, 2013, p.6).

One solution to improve access and oral health is to utilize the existing dental hygiene workforce (National Governor’s Association [NGA], 2014; DHHS, 2015c). The Health Resources and Services Administration (HRSA) estimates the growth of dentists in the U.S. will be inadequate to meet the increased demand for dentists in the U.S. (DHHS, 2015c). Additionally, HRSA estimates the growth of dental hygienists in the U.S. will be adequate to meet the need for dental hygienists (DHHS, 2015c). Utilizing the current and growing dental
hygiene workforce can assist with access to oral health care concerns in the U.S. (NGA, 2014; DHHS, 2015c). The utilization of this workforce will require “the integration of dental hygienists into the health care delivery system as essential primary care providers” (American Dental Hygienists’ Association [ADHA], 2015a). This integration will provide dental hygienists the opportunity to “practice to the fullest extent of their education” (ADHA, 2015d, p. 10).

Current oral health care issues facing the U.S. population include poor oral health status and access to oral health care in America (DHHS, 2000; DHHS, 2015a; DHHS, 2015b). Data show DHPSAs are found in over half of the states in the U.S. (Oral Health America, 2014) and individuals are utilizing the emergency room for dental health care (Wall & Nasseh, 2013; Wall, Nasseh, & Vujicic, 2014). The growth of the dental hygiene work force will be adequate to meet the demand of dental hygienists (DHHS, 2015c) and can help alleviate the oral health issues facing the U.S. population (NGA, 2014; DHHS, 2015c).

**Problem Statement**

While the utilization of the dental hygiene workforce will assist with alleviating the lack of access to oral health care, the existing dental hygiene curriculum will need to change to prepare dental hygienists for new roles in serving the oral health care needs of the public (ADHA, 2015d). A dental hygienist is a

Primary care oral health professional who has graduated from an accredited dental hygiene program in an institution of higher education, licensed in dental hygiene to provide education, assessment, research, administrative diagnostic, preventive and therapeutic services that support overall health through the promotion of optimal oral health. (ADHA, 2015b, p. 36)
In 2015 there were 335 entry-level dental hygiene programs in the U.S. (ADHA, 2015d). The average length for an entry-level program is approximately three years, with students accumulating an average of 84 credit hours (ADHA, 2015d, p. 5). Educational changes will “prepare dental hygienists to practice within the integrated health care delivery structure and impact the public’s oral and overall health” (ADHA, 2015d, p. 17). These educational changes require educators to be motivated to make changes to the existing dental hygiene curriculum (ADHA, 2015d). When explaining the reason for change, it is important to assess the environment for the forces of change (Eckel, Green, Hill, & Mallon, 1999).

**Purpose of the Study**

To utilize the dental hygiene profession to assist with the oral health care problems and lack of oral health access in the U.S., the education for the dental hygiene profession must evolve (ADHA, 2015d). These educational changes will “prepare dental hygienists to practice within the integrated health care delivery structure and impact the public’s oral and overall health” (ADHA, 2015d, p. 17). This change requires educators who will make necessary changes to the existing dental hygiene curriculum (ADHA, 2015d). Forces for and against a change must be addressed for change to occur (Lewin, 1947, 1951). The purpose of this study is to determine the perceptions of dental hygiene program directors toward curriculum change in two-year colleges.

**Theoretical Framework**

Change is “to become different,” through “a different position, course, or direction” (Merriam-Webster, n.d.). Lewin (1951) describes change as moving “from the present level to the desired one” (p. 224). This concept of change “implies that a planned change consists of supplanting the force field corresponding to an equilibrium at the beginning level L by a force
field having its equilibrium at the desired level $L^2$” (p. 224). The field of an individual is the life space, which “consists of the person and the psychological environment as it exists for him” (p. xi). Lewin’s field theory is based on the following assumptions:

(a) behavior has to be derived from a totality of coexisting factors,

(b) these coexisting facts have the character of a “dynamic field” in so far as the state of any part of this field depends on every other part of the field (p. 25).

The “force field analysis recognized that resistance to change can be overcome when people understand and contrast the force that may be leading them to resist (restraining forces) and the forces inducing them to change (driving forces)” (Bess & Dee, 2012, p. 805). For change to occur, “one or more of the forces for change must be increased or one or more of the forces against change must be reduced, or some combination of the two” (Bess & Dee, 2012, p. 805).

Lewin (1947, 1951) also devised a three-step model for successful change: unfreezing, changing, and refreezing. This three-step model moves individuals or groups from “the present level” to a “new level” with each level having a force field (Lewin, 1951, p. 228). The first step of the change model is unfreezing (Lewin, 1951). During this stage the group is prepared for the change by receiving reliable data on why change is needed and the desire is for the group to be “compelled to seek change” (Bess & Dee, 2012, p. 805). The second step of the change model is changing, which requires “a shift in the way people think” (Bess & Dee, 2012, p. 806). During the change step, “the total force field has to be changed” between the present level and the new level (Lewin, 1951, p.224). The third step of the change mode is refreezing (Lewin, 1951). During this final stage the group becomes stable at its new level with the changes implemented
(Bess & Dee, 2012). This new level has “new beliefs, attitudes, and values that support” the change (Bess & Dee, 2012, p. 807).

Lewin’s force field analysis and change model examine change as a three-step process, while factoring in the forces acting for and against the change (Lewin, 1947, 1951). The forces for and against change are acting on the group at the same time, and must be addressed for change to occur (Lewin, 1947, 1951). Forces for change are driving forces or facilitators of change, while forces impeding change are restraining forces or barriers to change (Bess & Dee, 2012; Lewin, 1951). Forces of change can be “both a driver and a restrainer of change” (Venance, LaDonna, & Watling, 2014, p. 1006). Different perceptions of the forces are based on the individual differences theory, which indicates “individuals may react differently to the same message” (Armenakis, Harris, & Mossholder, 1993, p. 687). Figure 1 provides a visual of Lewin’s force field analysis and three-step change model (Thatte & Khandelwal, n.d.).
Figure 1: Schematic of Lewin’s force field analysis and three step change model.
Adapted from “Grabbing hold of the GRPI model,” by Dushyant Thatte and Neemita Khandelwal, no date, iSixSigma.
Conceptual Framework

Figure 2: Graphical representation of the conceptual framework

Figure 2 represents the conceptual framework guiding the study. At the top of Figure 2 are the forces of curriculum change, which can be identified as external, internal, and organizational. To understand the perspectives of dental hygiene program directors on which curriculum change forces are influential to them to make changes to existing curriculum, Q methodology will be utilized as the research approach. Q methodology will allow program
directors to sort predefined statements about curriculum change forces based on their perspectives, which is called the Q sort. The results of the Q sort are evaluated through factor analysis; with several groups emerging representing the different viewpoints of influential curriculum change forces. These findings will have implications for practice, policy, and research in regards to the forces acting on curriculum change.

**Research Questions**

The research questions that guided this study were:

1. How many viewpoints toward curriculum change forces emerge, and what are the characteristics of these viewpoints?
2. Which curriculum change forces are distinct by the groups and which forces have consensus across the groups?
3. Which forces do dental hygiene program directors perceive to have the most significant impact and least significant impact on curriculum change?

**Overview of Research Method**

In order to determine dental hygiene program directors’ perceptions about the forces of curriculum change, this study utilized Q methodology. Q methodology was developed by William Stephenson in 1935 (Bartlett & DeWeese, 2015; Watts & Stenner, 2012). This method was developed from factor analysis, but explores the ways in which individuals are correlated together rather than items (van Exel & de Graaf, 2005). Q methodology is utilized to measure subjectivity (Bartlett & DeWeese, 2015; Watts & Stenner, 2012). Subjectivity is a “behavioural activity that constitutes a person’s current point of view” (Watts & Stenner, 2012, p. 26). Q methodology reveals “how and why people think the way they do” and assists researchers in
recognizing “perspectives on a particular topic” and possible themes among participants (Bartlett & DeWeese, 2015, p. 73).

Q methodology involves six distinct steps: develop the concourse, identify the Q-set, identify the P-set, administer the Q-sort, and analyze and interpret the results (van Exel & de Graaf, 2005). The first step for the researcher is to develop the concourse (van Exel & de Graaf, 2005). The concourse is individual statements containing all the possible opinions related to the research topic (Bartlett & DeWeese, 2015; van Exel & de Graaf, 2005). The researcher utilizes many different sources to develop the concourse, such as the literature, interviews, observations, and the media (Akhtar-Danesh, Baumann, & Cordingley, 2008; Bartlett & DeWeese, 2015).

Once the concourse is developed, the second step is for the researcher to identify the Q-set (van Exel & de Graaf, 2005). The Q-set is a smaller version of all the concourse statements, which will be utilized in the research study (van Exel & de Graaf, 2005). This refinement of the concourse statements removes statements that are vague or similar to other statements (Bartlett & DeWeese, 2015). The researcher may utilize experts, as well as a pilot study to assist with the final selection of the Q-set statements (Akhtar-Danesh, Baumann, & Cordingley, 2008; Bartlett & DeWeese, 2015). Once the Q-set is finalized, each statement is placed on a numbered card to be utilized in the Q-sort process (Bartlett & DeWeese, 2015; Van Exel & De Graaf, 2005). A Q-sort table should also be created, which provides participants a visual of how the Q-set should be sorted based on agreement level (Bartlett & DeWeese, 2015).

The third step in Q methodology is identifying the P-set (van Exel & de Graaf, 2005). The P-set is the group of individuals who will participate in the research study (Akhtar-Danesh, Baumann, & Cordingley, 2008; Bartlett & DeWeese, 2015). The P-set is not a random sample,
but “a structured sample of respondents who are theoretically relevant to the problem under consideration” (van Exel & de Graaf, 2005, p. 6). Q methodology does not require a large P-set (Watts & Stenner, 2012). A focal point to the P-set is to have at least five participants that characterize “each anticipated viewpoint” (van Exel & de Graaf, 2005, p. 6).

The fourth step in Q methodology is administering the Q-sort (van Exel & de Graaf, 2005). Researchers provide directions, cards containing the Q-set, and a Q-sort table to the P-set (Bartlett & DeWeese, 2015). The P-set is instructed to sort or rank the Q-set by level of agreement from strongly disagree to strongly agree (Bartlett & DeWeese, 2015; van Exel & de Graaf, 2005). The P-set should be encouraged to do a rough sort first and then organize the Q-set on the Q-sort table according to the perceived agreement level of each statement (Bartlett & DeWeese, 2015; van Exel & de Graaf, 2005).

The final two steps in Q methodology are to analyze and interpret the Qsorts (van Exel & de Graaf, 2005). The P-set’s Q-sorts are placed in a statistical software program, and factor analysis is conducted to analyze the data (Bartlett & DeWeese, 2015). The factor analysis will provide factor loadings, which are utilized to determine how each Q-sort correlates to each factor (Bartlett & DeWeese, 2015; van Exel & de Graaf, 2005). Individuals with similar viewpoints will be grouped into the same factor (Bartlett & DeWeese, 2015). Following factor analysis, factor rotation and factor score calculation are conducted (Bartlett & DeWeese, 2015; van Exel & de Graaf, 2005). The factor rotation allows the researchers to examine the data from different perspectives (Bartlett & DeWeese, 2015; van Exel & de Graaf, 2005). The factor score calculation is a z-score value that provides a value to each statement within each factor (Bartlett & DeWeese, 2015; van Exel & de Graaf, 2005). The interpretation of the data involves utilizing
the statistical analysis as well as explanations provided by the P-set in regards to the Q-sort (Bartlett & DeWeese, 2015; van Exel & de Graaf, 2005). Individuals are grouped together based on similar viewpoints and each group is described or labeled based on the factor’s specific Q-set statements, which are statistically significant to that factor (Bartlett & DeWeese, 2015; van Exel & de Graaf, 2005).

**Significance of the Study**

Data on dental hygiene program directors’ perceptions of the forces of curriculum change will impact the profession of dental hygiene. With education being the foundation of the profession (ADHA, 2015d), it is important to understand what forces impact curriculum change from the educators’ point of view (Yeager, 1997). These forces come from the external, internal, and organizational environment (Stark & Lattuca, 1997), and can influence change by driving or restraining the change (Lewin, 1947, 1951). Research on curriculum changes should focus on the educators, as the change is “about changes in people - in their desires, beliefs, and attitudes” (Yeager, 1997, p. 37). Research to assist with understanding the forces of curriculum change will aid in preparing current and future dental hygiene program directors and educators for changes now and in the future as the profession of dental hygiene continues to evolve to meet the oral health needs of the public.

**Limitations**

Due to the research design, several limitations exist for this study. The study sought to determine the perceptions of dental hygiene program directors at two-year colleges on the forces of curriculum change. The study had a small P-set and the results indicate the viewpoints of those involved in the study. Therefore, the results cannot be generalized to the entire population
of dental hygiene program directors. The sorting activity for Q methodology is time consuming and was designed with a forced distribution. Several program directors emailed back stating they did not have the time to participate, and others stated they did not like the forced distribution design. One participant suggested a Likert Scale design, as she felt several forces motivated her to change the curriculum. One participant on the post-sort questionnaire indicated there were too many statements to sort. The post-sort questionnaire also indicated some participants had concerns about the meaning of certain statements. Since the research study utilized a web-based program, participants were unable to ask the researcher during the sorting activity.

The participation request was emailed to program directors during the months of December and January, which could contribute to the lack of responses as programs have winter break during those months. This time period is also a busy time as one semester is ending and another one is beginning. Program directors also have administrative duties along with teaching responsibilities, and are usually the individuals who receive request of research participation in studies related to education. Due to their job responsibilities, their time may be limited on the ability to participate in research studies. Some directors emailed the researcher regarding technology issues, stating they were unable to access the link or reached a certain step and were unable to move forward. One director informed the researcher her institution’s IRB needed to approve the study prior to her participation. The researcher contacted the institution’s IRB and no further correspondences were received.
Delimitations

As a current dental hygiene educator and professional member of the ADHA, I desired to create a research study that would benefit dental hygiene education as well as the professional association. The research study was designed to determine the perceptions of dental hygiene program directors on forces of curriculum change. Curriculum change is an essential component in achieving ADHA’s goal of transforming the profession of dental hygiene (ADHA, 2015a).

The research study also only included participants from dental hygiene programs at two-year colleges. Two-year and four-year colleges received the web link to participate in the research project; however, the participants’ sorts from the four-year schools showed that 17% of the participants cross-loaded on multiple viewpoints, thus indicating there were not sufficiently distinct viewpoints in this particular demographic to warrant inclusion. Therefore, the four-year school data were removed from the overall data file and only the two-year college data were analyzed and discussed for the research project. Overall, 18 two-year colleges participated in the project, and six four-year colleges participated. The two-year college setting is the ideal selection due to the following: the majority of dental hygiene programs in the U.S. are located at a two-year institution, the researcher is employed by a community college, and the researcher’s program of study is focused on community colleges.

Q-methodology was selected as the research method due to the study’s research question of determining the perceptions of the dental hygiene educators. The researcher has also conducted a previous Q-methodology study and is familiar with the design and implementation of the method.
Definitions of Terms

- **Change** is “to become different,” through “a different position, course, or direction” (Merriam-Webster, n.d.). Lewin describes change as moving “from the present level to the desired one” (Lewin, 1951, p. 224), with three steps: unfreezing, changing, and refreezing (Lewin, 1947, 1951).

- The **concours** “is the list of items that are used to describe perspectives on specific topics” (Bartlett & DeWeese, 2015, p. 74).

- **Curriculum** is an academic plan, which includes eight elements: purpose, content, sequence, learners, instructional processes, instructional resources, evaluation, and adjustment. **Purpose** is defined as “the general goals that guide the knowledge, skills and attitudes to be learned” (Stark & Lattuca, 1997, p. 10). **Content** is “the subject matter or content within which the learning experiences are embedded” (p. 10). **Sequence** refers to the “arrangement of the subject matter” (p. 10). The **learners** element deals with student “ability, previous preparation, and goals” (p. 13). **Instructional processes** are the activities utilized to accomplish learning, and the **instructional resources** are the items utilized during the process. **Evaluation** refers to “strategies used to determine if skills, knowledge, attitudes, and behavior change as a result of the learning process” (p. 10). **Adjustments** are “changes in the plan to increase learning, based on experience and evaluation” (p. 10).

- A **dental hygienist** is a “primary care oral health professional who has graduated from an accredited dental hygiene program in an institution of higher education, licensed in dental hygiene to provide education, assessment, research, administrative diagnostic, preventive
and therapeutic services that support overall health through the promotion of optimal oral health” (ADHA, 2015b, p. 36).

- A **dental hygiene program director** is the “program administrator” “whose primary responsibility is for operation, supervision evaluation and revision of the program,” which includes “curriculum development, evaluation, and revision” (CODA, 2016, p. 30-31).

- A **P set** “is a structured sample of respondents who are theoretically relevant to the problem under consideration” (van Exel & de Graaf, 2005, p. 6).

- A **Q set** is a “refinement of the concourse” and is the “list of items that individuals sort to describe their perspectives toward a topic” (Bartlett & DeWeese, 2015, p. 75).

- The ranking of the Q set, “known as **Q sorting**, involves participants comparing and ranking the” Q set “items with regard to how much they agree or disagree with them” (Dziopa & Ahern, 2011, p. 40).

**Chapter Summary**

Current data address the poor oral health care status of the U.S. population, as well as the lack of access to oral health care (DHHS, 2000; DHHS, 2015c; Oral Health America, 2014). Individuals are seeking oral health care in emergency rooms, even though the care can be more appropriately and affordably provided in dental clinic settings (Wall & Nasseh, 2013; Wall, Nasseh, & Vujicic, 2014). To improve the oral health care issues facing the U.S. population, the dental hygiene workforce can be utilized to provide oral health care to the public (NGA, 2014; DHHS, 2015c). Utilizing the dental hygiene workforce will move the profession “into the health care delivery system as essential primary care providers” (ADHA, 2015a).
To utilize the dental hygiene profession, the education for the dental hygiene profession must evolve (ADHA, 2015d). Educational changes will prepare dental hygienists to meet the current oral health care needs of the public (ADHA, 2015d, p. 17). This change will require educators who are willing and able to make necessary changes to the existing dental hygiene curriculum (ADHA, 2015d). The current study, utilizing Q methodology, provides data on the perceptions of dental hygiene program directors employed by two-year colleges on the forces of curriculum change using Lewin’s Change Theory as a framework. Findings from this study will assist dental hygiene program directors and educators on identifying the forces that motivate educators to make changes to the existing curriculum. Identifying these forces will assist with the curriculum change process now and in the future as the dental hygiene curriculum evolves to prepare graduates to meet the oral health care needs of the public.
CHAPTER TWO: LITERATURE REVIEW

Introduction

The purpose of this study is to identify the perceptions held by dental hygiene program directors on curriculum change forces. This chapter provides an overview of the literature and a foundation for the current study. The first section discusses colleges and universities as organizations, and then discusses change, with focus on the concept of forces acting on a desired state. The second section discusses change in regards to higher education curriculum and the particular forces that may promote and impede change. The third section provides an historical perspective of dental hygiene education, as well as the present and future outlook of dental hygiene education. The final section discusses curriculum change in the dental and dental hygiene education literature in regards to the forces for and against curriculum change.

Colleges and Universities as Organizations

An organization is defined as “a social unit of people that is structured and managed to meet a need or to pursue collective goals” (Business Dictionary, n.d.). Organizations are further defined as “open systems,” in which “they affect and are affected by their environment” (Business Dictionary, n.d.). Bess and Dee (2012) have described colleges and universities as “complex organizations operating in a diverse and ever-changing environment” (p. 2).

Institutions of higher education are structured with academic and non-academic departments, in a system of shared responsibilities (Bess & Dee, 2012). They can vary depending on the educational services being provided, which is a shared goal of the organization (Bess & Dee, 2012). Two-year colleges provide educational services for “vocational preparation” as well as transfer credits to four-year colleges (Bess & Dee, 2012). Four-year
colleges provide an expansive range of courses for baccalaureate programs as well as graduate programs (Bess & Dee, 2012). Four-year colleges may also provide students and faculty with the opportunity to contribute to the research arena (Bess & Dee, 2012). Overall, institutions of higher education are “places of learning” motivating “people for lifelong learning, civic engagement, and spiritual fulfillment” (Bess & Dee, 2012, p. 2).

Due to their complexity and interactions, institutions of higher education face challenges, which can be categorized as “environmental, structural, interpersonal, and cultural” (Bess & Dee, 2012, p. 3). Environmental challenges faced by the organizations include funding resources, economic needs, and social needs, which can in turn change the interworking of the organization (Bess & Dee, 2012). They must assess the environment and decide how to respond while using resources wisely (Bess & Dee, 2012). Structural challenges faced by institutions of higher education include coordinating communication and the advancement of the mission across all departments. The organization wants to prevent “redundancy and inefficiency,” while maintaining specialization (Bess & Dee, 2012, p. 4).

Institutions of higher education also face interpersonal challenges (Bess & Dee, 2012). Individuals work together to meet the institution’s goals and mission (Bee & Dee, 2012). The organization must maintain an atmosphere of “motivation, commitment, and trust among members,” while taking into account their varying skills, roles, and responsibilities (Bess & Dee, 2012, p. 5). Postsecondary institutions face cultural challenges (Bess & Dee, 2012). An organization’s culture is “the superglue that bonds an organization, unites people, and helps an enterprise accomplish desired ends” (Bolman & Deal, 2008, p. 253). The organization wants to ensure a culture of “coherence and unity,” while maintaining an openness to “differences in
beliefs and values (Bess & Dee, 2012, p. 5). Challenges from the four categories should be addressed for colleges and universities to be successful (Bess & Dee, 2012). Addressing these challenges may require organizational changes (Bess & Dee, 2012).

**Change**

Change is “to become different,” through “a different position, course, or direction” (Merriam-Webster, n.d.). Change can be viewed as moving “from the present level to” (Lewin, 1951, p. 224) a desired level, with each level having forces acting for and against the change (Lewin, 1947, 1951). This concept of change suggests that a planned change occurs when the stable environment at the present level becomes a stable environment at the desired level (Lewin, 2015, p. 224). Change occurs when the forces encouraging change (driving forces) are increased or the forces impeding change (restraining forces) are decreased, or a combination of the two (Bess & Dee, 2012; Lewin, 1951). To understand this concept of change, individuals must be knowledgeable of the driving and restraining forces acting upon the present and desired levels (Bess & Dee, 2012; Lewin, 1951).

**Change theory.** Lewin’s (1947, 1951) change theory is composed of the field theory and a three-step model for change. The field theory is based on the following assumptions:

(a) behavior has to be derived from a totality of coexisting factors,

(b) these coexisting facts have the character of a “dynamic field” in so far as the state of any part of this field depends on every other part of the field (p. 25)

The force field analysis indicates there are forces for and against change (Bess & Dee, 2012). For change to occur the strengths of the forces must be altered where the driving forces are
increased, the restraining forces are decreased, or a blend of both (Bess & Dee, 2012; Lewin 1951).

Lewin’s (1947, 1951) three-step model for successful change includes: unfreezing, changing, and refreezing. At each level, there are forces acting for and against change (Bess & Dee, 2012). The unfreezing stage is when the group prepares for the change (Bess & Dee, 2012). The changing stage is moving from the present level to the new level. The refreezing stage is the new level with the implemented changes that becomes stable (Bess & Dee, 2012).

**Dealing with change.** Institutions of higher education continuously experience change (Eckel, Hill, & Green; 1998). The concept of change commonly brings about varied emotions anywhere from anxiety and fear to hope and enthusiasm (Nordvall, 1982, p. 6). To manage anxiety and fear, it is important to discuss the reason behind the change as well as “the direction of the change” (Eckel, Green, Hill, & Mallon, 1999, p. 6).

During the change process, several questions arise that should be addressed to assist with anxiety and fear. These questions include: why and how much change is needed; and what individuals need to be involved (Eckel, Green, Hill, & Mallon, 1999). The first question, why change is needed, evaluates the environment to determine which forces are acting on the change (Eckel, Green, Hill, & Mallon, 1999). Assessing the environment for the forces allows the institution to determine the following: the origin, the strength, and implications of the forces (Eckel, Green, Hill, & Mallon, 1999). Assessing the environment assists with explaining why the change is occurring (Eckel, Green, Hill, & Mallon, 1999).
Curriculum Change in Higher Education

As mentioned earlier, colleges and universities are “places of learning” (Bess & Dee, 2012, p. 2). A student’s academic development is achieved through the college curriculum, referred to as an academic plan (Stark & Lattuca, 1997). The college curriculum can change based on the environment (Stark & Lattuca, 1997).

Defining curriculum. Stark and Lattuca (1997) define curriculum as an academic plan, which includes eight elements: purpose, content, sequence, learners, instructional processes, instructional resources, evaluation, and adjustment. Purpose is defined as “the general goals that guide the knowledge, skills and attitudes to be learned” (p. 10). Content is “the subject matter or content within which the learning experiences are embedded” (p. 10). Sequence refers to the “arrangement of the subject matter” (p. 10). The learner element deals with student “ability, previous preparation, and goals” (p. 13). Instructional processes are the activities utilized to accomplish learning, and the instructional resources are the items utilized during the process. Evaluation refers to “strategies used to determine if skills, knowledge, attitudes, and behavior change as a result of the learning process” (p. 10). While Stark and Lattuca (1997) definition is all encompassing, this study focused on changes to only one element, the content.

A change to the curriculum is making it different by giving it a “new position or direction” (NSGMED, 2015). Stark and Lattuca (1997) state the “curriculum is constantly changing based on new needs and new information” (p. 10). Stark and Lattuca (1997) identify three specific environments that work for and against curriculum change: external, internal, and organizational. Within these three environments there are different forces acting on the change (Stark & Lattuca, 1997).
**Forces of curriculum change.** Three specific environments initiate forces that work for and against curriculum change: external, internal, and organizational environments (Stark & Lattuca, 1997, p. 267). External influences involve society, government, professional associations, marketplace, alumni, and sponsors (Stark & Lattuca, 1997, p. 267). Internal influences involve educators, students, the specific discipline, program mission, and leadership (Stark & Lattuca, 1997, p. 267). Organizational influences include program relationships and resources, governance, and leadership (Stark & Lattuca, 1997, p. 267). While there are three specific environments that produce the forces, all three overlap and work conjointly on curriculum changes (Stark & Lattuca, 1997, p. 19). These forces will be explored in depth in relation to the dental literature.

**The Past, Present, and Future of Dental Hygiene Education**

Oral health care dates back to 3000 B.C. with the use of toothpicks, as well as a book on dental and gingival disease in 2500 B.C. (Daniel & George, 2008, p. 3). The profession of dental hygiene developed “from the field of dentistry,” which was originally integrated in the medical field (Bowers, 2012, p. 65). The first dental school opened in 1840 in Baltimore, Maryland and in 1894 D. D. Smith opened the first prevention based dental practice (Daniel & George, 2008). After a presentation by D. D. Smith, Alfred Fones, the father of dental hygiene, began to provide preventative services to his patients in 1900 (Daniel & George, 2008). Within the next few years, it was recommended that women be trained to assist the dentist in preventative services with the title of dental nurse (Bowers, 2012). In 1906, Fones educated Irene Newman to provide preventative services and the first educational program for dental nurses opened in 1910 at the Ohio College of Dental Surgery (Bowers, 2012; Daniel & George, 2008). However, the program
closed shortly after it was opened because Ohio dentists thought the training was inadequate for the services provided by a dental nurse (Bowers, 2012).

Fones still believed in the value of the training for dental nurses so he opened a program in 1913 in Connecticut (Bowers, 2012; Daniel & George, 2008). Fones also re-named dental nurse to dental hygienist, as this name was appropriate for a person who is “versed in the science of health and the prevention of disease” (Bowers, 2012, p. 70; Daniel & George, 2008, p. 4). The first dental hygiene class graduated in 1914, after a little over six months of education and training (Bowers, 2012). In 1915, legislation was passed in Connecticut to regulate the practice of dental hygiene (Bowers, 2012). The first dental hygiene program at a university was at Columbia University (Bowers, 2012). This program was one year and required at least one year of high school (Bowers, 2012). The first dental hygiene program at a dental school was at the University of California College of Dentistry (Bowers, 2012). This program was two years in length (Bowers, 2012).

By 1944 there were 14 dental hygiene programs in the U.S., which varied in curriculum due to the differences in state practice acts and the needs of the dentist and community (Bowers, 2012). To have educational consistency in the profession of dental hygiene, in 1946, the American Dental Association set the educational length for dental hygiene programs to two years with four years of high school (Bowers, 2012). Within the next year, accreditation standards for dental hygiene programs were developed (Bowers, 2012). Currently there are 335 entry-level dental hygiene programs in the U.S. The average length for an entry-level program is approximately three years, with students accumulating an average of 84 credit hours (ADHA,
Graduates of an entry-level program can obtain “a certificate, an associate’s degree, or a bachelor’s degree” (Daniel & George, 2008, p. 5).

As the length of the dental hygiene programs has evolved, so too has the primary employment setting, as well as the scope of practice for dental hygienists (Daniel & George, 2008). Public health was the initial employment setting for the profession, as dental hygienists practiced in the public-school system (Daniel & George, 2008). Today, the majority of dental hygienists are employed in a private practice setting (Daniel & George, 2008). Other professional roles of dental hygienists today include educator, researcher, administrator, corporate positions, and advocacy positions (Daniel & George, 2008).

The scope of practice for the dental hygiene profession is evolving (ADHA, 2016). Dental practice acts in “39 states allow dental hygienists to initiate patient care in a setting outside of the private dental office without the presence of a dentist” (ADHA, 2016, p. 1). Currently there are two states, Minnesota and Maine, with oral health workforce models that have evolved from the dental hygiene profession (ADHA, 2016). There are also 12 additional states with current legislation for oral health workforce models (ADHA, 2016). As the employment settings of dental hygienists evolve and develop, so too will the dental hygiene education to ensure graduates are prepared to work in the ever-changing employment settings.

**Curriculum Change in Dental Hygiene Education**

The American Dental Hygienists’ Association (ADHA) “is the largest national organization representing the professional interests” of registered dental hygienists in the U.S. (ADHA, 2015c). The core ideology of the ADHA “is focused on leading the transformation of the dental hygiene profession to improve the public’s oral and overall health” (ADHA, 2015c).
The vision “is that dental hygienists are integrated into the health care delivery system as essential primary care providers to expand access to oral health care” (ADHA, 2015c). In September of 2013, the ADHA, along with the ADHA’s Institute for Oral Health and the Santa Fe Group held the symposium Transforming Dental Hygiene Education, Proud Past, Unlimited Future (ADHA, 2015d). Numerous stakeholders convened to address “how to best prepare dental hygienists to serve the health and wellness needs of society by transforming the way dental hygiene graduates are prepared for the future” (ADHA, 2015d, p. 3). As a result of the symposium, a pilot project was implemented “with seven dental hygiene education programs to create change within their curricula and learning domains” (ADHA, 2015d, p. 18). As a result of the pilot project, six new learning domains were established to prepare graduates for the evolving roles of dental hygienists (ADHA, 2015d). These six domains include:

- Foundation Knowledge: Includes basic, behavioral and clinical science knowledge that can be recalled and applied to patient care. A solid foundation in liberal education provides the cornerstone for the practice of dental hygienists.
- Patient-Centered Care: Includes skills in patient assessment, dental hygiene diagnosis and the dental hygiene process of care to foster oral and systemic health.
- Management in Health Care Systems: Works within the oral care system and with the overall health care system to foster optimal health. Includes business management skills, advocacy, and change agent skills to integrate oral health into health systems.
- Interpersonal Communication and Interprofessional Collaboration: Communication skills with patient and within health care teams, including cultural sensitivity and
fostering health behaviors. Communication and collaboration are essential to the
delivery of high quality and safe patient care.

• Critical Thinking: Use of knowledge and critical evaluation of the research and
evidence-based skills and clinical judgment in providing dental hygiene care.
Professional dental hygiene practice is grounded in the translation of current evidence
into one’s practice.

• Professionalism: Inculcates the values and ethics needed for the provision of
compassionate, patient-centered, evidence based care that meets standards of quality.
(ADHA, 2015d, p. 18-19)

These six learning domains are broad allowing curriculum revisions to prepare graduates
with the knowledge and skills to provide adequate oral health care to the public (ADAH, 2015d).
Several curriculum changes implemented by the dental hygiene programs in the pilot project
included addition and deletion of courses and content (ADHA, 2015d). Curriculum additions
included content in the following areas: ethics, interprofessional education, practice and business
management, leadership, personal responsibility, critical thinking, and community oral health
(ADHA, 2015d). Curriculum deletions included content in nutritional counseling, topics
unrelated to clinical care, as well as the removal of a dental anatomy lab (ADHA, 2015d, p. 19).
While these changes were implemented as part of a pilot project in response to ADHA’s
symposium, additional forces are key factors in curriculum change.

**Forces of Curriculum Change in Dental Literature**

As stated previously, three different environments influence curriculum change: external,
internal, and organizational (Stark & Lattuca, 1997, p. 16). Several research studies have
provided data on forces of curriculum changes in dental and dental hygiene education involving educators and administrators (Beistle & Palmer, 2014; Formicola et al., 2012; Furgeson, Kinney, Gwozdek, Wilder, & Inglehart, 2015; Haden et al., 2010; Holt, Bray, Mayberry, & Overman, 2000; Kassebaum, Hendricson, Taft, & Haden, 2004). Some studies examined curriculum changes as a whole (Haden et al., 2010; Kassebaum, Hendricson, Taft, & Haden, 2004), while others were specific on the change being implemented in the curriculum (Beistle & Palmer, 2014; Holt, Bray, Mayberry, & Overman, 2000; Formicola et al., 2012; Furgeson, Kinney, Gwozdek, Wilder, & Inglehart, 2015). The two specific changes that were addressed in the dental literature included critical thinking skills and interprofessional education (IPE) (Beistle & Palmer, 2014; Formicola et al., 2012; Furgeson, Kinney, Gwozdek, Wilder, & Inglehart, 2015; Holt, Bray, Mayberry, & Overman, 2000). IPE is “when students from two or more health professions learn together during all or part of their professional training with the objective of cultivating collaborative practice to improve the quality of patient care” (Formicola et al., 2012, p. 1251).

**External curriculum change forces.** An analysis of the scholarly dental and dental hygiene literature revealed five external forces for curriculum change. These external forces that promote curriculum change included: incorporation of new scientific findings, feedback and recommendations from alumni, accreditation standards, educational best practices in the literature, and professional organizations (Formicola et al., 2012; Furgeson, Kinney, Gwozdek, Wilder, & Inglehart, 2015; Haden et al., 2010; Kassebaum, Hendricson, Taft, & Haden, 2004). One study also further addressed the support of a professional organization in promoting curriculum change. The study asked participants how the American Dental Educators
Association (ADEA) could support curriculum changes. The majority of participants indicated ADEA could assist by disseminating curriculum models from other schools (93%), offering seminars at annual session on outcomes of changes (92%), conducting research to explore outcomes of new strategies (89%), and providing grants to support pilot-testing of new models (88%) (Haden et al., 2010).

While societal forces were not found in the dental and dental hygiene literature, they do play a role in curriculum change. Stark and Lattuca (1997) indicate that “society shapes” the curriculum developed by institutions of higher education (p. 122). In response “to the changing needs of the population,” the Institute of Medicine (2003) recommends academic programs to change “the content, methods, approaches, and settings used in” the education of health professionals (p. 803). “Demographic trends indicate that the U.S. population is changing” (ADHA, 2015d, p. 8), and the dental hygiene profession has a “responsibility to the public” to evaluate “its own ability to provide care” (ADHA, 2015d, p. 3). These societal forces "support the need for" a change in the dental hygiene profession (ADHA, 2015d, p. 8).

**Internal curriculum change forces.** An analysis of the dental and dental hygiene literature revealed five internal forces for curriculum change. Two identified forces were specific to students, which included student attitudes and student feedback towards the curriculum (Beistle & Palmer, 2014; Haden et al., 2010). Two internal forces were specific to the educators, which included educator calibration and a personal responsibility to ensure graduates are prepared for the workforce (Beistle & Palmer, 2014; Furgeson, Kinney, Gwozdek, Wilder, & Inglehart, 2015). The final internal force was specific to the program, which
identified an internal curriculum review as a driving force for curriculum change (Haden et al., 2010).

**Organizational curriculum change forces.** An analysis of the dental and dental hygiene literature revealed six organizational curriculum change forces. Three forces were specific to divisions within the organization, which included other allied health programs, the department where the dental hygiene program is located, and college administration (Beistle & Palmer, 2014; Furgeson, Kinney, Gwozdek, Wilder, & Inglehart, 2015; Holt, Bray, Mayberry, & Overman, 2000; Kassebaum, Hendricson, Taft, & Haden, 2004). Availability of resources was also identified as an organizational force, which was found in two studies (Furgeson, Kinney, Gwozdek, Wilder, & Inglehart, 2015; Kassebaum, Hendricson, Taft, & Haden, 2004).

Two forces identified in the literature could be classified as organizational as well as internal. These two forces included scheduling coordination and a crowded curriculum (Beistle & Palmer, 2014; Furgeson, Kinney, Gwozdek, Wilder, & Inglehart, 2015; Holt, Bray, Mayberry, & Overman, 2000). While the organization will have the final say in regards to scheduling and the current curriculum, the dental hygiene educators are able to influence both of these forces. Table 1 provides a summary of the forces of curriculum change evident in the literature organized my environmental influences; external, internal, and organizational.
<table>
<thead>
<tr>
<th>Force</th>
<th>Source(s)</th>
<th>Environmental Influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorporate new scientific findings</td>
<td>Kassebaum, Hendricson, Taft, &amp; Haden (2004); Haden et al. (2010)</td>
<td>External</td>
</tr>
<tr>
<td>Professional organizations</td>
<td>Kassebaum, Hendricson, Taft, &amp; Haden (2004); Haden et al. (2010); Furgeson, Kinney, Gwozdek, Wilder, &amp; Inglehart (2015)</td>
<td>External</td>
</tr>
<tr>
<td>Accreditation Standards</td>
<td>Formicola et al. (2012)</td>
<td>External</td>
</tr>
<tr>
<td>Educational best practices in the literature</td>
<td>Haden et al. (2010)</td>
<td>External</td>
</tr>
<tr>
<td>Personal responsibility among educators to ensure graduates are prepared</td>
<td>Beistle &amp; Palmer (2014)</td>
<td>Internal</td>
</tr>
<tr>
<td>Students’ attitudes</td>
<td>Beistle &amp; Palmer (2014)</td>
<td>Internal</td>
</tr>
<tr>
<td>Internal curriculum review</td>
<td>Haden et al. (2010)</td>
<td>Internal</td>
</tr>
<tr>
<td>Student feedback</td>
<td>Haden et al. (2010)</td>
<td>Internal</td>
</tr>
<tr>
<td>Departmental decisions</td>
<td>Holt, Bray, Mayberry, &amp; Overman (2000); Beistle &amp; Palmer (2014)</td>
<td>Organizational</td>
</tr>
<tr>
<td>Other allied health programs</td>
<td>Holt, Bray, Mayberry, &amp; Overman (2000)</td>
<td>Organizational</td>
</tr>
<tr>
<td>Scheduling coordination</td>
<td>Holt, Bray, Mayberry, &amp; Overman (2000); Furgeson, Kinney, Gwozdek, Wilder, &amp; Inglehart (2015)</td>
<td>Organizational &amp; Internal</td>
</tr>
<tr>
<td>Available resources</td>
<td>Kassebaum, Hendricson, Taft, &amp; Haden (2004); Furgeson, Kinney, Gwozdek, Wilder, &amp; Inglehart (2015)</td>
<td>Organizational</td>
</tr>
<tr>
<td>University/College Administration</td>
<td>Kassebaum, Hendricson, Taft, &amp; Haden (2004); Furgeson, Kinney, Gwozdek, Wilder, &amp; Inglehart (2015)</td>
<td>Organizational</td>
</tr>
</tbody>
</table>
Chapter Summary

This chapter provides a review of the literature for the current study, which sought to determine the perceptions of dental hygiene program directors on forces of curriculum change. The first part of the chapter discussed institutions of higher education as organizations and the challenges they face. The concept of change was discussed next in terms of Lewin’s (1947, 1951) change theory, followed by curriculum change in higher education. Three environments influence changes to the curriculum: external, organizational, and internal. Within each environment, several forces arise that act for or against a change. The environments interact and work together to promote curriculum changes.

The chapter also provided a historical perspective on dental hygiene education. The dental hygiene profession evolved from the field of dentistry, with the first dental hygiene class graduating in 1914. The length of the dental hygiene program has changed from six months to three years. The scope of practice has also evolved as well as the work environments for dental hygienists. With these changes, the dental hygiene professional organization is encouraging curriculum changes and has developed pilot groups for curriculum changes. With the ADHA being a force for curriculum change, additional research studies were discussed to address other forces from the three environments that influence curriculum changes.

The studies identified in this chapter on forces of curriculum change in the dental literature do not specifically address the question of which forces encourage program directors to change the existing curriculum. Only one study reviewed addressed forces from all three environments; external, internal, and organizational. All the other studies addressed forces from one or two of the environments, but not all three. In addition, only two studies surveyed dental
hygiene program directors; however, both studies were specific on the curriculum change of IPE. Therefore, a study to determine which forces motivate dental hygiene program directors to change the existing curriculum will add necessary data to the literature. This study included forces from all three environments; external, internal, and organizational, and did not address a specific curriculum change. While Stark and Lattuca (1997) define curriculum as an academic plan with eight elements, this study focused only on change in one element from the academic plan, the content. The data will assist with present and future curriculum changes by understanding the forces of change to ensure new graduates are prepared to meet the oral health care needs of the public.
CHAPTER THREE: METHODOLOGY

Introduction

This study explored the viewpoints of dental hygiene program directors employed by two-year colleges. Q methodology was selected as the research method to study dental hygiene program directors’ viewpoints on forces of curriculum change. This chapter provides an overview of Q methodology, which includes the history and suitability for the study. This chapter also discusses research design according to the six phases of Q methodology research: concourse development, Q set development, P set selection, data collection through the Q sort, as well as data analysis and interpretation. This chapter concludes with a description of Q methodology and the P set of dental hygiene program directors.

Overview of Q methodology

William Stephenson developed Q methodology from the statistical method of factor analysis in 1935 (Watts & Stenner, 2012, p. 7). Q methodology is utilized to identify “different types of people” or different “types of viewpoint” (Watts & Stenner, 2012, p. 14). Q methodology participants are provided with a “set of stimulus items” that they must rank based on their perspective (Watts & Stenner, 2012, p. 15). The ranking of the items measures subjectivity, which is defined as “a person’s current point of view” (Watts & Stenner, 2012, p. 26).

Q methodology utilizes both qualitative and quantitative research methods (Brown, 1996). Participants in a Q methodology research study sort statements according to their point of view and rank the statements from most unlike my viewpoint to most like my viewpoint (van Exel & de Graaf, 2005). The statistical method factor analysis is utilized to evaluate the sorts,
providing quantitative data for individual points of view (Ramlo, 2016). Following the analysis, individuals “with similar views on the topic will share the same factor” (van Exel & de Graaf, 2005, p. 8) and each “factor represents a group of individual points of view that are highly correlated” (van Exel & de Graaf, 2005, p. 9). Participants in a Q methodology research study also complete a questionnaire following the sorting activity (van Exel & de Graaf, 2005), providing qualitative data (Bartlett & deWeese, 2015). The resulting factor analysis of the sort and the post sort questionnaire assist in the interpretation and description of the different viewpoints that emerge from the study (Ramlo, 2016). Utilizing the factor analysis and the post sort questionnaire to label the viewpoints, the researcher utilizes qualitative and quantitative methods (Ramlo, 2016). As the purpose of this research study is to identify viewpoints of curriculum change forces among dental hygiene educators, Q methodology is an appropriate research method.

**Research Design**

This study utilized Q methodology to determine the perceptions of dental hygiene program directors employed by two-year colleges on curriculum change forces. This study answered the following research questions:

1. How many viewpoints toward curriculum change forces emerge, and what are the characteristics of these viewpoints?

2. Which curriculum change forces are distinct by the groups and which forces have consensus across the groups?

3. Which forces do dental hygiene program directors perceive to have the most significant impact and least significant impact on curriculum change?
This Q methodology study was conducted in six phases: (1) developing a list of statements, called a concourse; (2) creating “a subset of statements” from the concourse, called a Q set; (3) selecting the participants, called a P set; (4) sorting of the Q set by the P set based on the individual’s point of view, called a Q sort; (5) analyzing the data; (6) interpreting the data analysis (van Exel & de Graaf, 2005, p. 4-5). The six phases are described in detail in the following sections. Figure 3 provides a visual of the study’s research design.

Figure 3: Research design
**Concourse development.** Concourse development is the process of identifying “all the possible statements” an individual can make regarding a certain subject (van Exel & de Graaf, 2005, p. 4). The concourse for this study was developed through the analysis of scholarly literature, practitioner literature, informal interviews, web pages, and news articles on curriculum change forces, as well as an analysis of societal forces effecting the U.S. population and then profession of dental hygiene. Scholarly and practitioner literature were found using the search engines Google Scholar and Summon through North Carolina State University. Keywords utilized included curriculum change, higher education curriculum, dental hygiene curriculum change, dental curriculum change, and curriculum change forces. The literature utilized included journal articles, published books, and governmental reports. The same key words were utilized in the Google search engine to find web pages and news articles on curriculum change. Societal forces from the external environment effecting the U.S. population and the profession of dental hygiene were identified through resources available from the ADHA, the professional association of the dental hygiene profession.

Following the analysis of all the resources on curriculum change forces and societal influencers on the dental hygiene profession, an initial concourse list of curriculum change forces was developed. Three community college dental hygiene educators and one dental hygiene program director via informal interviews reviewed the initial concourse. The individuals were asked via email to review and make suggestions on additions or changes to the initial concourse. Following the analysis of the resources and the informal interviews, a total of 61 statements were created regarding curriculum change forces. Analysis of the forces also grouped the forces into
three different themes according to their environmental origin: external, internal, and organizational. The concourse is shown in Table 2 and is organized by theme.
<table>
<thead>
<tr>
<th>#</th>
<th>Q Statement</th>
<th>Source(s)</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>New scientific findings are available to incorporate into the curriculum</td>
<td>Kassebaum, Hendricson, Taft, &amp; Haden (2004); Haden et al. (2010)</td>
<td>External</td>
</tr>
<tr>
<td>2</td>
<td>Alumni surveys provide topics to incorporate into the curriculum</td>
<td>Kassebaum, Hendricson, Taft, &amp; Haden (2004)</td>
<td>External</td>
</tr>
<tr>
<td>3</td>
<td>Support from professional organizations</td>
<td>Kassebaum, Hendricson, Taft, and Haden (2004); Haden et al. (2010); Furgeson, Kinney, Gwozdek, Wilder, &amp; Inglehart (2015)</td>
<td>External</td>
</tr>
<tr>
<td>4</td>
<td>Dental hygiene accreditation standards</td>
<td>Formicola et al. (2012); NSGMED (2015)</td>
<td>External</td>
</tr>
<tr>
<td>5</td>
<td>Scholarly research on educational best practices</td>
<td>Haden et al. (2010)</td>
<td>External</td>
</tr>
<tr>
<td>6</td>
<td>The U.S. population is becoming more culturally diverse</td>
<td>ADHA (2015a)</td>
<td>External</td>
</tr>
<tr>
<td>7</td>
<td>The U.S. population is aging</td>
<td>ADHA (2015a); Galea (2015).</td>
<td>External</td>
</tr>
<tr>
<td>8</td>
<td>The healthcare delivery system is changing</td>
<td>ADHA (2015a); Fish (2010); Faison &amp; Montague (2013)</td>
<td>External</td>
</tr>
<tr>
<td>9</td>
<td>Workplace environments are evolving beyond the traditional dental office</td>
<td>ADHA (2015a)</td>
<td>External</td>
</tr>
<tr>
<td>10</td>
<td>Practice regulation by state laws</td>
<td>ADHA (2015a); Informal interview; Landry (2011)</td>
<td>External</td>
</tr>
<tr>
<td>11</td>
<td>Dental hygiene based workforce models are being created</td>
<td>ADHA (2015d)</td>
<td>External</td>
</tr>
<tr>
<td>12</td>
<td>Recommendations from advisory board members</td>
<td>Informal interview</td>
<td>External</td>
</tr>
</tbody>
</table>
Table 2 continued

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>National healthcare is trending towards interprofessional collaboration to treat patients</td>
<td>Informal interview; ADHA (2015a); NSGMED</td>
</tr>
<tr>
<td>14</td>
<td>Technological advancements</td>
<td>Stark &amp; Lattuca (1997); Eckel, Hill, &amp; Green (1998)</td>
</tr>
<tr>
<td>15</td>
<td>The profession’s scope of practice is expanding</td>
<td>Informal interview; ADHA (2015a); ADHA (2015d)</td>
</tr>
<tr>
<td>16</td>
<td>Findings from evidence based research</td>
<td>Informal interview</td>
</tr>
<tr>
<td>17</td>
<td>The U.S. population is growing</td>
<td>NSGMED (2015)</td>
</tr>
<tr>
<td>18</td>
<td>The U.S. is experiencing a move towards urbanization</td>
<td>NSGMED (2015)</td>
</tr>
<tr>
<td>19</td>
<td>Government control of healthcare is increasing</td>
<td>NSGMED (2015)</td>
</tr>
<tr>
<td>20</td>
<td>A colleague from another dental hygiene program</td>
<td>Stark &amp; Lattuca (1997)</td>
</tr>
<tr>
<td>21</td>
<td>The U.S. is seeing an increase in chronic diseases with treatment options that require oral health care services</td>
<td>ADHA (2015a)</td>
</tr>
<tr>
<td>22</td>
<td>Dental Support Organizations (DSOs) are growing in the U.S.</td>
<td>Group Dentistry Now (2016); ADHA (2015a)</td>
</tr>
<tr>
<td>23</td>
<td>The U.S. population desires convenient oral health care at a low cost</td>
<td>ADHA (2015a)</td>
</tr>
<tr>
<td>24</td>
<td>The U.S. has seen a growth in distance education</td>
<td>Eckel, Hill, &amp; Green (1998)</td>
</tr>
<tr>
<td>25</td>
<td>The U.S. has seen a growth in for-profit colleges</td>
<td>Eckel, Hill, &amp; Green (1998)</td>
</tr>
<tr>
<td>26</td>
<td>Dental products on the market</td>
<td>Stark &amp; Lattuca (1997)</td>
</tr>
<tr>
<td></td>
<td>Issue</td>
<td>Source(s)</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>27</td>
<td>Reimbursement for oral health care services</td>
<td>ADHA (2015a)</td>
</tr>
<tr>
<td>28</td>
<td>The need to educate policy makers on oral health care</td>
<td>ADHA (2015a)</td>
</tr>
<tr>
<td>29</td>
<td>The “scope creep” on the dental hygiene profession by other professions</td>
<td>ADHA (2015a); ADA (n.d.)</td>
</tr>
<tr>
<td>30</td>
<td>The underserved U.S. population</td>
<td>ADHA (2015d)</td>
</tr>
<tr>
<td>31</td>
<td>Textbook authors and publishers</td>
<td>Jossey-Bass (1977)</td>
</tr>
<tr>
<td>32</td>
<td>Schedule flexibility of the dental hygiene program</td>
<td>Holt, Bray, Mayberry, &amp; Overman (2000); Furgeson, Kinney, Gwozdek, Wilder, &amp; Inglehart (2015)</td>
</tr>
<tr>
<td>35</td>
<td>Ensure graduates are prepared for the workforce environment</td>
<td>Beistle &amp; Palmer (2014)</td>
</tr>
<tr>
<td>36</td>
<td>Students’ attitudes towards the current curriculum</td>
<td>Beistle &amp; Palmer (2014)</td>
</tr>
<tr>
<td>37</td>
<td>Results of an internal review of the current curriculum</td>
<td>Haden et al. (2010)</td>
</tr>
<tr>
<td>38</td>
<td>Student feedback on course evaluations</td>
<td>Haden et al. (2010)</td>
</tr>
<tr>
<td>39</td>
<td>Students’ attitudes toward lab equipment</td>
<td>Informal Interview</td>
</tr>
<tr>
<td>40</td>
<td>To connect theory course content with clinical course content</td>
<td>NSGMED (2015)</td>
</tr>
<tr>
<td></td>
<td>To accommodate the learning needs and abilities of the students</td>
<td>NSGMED (2015)</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>41</td>
<td>Students desire an active role in their learning and experiences</td>
<td>NSGMED (2015)</td>
</tr>
<tr>
<td>42</td>
<td>Adoption of a new textbook</td>
<td>Stark &amp; Lattuca (1997)</td>
</tr>
<tr>
<td>43</td>
<td>An educator’s background</td>
<td>Stark &amp; Lattuca (1997)</td>
</tr>
<tr>
<td>44</td>
<td>An educator’s educational beliefs</td>
<td>Stark &amp; Lattuca (1997)</td>
</tr>
<tr>
<td>45</td>
<td>Student success in the course</td>
<td>Stark &amp; Lattuca (1997)</td>
</tr>
<tr>
<td>46</td>
<td>Student success on formal measurements, such as quizzes, tests, and other graded</td>
<td>Stark &amp; Lattuca (1997)</td>
</tr>
<tr>
<td>47</td>
<td>A co-worker in the dental hygiene program</td>
<td>Stark &amp; Lattuca (1997)</td>
</tr>
<tr>
<td>48</td>
<td>The opportunity for meaningful student interactions</td>
<td>Furgeson, Kinney, Gwozdek, Wilder, &amp; Inglehart (2015)</td>
</tr>
<tr>
<td>49</td>
<td>The program’s mission</td>
<td>Eckel, Hill, &amp; Green (1998); Stark &amp; Lattuca (1997)</td>
</tr>
<tr>
<td>50</td>
<td>Student attitudes towards the classroom environment</td>
<td>Informal interview</td>
</tr>
<tr>
<td>51</td>
<td>Enhance rigor of course</td>
<td>Gonzalez (2015)</td>
</tr>
<tr>
<td>52</td>
<td>Respond to the quality of entering students</td>
<td>Gonzalez (2015)</td>
</tr>
<tr>
<td>53</td>
<td>Prepare students for continuous, lifelong learning</td>
<td>Cleveland-Innes &amp; Emes (2005)</td>
</tr>
<tr>
<td>54</td>
<td>Prepare students for a higher educational degree</td>
<td>Jossey-Bass (1977)</td>
</tr>
<tr>
<td>55</td>
<td>Make an institution of distinction and prestige</td>
<td>Gonzalez (2015)</td>
</tr>
</tbody>
</table>
Table 2 continued

<table>
<thead>
<tr>
<th></th>
<th>Recommendations from the department</th>
<th>Kassebaum, Hendricson, Taft, and Haden (2004); Furgeson, Kinney, Gwozdek, Wilder, &amp; Inglehart (2015)</th>
<th>Organization &amp; External</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>Other allied health programs desire collaboration with the dental hygiene program</td>
<td>Holt, Bray, Mayberry, &amp; Overman (2000)</td>
<td>Organizational</td>
</tr>
<tr>
<td>58</td>
<td>Requests from college administration</td>
<td>Jossey-Bass (1977); NSGMED (2015)</td>
<td>Organizational &amp; External</td>
</tr>
<tr>
<td>59</td>
<td>Availability of financial resources</td>
<td>Kassebaum, Hendricson, Taft, and Haden (2004); Furgeson, Kinney, Gwozdek, Wilder, &amp; Inglehart (2015)</td>
<td>Organizational &amp; External</td>
</tr>
<tr>
<td>60</td>
<td>Available human resources for curriculum change</td>
<td>Kassebaum, Hendricson, Taft, and Haden (2004); Furgeson, Kinney, Gwozdek, Wilder, &amp; Inglehart (2015)</td>
<td>Organizational &amp; External</td>
</tr>
</tbody>
</table>

**Q set.** The Q set is a reduction of the concourse statements (van Exel & de Graaf, 2005). The purpose of the Q set is to have statements that represent a “wide range of existing opinions” on the selected topic (van Exel & de Graaf, 2005, p. 5). The Q set “must be broadly representative of the” topic and “not appear to be value-laden or biased towards” certain viewpoints (Watts & Stenner, 2012, p. 67). The standard number of a Q set is “between 40 and 80” statements and is based upon the research topic (Watts & Stenner, 2012, p. 61). The statements in the Q set should be easy to understand (Watts & Stenner, 2012). Once the Q set is finalized, the statements are numbered (van Exel & de Graaf, 2005).

To create the Q set for this research study, the researcher conducted a pilot test of the study, following IRB approval, with two dental hygiene program directors, one from a community college and one from a university. The directors were asked to examine the
statements for clarity and distribution of environmental origin of the forces, as well as to ensure statements were unbiased. Following their review, the researcher amended the concourse statements to develop the final Q set of 60 statements, which is available in Appendix A.

**P set.** The P set is the group of participants in the Q study (Watts & Stenner, 2012). The P set should be selected purposefully (Watts & Stenner, 2012). A goal of the P set selection is to find individuals “who have a defined viewpoint to express” associated with the research topic (Watts & Stenner, 2012). An additional goal of the P set is to ensure there are four or five individuals who identify with “each anticipated viewpoint” (van Exel & de Graaf, 2005, p. 6). Watts and Stenner (2012) state that a large number of participants is not necessary since Q methodology seeks to determine “particular viewpoints” and recommends having a P set that is smaller than the Q set (p. 72).

The P set for the research on change forces for the dental hygiene curriculum was program directors employed by two-year colleges. The researcher received an Excel document with names and email addresses of current dental hygiene program directors in the U.S. from the ADHA. All program directors in the U.S. received an email to participate in the research study; however, only data from the two-year colleges were analyzed and discussed in this research project. Participants from the four-year colleges cross-loaded on multiple viewpoints, indicating insufficient distinct viewpoints to warrant inclusion.

**Q sort.** The Q sort is the ranking of the Q set statements by the P set from the individual’s point of view (van Exel & de Graaf, 2005). The P set was asked the following question: Which forces most influence and least influence you to make changes to the existing dental hygiene curriculum? The P set ranked the Q set from “most disagree” to “most agree”
(van Exel & de Graaf, 2005). The P set was instructed to read all the statements carefully during the initial sort. During the initial sort, the P set was instructed to place statements in three categories – disagree, neutral, and agree (van Exel & de Graaf, 2005). The P set was able to move statements from one category to the other during the initial sort process. The P set was then able to rank the statements based on personal viewpoints into a larger agreement scale (van Exel & de Graaf, 2005). Figure 4 shows a sample Q sort matrix with a 13-point agreement scale ranging from left to right with most unlike my viewpoint (-6) to most like my viewpoint (+6), which was the Q sort matrix for this research study.
There are two options for the distribution of the sort for a Q methodology study (Watts & Stenner, 2012). The P set may rank the statements in a force-choice distribution or a free distribution (Watts & Stenner, 2012). The force-choice distribution allows the P set to only assign a certain number of statements under each ranking category (Watts & Stenner, 2012). A free distribution allows the P set “to assign any number of items” under each ranking category (Watts & Stenner, 2012, p. 78). A force-choice distribution was utilized for this research study.

This research study utilized QSortWare, a web based program for Q methodology research. Dr. Alessio Pruneddu developed the online program during his graduate research.
studies (Pruneddu, 2016). QSortWare allows participants to complete an initial sort of the Q set statements, and then complete a final sort based on their level of agreement with the statements (Pruneddu, 2016). During the initial sort, participants were able to place the Q set statements into the following three categories: disagree, neutral, and agree (Pruneddu, 2016). The final sort is a force-choice distribution, where a set number of Q set statements must be placed under each agreement category (Pruneddu, 2016). The final sort has a larger agreement level scale compared to the initial sort (Pruneddu, 2016). When completing both the initial and final sort, participants dragged and dropped the Q set statements into boxes that corresponded to the agreement scale created by the researcher (Pruneddu, 2016). The agreement level scale for this research study was -6 to +6.

**Data analysis.** Analysis of the Q sort occurred with several statistical methods. A correlation matrix was first calculated for all Q sorts (van Exel & de Graaf, 2005). The correlation matrix showed the agreement or disagreement among the sorts, therefore showing similar viewpoints (van Exel & de Graaf, 2005). Factor analysis was the next step to determine the number of different viewpoints, therefore grouping individuals with similar viewpoints into the same factor (van Exel & de Graaf, 2005). Factor rotation occurred to evaluate the results from a different perspective (van Exel & de Graaf, 2005). The last analysis was “the calculation of factor scores and difference scores” (van Exel & de Graaf, 2005, p. 9). The factor scores, or z scores, was based on “all the scores given to that specific statement by each” individual in the P set (Bartlett & DeWeese, 2015, p. 79). These results showed “how statements rank in each of the groups” (Bartlett & DeWeese, 2015, p. 79). The difference score was “the magnitude of difference between a statement’s score on any two factors” (van Exel & de Graaf, 2005, p. 9).
These results identified distinguishing statements, which occurs “when a statement’s score on two factors exceeds” the difference score (van Exel & de Graaf, 2005, p. 9).

Data analysis for this research study utilized SPSS and R Statistical Data Analysis Software. Data analysis began with pre-analysis data screening to examine the data for missing data. Once all the Q sorts were entered into the analysis software, a correlation matrix was created, which showed an “intercorrelation of each Q sort with every other sort” (Watts & Stenner, 2012, p. 97). The resulting correlation matrix measured similarities “between any two Q sorts” (p. 97). The next step in the analysis was factor analysis and rotation. The resulting analysis identified the different viewpoints in the P set (p. 98). The final factors that resulted represent “a group of individual points of view that are highly correlated with each other and uncorrelated with others” (van Exel & de Graaf, 2005, p. 9).

**Interpretation of data analysis.** Once the Q sort data was analyzed, the researcher interpreted the factors by describing the groups of individuals (Bartlett & deWeese, 2015). The factors that emerged were groups of individuals with similar viewpoints (van Exel & de Graaf, 2005). The quantitative data, along with the post sort questionnaire and focus groups, were utilized to describe and name the different perspectives that emerged from the research study (Bartlett & deWeese, 2015).

**Q Methodology and Dental Hygiene Program Directors**

While the studies reviewed in Chapter Two do address curriculum change forces, a study that includes curriculum change forces from all three environments and seeks to determine the perceptions of dental hygiene program directors on which forces motivate them to change the existing curriculum is not available. Since Q methodology is utilized to identify “perspectives
on a particular topic“ it is an ideal research method for this study (Bartlett & DeWeese, 2015, p. 73). In addition, a research study utilizing Q methodology to explore the topic of curriculum change forces in dental hygiene education is not available.

**P set.** For this research study on curriculum change forces, dental hygiene program directors in December of 2016 were requested to participate. An Excel document of U.S. dental hygiene programs with program director names and email addresses was obtained from the ADHA. This list contained a total of 335 dental hygiene programs. All dental hygiene program directors received an email request to participate in the research study. However, only those programs located at two-year institutions were utilized in the data analysis for this research study. Therefore, a total possible P set for this project was 250 program directors. Programs excluded from this research study included those awarding a baccalaureate degree in dental hygiene, as well as programs located at four-year institutions who award an associate degree or certificate in dental hygiene. The email invitation, included in Appendix B, provided information on the intent of the study with the proper consent and requested their participation with a link to the study. Two additional email requests were sent to the P set in January 2017. As a result of the three email requests, a total of 18 dental hygiene program directors completed the web based Q sort.

**Instrumentation.** The web application QSortWare was utilized to collect data for this Q-methodology study. QSortWare is a web-based program that allows the research to create an online Q sort by adding in the Q set statements and setting the desired agreement level scale. The researcher was also able to create a demographic section and a post-sort questionnaire for the P-set to complete following the Q sort. QSortWare allows the P set to drag and drop the Q
set statements into an agreement category, and includes an initial sort prior to the final Q sort. QSortWare provides a web link to the Q sort that is provided to the P set.

To set-up the Q sort for this research study, the researcher added the concourse list to the QSortWare program and set the agreement scale to -6 to +6. The researcher also created a demographic section with multiple-choice questions and a post-sort questionnaire with open-ended questions. The researcher combined all three procedures into one application, so once individuals clicked on the research link, they were able to complete the Q sort, the post-sort questionnaire, and the demographic section. At the completion of all three activities, the participant had to click the save button to save the data to the QSortWare database. The researcher was able to download the data from QSortWare into an Excel document.

Analyzing literature, websites, and news articles, as well as conducting informal interviews created an initial concourse list of 61 statements. Two program directors participated in a pilot project with the 61 statements to provide feedback on the statements as well as the Q sort process through QSortWare. Following the pilot project, and review of the statements by the researcher, the concourse list was finalized to 60 statements for the Q set. The concourse list in the QSortWare program was corrected to the final Q set. The Q set of curriculum change forces in dental hygiene education is included in Appendix A.

Data Collection and Analysis. The research study was submitted to the Institutional Review Board (IRB) at North Carolina State University for approval. The IRB approval letter is included in Appendix B. Following approval, the researcher reached out to two dental hygiene program directors to participate in the pilot project. Once the pilot project was complete, and the Q set was finalized, a total of 250 dental hygiene program directors employed by two-year
colleges received an email to participate in the research study, available in Appendix C. The P set was directed to sort the Q set based on the following: sort the statement based on your view of which forces influencing curriculum change most motivate you to make changes to the existing curriculum. Two additional email requests were sent to the P set, and the Q sort link was closed in February 2017. The instrumentation is found in Appendices D, E, F, and G. These Appendices show the initial sort, final sort, post-sort questionnaire, and demographic questionnaire through the web based program QSortWare.

Data were downloaded from QSortWare into an Excel document and analyzed using SPSS and R Statistical Data Analysis Software. Three additional focus groups were conducted via conference calls to expand on the qualitative data received from the post-sort questionnaire at the end of February 2017 and the beginning of March 2017. Focus group participants were those program directors who selected yes to the focus group participation question in the demographic questionnaire and also responded to a doodle poll to select the date and time for the conference call. The focus group recruitment letter is available in Appendix H and the focus group protocol is available in Appendix I.

**Chapter Summary**

This chapter provided a description of the research design for this study to explore the viewpoints of two-year college dental hygiene program directors regarding curriculum change forces. An overview of Q methodology was presented as well as the six phases of the research method. The first phase was the concourse development, where the researcher collected all the possible statements pertaining to curriculum change in dental hygiene education. The second phase was the development of the Q set, which was a refinement of the concourse statements.
The third phase was the selection of the P set, which included dental hygiene program directors employed at two-year colleges. The fourth phase was data collection through the Q sort, where the P set sorted the Q set based on their perspective towards curriculum change forces. This research project utilized QSortWare, a web based program for Q methodology. The P-set also completed a post-sort questionnaire and demographic questionnaire. The fifth phase was data analysis, which included the following: a correlation matrix, factor analysis, and factor scores. This research project utilized SPSS and R Statistical Data Analysis Software to analyze the Q sorts. The final phase was interpretation of the results, where the resulting factors, which are groups of individuals with similar viewpoints, were described. Focus groups were conducted with those willing to participate. The qualitative and quantitative data received from the research study provided the current perceptions of curriculum change forces among dental hygiene program directors.
CHAPTER 4: FINDINGS

Introduction

This chapter presents the results of the data analysis from the Q sorts utilized to answer the three research questions proposed in the study. Eighteen dental hygiene program directors employed at two-year institutions completed the Q sort to determine their subjective perception of curriculum change forces. Participants sorted a 60-item concourse, which was developed through the analysis of scholarly literature, practitioner literature, informal interviews, web pages, and news articles on curriculum change forces and the current external environment as it relates to the U.S. population and the profession of dental hygiene. The six phase Q methodology approach presented in Chapter 3 was followed for this research study.

The purpose of this study was to determine the distinct viewpoints of dental hygiene program directors toward curriculum change in two-year colleges. This chapter will provide the data collected via the Q sorts to answer the following research questions:

1. How many viewpoints toward curriculum change forces emerge, and what are the characteristics of these viewpoints?
2. Which curriculum change forces are distinct by the groups and which forces have consensus across the groups?
3. Which forces do dental hygiene program directors perceive to have the most significant impact and least significant impact on curriculum change?

To answer these questions, dental hygiene program directors employed at two-year institutions were asked via email to complete a Q sort and answer a post-sort questionnaire. Participants were asked to sort the concourse statements based on their perception of curriculum change
forces. The post-sort questionnaire allowed participants to provide information on understanding why items were sorted the way they were. The questions specifically sought to answer the following: the reasoning behind the sort of statements into the strongly agree and strongly disagree ranks, any difficulties on ranking a statement, and the greatest impact on how they sorted the statements.

This chapter will include the following: an overview of data analysis, correlations between factors, factor analysis, factor loadings, factor arrays, consensus statements, distinguishing statements with factor interpretation, and participant demographics.

**Overview of Data Analysis**

Q methodology is utilized to identify and describe different viewpoints on a topic (Ramlo, 2016). Participants rank statements into a forced distribution based on their perception of the given topic (Watts & Stenner, 2012). Once the Q sorts were completed, factors were extracted, which represent a group of individual viewpoints (van Exel & de Graaf, 2005). In this study, dental hygiene program directors employed at two-year institutions completed Q sorts to provide their perceptions of curriculum change forces. The directors sorted statements of curriculum change forces into a forced distribution ranging from “most unlike my viewpoint” to “most like my viewpoint” on which forces motivate them to change the existing dental hygiene curriculum.

The Q sort data were collected through the online Q sort program called QSortWare, developed by Dr. Alessio Prennedu. The QSortWare program is similar to the in-person sort, where individuals first complete a pre-sort by placing the statements into three categories, disagree, neutral, and agree, and then complete the Q sort by ranking the statements on a scale of
-6 to +6, most unlike my viewpoint to most like my viewpoint. Once the data were collected, the instrument was closed, and the data was exported to an Excel document. The data were analyzed using SPSS and R Statistical Data Analysis Software. SPSS was utilized for correlations, descriptive statistics, and frequencies, while R Statistical Data Analysis Software was utilized for factor analysis. The resulting information, along with the post-sort questionnaire, was utilized to define and describe the emerging factors, representing a group of individuals with similar viewpoints.

**Correlation Matrix**

The first step in Q methodology analysis is the calculation of a correlation matrix between all sorts (Watts & Stenner, 2012). These values range from +1.00 to -1.00, and reveals “the nature and extent of the relationship between any two Q sorts and hence a measure of their similarity or otherwise” (Watts & Stenner, 2012, p. 97). These values assist to determine the number of “shared factors” among the data (Bartlett & DeWeese, 2015, p. 79). Values close to +1.00 indicate agreement, while values close to -1.00 indicate disagreement (Bartlett & DeWeese, 2015). The highest correlation value, 0.70, is seen between Participant 2, a 54-year-old Caucasian female with a doctorate degree who has been in education for 25 years, and Participant 14, a 51-year-old female with a master’s degree who has been in education for 10 years. This correlation value would usually indicate the two participants to load together in a factor; however, this incident did not occur. Participant 2 had factor loading values of 0.51 for three factors, and did not load significantly into any factor.

The next highest correlation value, 0.69, is seen between Participant 9, a 54-year-old Caucasian female with a master’s degree who has been in education for 30 years, and Participant
14, a 51-year-old female with a master’s degree who has been in education for 10 years. These two participants loaded significantly into the same factor, factor one. Participant 9 also had a correlation value of 0.69 with Participant 17, a 47-year-old Caucasian female with a master’s degree who has been in education for 4 years. Participant 17 also loaded into factor one.

The lowest correlation value, 0.24, is seen between Participant 12 and Participant 16. Both participants are Caucasian females with baccalaureate degrees who are new to education. Participant 12 is a 26-year-old, while Participant 16 is a 20-year-old. A low correlation value indicates the two participants would load into different factors. While these two participants are similar demographically, they did load into two different factors indicating different perspectives on curriculum change forces. Participant 12 loaded into factor five as the sole individual, and Participant 16 loaded into factor three with one other individual. Table 3 presents the correlation matrix for this research study. The correlation matrix shows that there are no two sorts precisely the same or opposite.
### Table 3: Correlation matrix between sorts

<table>
<thead>
<tr>
<th>Sort</th>
<th>P01</th>
<th>P02</th>
<th>P03</th>
<th>P04</th>
<th>P05</th>
<th>P06</th>
<th>P07</th>
<th>P08</th>
<th>P09</th>
<th>P10</th>
<th>P11</th>
<th>P12</th>
<th>P13</th>
<th>P14</th>
<th>P15</th>
<th>P16</th>
<th>P17</th>
<th>P18</th>
</tr>
</thead>
<tbody>
<tr>
<td>P01</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P02</td>
<td>0.38*</td>
<td></td>
<td>0.54*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P03</td>
<td>0.52*</td>
<td>0.54*</td>
<td></td>
<td>0.39*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P04</td>
<td>0.34*</td>
<td>0.59*</td>
<td>0.43*</td>
<td></td>
<td>0.39*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P05</td>
<td>0.27*</td>
<td>0.46*</td>
<td>0.37*</td>
<td>0.40*</td>
<td></td>
<td>0.43*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P06</td>
<td>0.42*</td>
<td>0.37*</td>
<td>0.42*</td>
<td>0.43*</td>
<td>0.43*</td>
<td></td>
<td>0.43*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P07</td>
<td>0.38*</td>
<td>0.57*</td>
<td>0.57*</td>
<td>0.38*</td>
<td>0.39*</td>
<td>0.21*</td>
<td></td>
<td>0.39*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P08</td>
<td>0.27*</td>
<td>0.55*</td>
<td>0.60*</td>
<td>0.31*</td>
<td>0.47*</td>
<td>0.29*</td>
<td>0.61*</td>
<td></td>
<td>0.39*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P09</td>
<td>0.47*</td>
<td>0.64*</td>
<td>0.65*</td>
<td>0.60*</td>
<td>0.52*</td>
<td>0.47*</td>
<td>0.65*</td>
<td>0.62*</td>
<td></td>
<td>0.39*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P10</td>
<td>0.32*</td>
<td>0.53*</td>
<td>0.52*</td>
<td>0.49*</td>
<td>0.45*</td>
<td>0.40*</td>
<td>0.57*</td>
<td>0.61*</td>
<td>0.67*</td>
<td></td>
<td>0.39*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P11</td>
<td>0.44*</td>
<td>0.54*</td>
<td>0.42*</td>
<td>0.34*</td>
<td>0.51*</td>
<td>0.37*</td>
<td>0.36*</td>
<td>0.52*</td>
<td>0.41*</td>
<td>0.43*</td>
<td></td>
<td>0.43*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P12</td>
<td>0.14*</td>
<td>0.24*</td>
<td>0.26*</td>
<td>0.26*</td>
<td>0.33*</td>
<td>0.12*</td>
<td>0.15*</td>
<td>0.40*</td>
<td>0.27*</td>
<td>0.09*</td>
<td>0.16*</td>
<td></td>
<td>0.43*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P13</td>
<td>0.24*</td>
<td>0.48*</td>
<td>0.30*</td>
<td>0.30*</td>
<td>0.16*</td>
<td>0.46*</td>
<td>0.52*</td>
<td>0.49*</td>
<td>0.44*</td>
<td>0.44*</td>
<td>0.16*</td>
<td>0.16*</td>
<td></td>
<td>0.44*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P14</td>
<td>0.33*</td>
<td>0.70*</td>
<td>0.61*</td>
<td>0.57*</td>
<td>0.47*</td>
<td>0.33*</td>
<td>0.52*</td>
<td>0.51*</td>
<td>0.69*</td>
<td>0.55*</td>
<td>0.49*</td>
<td>0.28*</td>
<td>0.40*</td>
<td></td>
<td>0.39*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P15</td>
<td>0.39*</td>
<td>0.61*</td>
<td>0.36*</td>
<td>0.46*</td>
<td>0.44*</td>
<td>0.35*</td>
<td>0.55*</td>
<td>0.45*</td>
<td>0.49*</td>
<td>0.64*</td>
<td>0.35*</td>
<td>0.49*</td>
<td>0.43*</td>
<td></td>
<td></td>
<td>0.35*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P16</td>
<td>0.09*</td>
<td>0.30*</td>
<td>0.05*</td>
<td>0.39*</td>
<td>0.21*</td>
<td>0.30*</td>
<td>0.00*</td>
<td>0.04*</td>
<td>0.24*</td>
<td>0.20*</td>
<td>0.14*</td>
<td>0.24*</td>
<td>0.13*</td>
<td>0.17*</td>
<td>0.27*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P17</td>
<td>0.35*</td>
<td>0.46*</td>
<td>0.63*</td>
<td>0.34*</td>
<td>0.57*</td>
<td>0.51*</td>
<td>0.66*</td>
<td>0.66*</td>
<td>0.69*</td>
<td>0.59*</td>
<td>0.44*</td>
<td>0.17*</td>
<td>0.40*</td>
<td>0.51*</td>
<td>0.35*</td>
<td>0.04*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P18</td>
<td>0.39*</td>
<td>0.61*</td>
<td>0.50*</td>
<td>0.49*</td>
<td>0.50*</td>
<td>0.51*</td>
<td>0.34*</td>
<td>0.37*</td>
<td>0.59*</td>
<td>0.51*</td>
<td>0.44*</td>
<td>0.38*</td>
<td>0.31*</td>
<td>0.53*</td>
<td>0.66*</td>
<td>0.39*</td>
<td>0.32</td>
<td></td>
</tr>
</tbody>
</table>

*Correlation is significant at the .01 level (2-tailed)
Factor Analysis

The second step in Q methodology analysis is factor analysis (van Exel & de Graaf, 2005). Factor analysis explains the relationship between the Q sorts in the research study by identifying commonalities in the data (Watts & Stenner, 2012). This process reduced the data into “patterns of similarity” and produces factors, which are groups of participants who have comparable viewpoints (Watts & Stenner, 2012, p. 98). The data were processed through both SPSS and R Statistical Data Analysis Software. Per the suggestion of Watts and Stenner (2012), the factor analysis began with a seven-factor solution. Upon further analysis, it was determined that only five factor groups needed to be extracted. Deciding the statistical significance of a factor is commonly based on the eigenvalues, which measures the total variance for each factor (McKeown & Thomas, 2014). Utilizing this value, factors with eigenvalues greater than 1 are statistically significant and thus are retained (McKeown & Thomas, 2014; Mertler & Vannatta, 2010). The five factors extracted all had eigenvalues greater than 1.0. The eigenvalues and factor variance specify the strength of the extracted factor (Watts & Stenner, 2012). Table 4 provides the factor characteristics, which include the eigenvalues and variance for the five extracted factors.
Table 4: Factor characteristics

<table>
<thead>
<tr>
<th>Factor</th>
<th>Participants Loaded</th>
<th>Eigenvalues</th>
<th>Variance</th>
<th>Reliability</th>
<th>SE of factor scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>7</td>
<td>4.8</td>
<td>26.6</td>
<td>0.97</td>
<td>0.19</td>
</tr>
<tr>
<td>Two</td>
<td>3</td>
<td>2.9</td>
<td>16.0</td>
<td>0.92</td>
<td>0.28</td>
</tr>
<tr>
<td>Three</td>
<td>2</td>
<td>2.2</td>
<td>12.2</td>
<td>0.89</td>
<td>0.33</td>
</tr>
<tr>
<td>Four</td>
<td>2</td>
<td>1.8</td>
<td>10.0</td>
<td>0.89</td>
<td>0.33</td>
</tr>
<tr>
<td>Five</td>
<td>1</td>
<td>1.4</td>
<td>7.9</td>
<td>0.80</td>
<td>0.45</td>
</tr>
</tbody>
</table>

Factor Loadings

The results of factor analysis contains factor loadings, which measures “the extent to which each individual Q sort” represents that factor (Watts & Stenner, 2012, p. 111). The factor loadings range from -1.00 to +1.00, a negative association to a positive association (Mertler & Vannatta, 2010). The criterion for statistical significance for the factor loading values is “based on their magnitude” (Statistics Solutions, n.d.). The following criteria is utilized for the statistical significance of the factor loading: values greater than +.30 are considered minimal consideration, whereas +.40 is “more important”, and +.50 is “practically significant” (Statistics Solutions, n.d.). The next two tables provide factor-loading information, with Table 5 presenting the flagged factor loadings, and Table 6 presenting the factor loading values.
Table 5: Flagged factor loadings

<table>
<thead>
<tr>
<th></th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
<th>Factor 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>P01</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>TRUE</td>
<td>False</td>
</tr>
<tr>
<td>P02</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>P03</td>
<td>TRUE</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>P04</td>
<td>False</td>
<td>False</td>
<td>TRUE</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>P05</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>P06</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>TRUE</td>
<td>False</td>
</tr>
<tr>
<td>P07</td>
<td>TRUE</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>P08</td>
<td>TRUE</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>P09</td>
<td>TRUE</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>P10</td>
<td>TRUE</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>P11</td>
<td>False</td>
<td>TRUE</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>P12</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>TRUE</td>
</tr>
<tr>
<td>P13</td>
<td>False</td>
<td>TRUE</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>P14</td>
<td>TRUE</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>P15</td>
<td>False</td>
<td>TRUE</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>P16</td>
<td>False</td>
<td>False</td>
<td>TRUE</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>P17</td>
<td>TRUE</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
<tr>
<td>P18</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
<td>False</td>
</tr>
</tbody>
</table>
Table 6: Five Factor Solution for Dental Hygiene Program Directors’ Viewpoints Toward Curriculum Change

<table>
<thead>
<tr>
<th></th>
<th>Factor One</th>
<th>Factor Two</th>
<th>Factor Three</th>
<th>Factor Four</th>
<th>Factor Five</th>
</tr>
</thead>
<tbody>
<tr>
<td>P07</td>
<td>.8258*</td>
<td>.1947</td>
<td>.0713</td>
<td>.0549</td>
<td>-.0675</td>
</tr>
<tr>
<td>P17</td>
<td>.7801*</td>
<td>.1406</td>
<td>-.0839</td>
<td>.3649</td>
<td>.1899</td>
</tr>
<tr>
<td>P09</td>
<td>.7582*</td>
<td>.2024</td>
<td>.3217</td>
<td>.2060</td>
<td>.2650</td>
</tr>
<tr>
<td>P08</td>
<td>.6998*</td>
<td>.4592</td>
<td>-.0405</td>
<td>.0684</td>
<td>.0926</td>
</tr>
<tr>
<td>P03</td>
<td>.6988*</td>
<td>.1354</td>
<td>.1593</td>
<td>.4371</td>
<td>-.0302</td>
</tr>
<tr>
<td>P10</td>
<td>.6584*</td>
<td>.2918</td>
<td>.2332</td>
<td>.0919</td>
<td>.2301</td>
</tr>
<tr>
<td>P14</td>
<td>.6462*</td>
<td>.2903</td>
<td>.4312</td>
<td>.0540</td>
<td>.0490</td>
</tr>
<tr>
<td>P02</td>
<td>.5148</td>
<td>.5105</td>
<td>.5114</td>
<td>.0557</td>
<td>-.0093</td>
</tr>
<tr>
<td>P15</td>
<td>.1634</td>
<td>.8084*</td>
<td>.2296</td>
<td>.2117</td>
<td>.2456</td>
</tr>
<tr>
<td>P11</td>
<td>.2385</td>
<td>.7503*</td>
<td>.1160</td>
<td>.3485</td>
<td>-.1003</td>
</tr>
<tr>
<td>P13</td>
<td>.4684</td>
<td>.6604*</td>
<td>-.1499</td>
<td>-.1650</td>
<td>.0792</td>
</tr>
<tr>
<td>P05</td>
<td>.3795</td>
<td>.3828</td>
<td>.1525</td>
<td>.2926</td>
<td>.3116</td>
</tr>
<tr>
<td>P16</td>
<td>-.1323</td>
<td>.0452</td>
<td>.7706*</td>
<td>.1023</td>
<td>.2404</td>
</tr>
<tr>
<td>P04</td>
<td>.4240</td>
<td>.0949</td>
<td>.7017*</td>
<td>.1786</td>
<td>.0411</td>
</tr>
<tr>
<td>P18</td>
<td>.2358</td>
<td>.4699</td>
<td>.5086</td>
<td>.2807</td>
<td>.3026</td>
</tr>
<tr>
<td>P01</td>
<td>.2637</td>
<td>.2452</td>
<td>.1269</td>
<td>.7241*</td>
<td>-.1447</td>
</tr>
<tr>
<td>P06</td>
<td>.1922</td>
<td>.1591</td>
<td>.0713</td>
<td>.6915*</td>
<td>.4064</td>
</tr>
<tr>
<td>P12</td>
<td>.1214</td>
<td>.0966</td>
<td>.1620</td>
<td>.0280</td>
<td>.8529*</td>
</tr>
</tbody>
</table>

* p < .05
The five factor themes that emerge, Accreditation and Administration for Change, Student Success for Change, U.S. Population and Health Care for Change, External Professional Forces for Change, and Science and Practice for Change, were further described utilizing the following: distinguishing statements, highest and lowest ranked statements, and the post-sort questionnaire.

**Factor Arrays**

Factor arrays are calculated for each concourse statement and include all the ranking values from every participant for each statement (Bartlett & DeWeese, 2015). The factor arrays show how the concourse statements are ranked by each factor and are presented in whole numbers (-6 to +6), which were utilized as the ranking scale during the Q sort (Bartlett & DeWeese, 2015). For this research study, dental hygiene program directors were asked to sort curriculum change forces on a forced distribution scale from -6 (most unlike my viewpoint) to +6 (most like my viewpoint), pertaining to their perceptions on which forces would motivate them to change the existing dental hygiene curriculum. Table 7 presents the factor arrays for the concourse statements utilized in this research study. Table 8 presents the z-score value for each statement by factors.
<table>
<thead>
<tr>
<th>Number</th>
<th>Statement</th>
<th>Factor One</th>
<th>Factor Two</th>
<th>Factor Three</th>
<th>Factor Four</th>
<th>Factor Five</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q01</td>
<td>New scientific findings are available to incorporate into the curriculum</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Q02</td>
<td>Alumni surveys provide topics to incorporate into the curriculum</td>
<td>1</td>
<td>0</td>
<td>-3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Q03</td>
<td>Support from professional organizations</td>
<td>-1</td>
<td>-2</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Q04</td>
<td>Dental hygiene accreditation standards</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Q05</td>
<td>Scholarly research on educational best practices</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>-2</td>
</tr>
<tr>
<td>Q06</td>
<td>The U.S. population is becoming more culturally diverse</td>
<td>0</td>
<td>-1</td>
<td>6</td>
<td>-5</td>
<td>0</td>
</tr>
<tr>
<td>Q07</td>
<td>The U.S. population is aging</td>
<td>-1</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Q08</td>
<td>The healthcare delivery system is changing</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>-1</td>
<td>1</td>
</tr>
<tr>
<td>Q09</td>
<td>Workplace environments are evolving beyond the traditional dental office</td>
<td>-2</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Q10</td>
<td>Practice regulation by state laws</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Q11</td>
<td>Dental hygiene based workforce models are being created</td>
<td>-1</td>
<td>1</td>
<td>1</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>Q12</td>
<td>Recommendations from advisory board members</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>-6</td>
</tr>
<tr>
<td>Q13</td>
<td>National healthcare is trending towards interprofessional collaboration to treat patients</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>5</td>
<td>-1</td>
</tr>
<tr>
<td>Q14</td>
<td>Technological advancements</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Q15</td>
<td>The profession’s scope of practice is expanding</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Q16</td>
<td>Findings from evidence based research</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Q17</td>
<td>The U.S. population is growing</td>
<td>-4</td>
<td>-3</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Q18</td>
<td>The U.S. is experiencing a move towards urbanization</td>
<td>-4</td>
<td>-6</td>
<td>-5</td>
<td>0</td>
<td>-3</td>
</tr>
<tr>
<td>Q19</td>
<td>Government control of healthcare is increasing</td>
<td>-4</td>
<td>-5</td>
<td>2</td>
<td>1</td>
<td>-3</td>
</tr>
<tr>
<td>Q20</td>
<td>A colleague from another dental hygiene program</td>
<td>-3</td>
<td>-2</td>
<td>-1</td>
<td>-4</td>
<td>-2</td>
</tr>
<tr>
<td>Q21</td>
<td>The U.S. is seeing an increase in chronic diseases with treatment options that require oral health care services</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>-4</td>
</tr>
<tr>
<td>Q22</td>
<td>Dental Support Organizations (DSOs) are growing in the U.S.</td>
<td>-3</td>
<td>-4</td>
<td>-1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Q23</td>
<td>The U.S. population desires convenient oral health care at a low cost</td>
<td>-4</td>
<td>-5</td>
<td>4</td>
<td>-6</td>
<td>1</td>
</tr>
<tr>
<td>Q24</td>
<td>The U.S. has seen a growth in distance education</td>
<td>-3</td>
<td>-3</td>
<td>1</td>
<td>-3</td>
<td>0</td>
</tr>
<tr>
<td>Q25</td>
<td>The U.S. has seen a growth in for-profit colleges</td>
<td>-6</td>
<td>-4</td>
<td>-5</td>
<td>-3</td>
<td>0</td>
</tr>
<tr>
<td>Q26</td>
<td>Dental products on the market</td>
<td>-2</td>
<td>-2</td>
<td>-3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Q27</td>
<td>Reimbursement for oral health care services</td>
<td>-5</td>
<td>-3</td>
<td>-4</td>
<td>-3</td>
<td>0</td>
</tr>
<tr>
<td>Q28</td>
<td>The need to educate policy makers on oral health care</td>
<td>0</td>
<td>-1</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Q29</td>
<td>The “scope creep” on the dental hygiene profession by other professions</td>
<td>-2</td>
<td>0</td>
<td>-4</td>
<td>-1</td>
<td>-4</td>
</tr>
<tr>
<td>Q30</td>
<td>The underserved U.S. population</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>-2</td>
</tr>
<tr>
<td>Q31</td>
<td>Textbook authors and publishers</td>
<td>-1</td>
<td>-5</td>
<td>-2</td>
<td>-1</td>
<td>3</td>
</tr>
<tr>
<td>Q32</td>
<td>Schedule flexibility of the dental hygiene program</td>
<td>-3</td>
<td>1</td>
<td>-6</td>
<td>-2</td>
<td>-1</td>
</tr>
<tr>
<td>Q33</td>
<td>A crowded curriculum</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>-4</td>
</tr>
<tr>
<td>Q34</td>
<td>Outcomes of calibration exercises among educators</td>
<td>3</td>
<td>-1</td>
<td>0</td>
<td>2</td>
<td>-5</td>
</tr>
<tr>
<td>Q35</td>
<td>Ensure graduates are prepared for the workforce environment</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Q36</td>
<td>Students’ attitudes towards the current curriculum</td>
<td>-1</td>
<td>-2</td>
<td>1</td>
<td>-1</td>
<td>-3</td>
</tr>
<tr>
<td>Q37</td>
<td>Results of an internal review of the current curriculum</td>
<td>4</td>
<td>3</td>
<td>-2</td>
<td>1</td>
<td>-1</td>
</tr>
<tr>
<td>Q38</td>
<td>Student feedback on course evaluations</td>
<td>2</td>
<td>-1</td>
<td>1</td>
<td>-4</td>
<td>4</td>
</tr>
<tr>
<td>Q39</td>
<td>Students’ attitudes toward lab equipment</td>
<td>-2</td>
<td>-3</td>
<td>-2</td>
<td>-3</td>
<td>3</td>
</tr>
<tr>
<td>Q40</td>
<td>To connect theory course content with clinical course content</td>
<td>2</td>
<td>6</td>
<td>-2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Q41</td>
<td>To accommodate the learning needs and abilities of the students</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Q42</td>
<td>Students desire an active role in their learning and experiences</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Q43</td>
<td>Adoption of a new textbook</td>
<td>0</td>
<td>-3</td>
<td>-4</td>
<td>-4</td>
<td>2</td>
</tr>
<tr>
<td>Q44</td>
<td>An educator’s background</td>
<td>-2</td>
<td>-2</td>
<td>-3</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Q45</td>
<td>An educator’s educational beliefs</td>
<td>-3</td>
<td>1</td>
<td>-1</td>
<td>-2</td>
<td>-1</td>
</tr>
<tr>
<td>Q46</td>
<td>Student success in the course on formal measurements, such as quizzes, tests, and other graded assessments</td>
<td>1</td>
<td>2</td>
<td>-1</td>
<td>-2</td>
<td>1</td>
</tr>
<tr>
<td>Q47</td>
<td>A co-worker in the dental hygiene program</td>
<td>-5</td>
<td>0</td>
<td>0</td>
<td>-5</td>
<td>-2</td>
</tr>
</tbody>
</table>
Table 7 continued

| Q48 | The opportunity for meaningful student interactions | 2  | 2  | 0  | 0  | -1 |
| Q49 | The program’s mission                                | 4  | 4  | 0  | 0  | 1  |
| Q50 | Student attitudes towards the classroom environment  | -1 | -1 | 0  | -3 | -2 |
| Q51 | Enhance rigor of course                              | -1 | 1  | -5 | -2 | -3 |
| Q52 | Respond to the quality of entering students          | -5 | 2  | -2 | -4 | -5 |
| Q53 | Prepare students for continuous, lifelong learning   | 2  | 5  | -1 | 0  | 1  |
| Q54 | Prepare students for a higher educational degree     | -2 | 3  | -2 | 0  | 3  |
| Q55 | Make an institution of distinction and prestige      | 0  | -1 | -3 | -1 | -5 |
| Q56 | Recommendations from the department                  | 2  | -1 | -2 | -3 | -1 |
| Q57 | Other allied health programs desire collaboration with the dental hygiene program | 2  | 0  | 0  | -2 | -2 |
| Q58 | Requests from college administration                 | 3  | -4 | -1 | -5 | -3 |
| Q59 | Availability of financial resources                  | 1  | -2 | -3 | -1 | -4 |
| Q60 | Available human resources for curriculum change      | 1  | -4 | -4 | -1 | -1 |
### Table 8: Sorted Z Scores for each statement by factor

<table>
<thead>
<tr>
<th>Statement</th>
<th>Factor One</th>
<th>Statement</th>
<th>Factor Two</th>
<th>Statement</th>
<th>Factor Three</th>
<th>Statement</th>
<th>Factor Four</th>
<th>Statement</th>
<th>Factor Five</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>2.3549</td>
<td>20</td>
<td>0.0200</td>
<td>6</td>
<td>2.2909</td>
<td>1</td>
<td>2.4385</td>
<td>1</td>
<td>2.0570</td>
</tr>
<tr>
<td>16</td>
<td>1.9386</td>
<td>35</td>
<td>2.0358</td>
<td>4</td>
<td>1.9889</td>
<td>5</td>
<td>2.0321</td>
<td>14</td>
<td>1.7141</td>
</tr>
<tr>
<td>1</td>
<td>1.8591</td>
<td>53</td>
<td>1.7247</td>
<td>8</td>
<td>1.6427</td>
<td>12</td>
<td>1.6257</td>
<td>15</td>
<td>1.7141</td>
</tr>
<tr>
<td>35</td>
<td>1.4460</td>
<td>16</td>
<td>1.5791</td>
<td>7</td>
<td>1.4696</td>
<td>13</td>
<td>1.6257</td>
<td>35</td>
<td>1.7141</td>
</tr>
<tr>
<td>10</td>
<td>1.4354</td>
<td>4</td>
<td>1.3546</td>
<td>13</td>
<td>1.4696</td>
<td>14</td>
<td>1.6257</td>
<td>9</td>
<td>1.3713</td>
</tr>
<tr>
<td>14</td>
<td>1.3129</td>
<td>1</td>
<td>1.2633</td>
<td>9</td>
<td>1.4051</td>
<td>16</td>
<td>1.5975</td>
<td>16</td>
<td>1.3713</td>
</tr>
<tr>
<td>37</td>
<td>1.2820</td>
<td>15</td>
<td>1.2215</td>
<td>15</td>
<td>1.2320</td>
<td>15</td>
<td>1.4084</td>
<td>28</td>
<td>1.3713</td>
</tr>
<tr>
<td>49</td>
<td>1.1601</td>
<td>49</td>
<td>1.1836</td>
<td>23</td>
<td>1.1878</td>
<td>2</td>
<td>1.2756</td>
<td>38</td>
<td>1.3713</td>
</tr>
<tr>
<td>5</td>
<td>1.0940</td>
<td>37</td>
<td>1.1735</td>
<td>5</td>
<td>1.1675</td>
<td>3</td>
<td>1.2756</td>
<td>4</td>
<td>1.0285</td>
</tr>
<tr>
<td>58</td>
<td>1.0658</td>
<td>5</td>
<td>1.1302</td>
<td>10</td>
<td>1.1031</td>
<td>28</td>
<td>1.2192</td>
<td>31</td>
<td>1.0285</td>
</tr>
<tr>
<td>34</td>
<td>0.9349</td>
<td>33</td>
<td>1.1247</td>
<td>35</td>
<td>1.0589</td>
<td>30</td>
<td>1.0301</td>
<td>39</td>
<td>1.0285</td>
</tr>
<tr>
<td>15</td>
<td>0.8873</td>
<td>14</td>
<td>0.9103</td>
<td>41</td>
<td>1.0589</td>
<td>40</td>
<td>1.0019</td>
<td>40</td>
<td>1.0285</td>
</tr>
<tr>
<td>12</td>
<td>0.8787</td>
<td>54</td>
<td>0.9065</td>
<td>3</td>
<td>0.9944</td>
<td>41</td>
<td>1.0019</td>
<td>54</td>
<td>1.0285</td>
</tr>
<tr>
<td>56</td>
<td>0.7519</td>
<td>48</td>
<td>0.8631</td>
<td>16</td>
<td>0.8858</td>
<td>7</td>
<td>0.8692</td>
<td>3</td>
<td>0.6857</td>
</tr>
<tr>
<td>38</td>
<td>0.7460</td>
<td>52</td>
<td>0.6804</td>
<td>17</td>
<td>0.8417</td>
<td>21</td>
<td>0.8410</td>
<td>17</td>
<td>0.6857</td>
</tr>
<tr>
<td>57</td>
<td>0.7224</td>
<td>9</td>
<td>0.6371</td>
<td>19</td>
<td>0.8417</td>
<td>33</td>
<td>0.8128</td>
<td>26</td>
<td>0.6857</td>
</tr>
<tr>
<td>40</td>
<td>0.7213</td>
<td>46</td>
<td>0.5837</td>
<td>33</td>
<td>0.8213</td>
<td>34</td>
<td>0.8128</td>
<td>41</td>
<td>0.6857</td>
</tr>
<tr>
<td>48</td>
<td>0.6303</td>
<td>8</td>
<td>0.5403</td>
<td>14</td>
<td>0.7569</td>
<td>35</td>
<td>0.8128</td>
<td>42</td>
<td>0.6857</td>
</tr>
<tr>
<td>53</td>
<td>0.5526</td>
<td>12</td>
<td>0.4931</td>
<td>21</td>
<td>0.6482</td>
<td>4</td>
<td>0.7282</td>
<td>43</td>
<td>0.6857</td>
</tr>
<tr>
<td>21</td>
<td>0.5109</td>
<td>45</td>
<td>0.3538</td>
<td>30</td>
<td>0.6482</td>
<td>37</td>
<td>0.6237</td>
<td>2</td>
<td>0.3428</td>
</tr>
<tr>
<td>2</td>
<td>0.5009</td>
<td>42</td>
<td>0.3228</td>
<td>38</td>
<td>0.4107</td>
<td>9</td>
<td>0.1891</td>
<td>8</td>
<td>0.3428</td>
</tr>
<tr>
<td>59</td>
<td>0.4483</td>
<td>51</td>
<td>0.3158</td>
<td>42</td>
<td>0.4107</td>
<td>26</td>
<td>0.1327</td>
<td>23</td>
<td>0.3428</td>
</tr>
<tr>
<td>46</td>
<td>0.4072</td>
<td>11</td>
<td>0.2779</td>
<td>11</td>
<td>0.3903</td>
<td>10</td>
<td>0.0000</td>
<td>44</td>
<td>0.3428</td>
</tr>
<tr>
<td>41</td>
<td>0.3723</td>
<td>30</td>
<td>0.2717</td>
<td>24</td>
<td>0.0645</td>
<td>17</td>
<td>0.0000</td>
<td>46</td>
<td>0.3428</td>
</tr>
<tr>
<td>60</td>
<td>0.3373</td>
<td>32</td>
<td>0.2307</td>
<td>36</td>
<td>0.0645</td>
<td>19</td>
<td>0.0000</td>
<td>49</td>
<td>0.3428</td>
</tr>
</tbody>
</table>
Table 8 continued

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>0.2903</td>
<td>10</td>
<td>0.2253</td>
<td>1</td>
<td>0.0000</td>
<td>22</td>
<td>0.0000</td>
</tr>
<tr>
<td>42</td>
<td>0.2061</td>
<td>7</td>
<td>0.1749</td>
<td>28</td>
<td>0.0000</td>
<td>42</td>
<td>-0.0282</td>
</tr>
<tr>
<td>8</td>
<td>0.1481</td>
<td>41</td>
<td>0.1455</td>
<td>12</td>
<td>-0.0203</td>
<td>53</td>
<td>-0.1609</td>
</tr>
<tr>
<td>6</td>
<td>0.0805</td>
<td>2</td>
<td>0.1393</td>
<td>57</td>
<td>-0.0645</td>
<td>54</td>
<td>-0.1609</td>
</tr>
<tr>
<td>55</td>
<td>-0.1571</td>
<td>13</td>
<td>0.1293</td>
<td>47</td>
<td>-0.1731</td>
<td>18</td>
<td>-0.1891</td>
</tr>
<tr>
<td>33</td>
<td>-0.1718</td>
<td>47</td>
<td>-0.0054</td>
<td>50</td>
<td>-0.1731</td>
<td>48</td>
<td>-0.2737</td>
</tr>
<tr>
<td>30</td>
<td>-0.2101</td>
<td>57</td>
<td>-0.0488</td>
<td>48</td>
<td>-0.2172</td>
<td>49</td>
<td>-0.3500</td>
</tr>
<tr>
<td>43</td>
<td>-0.2130</td>
<td>21</td>
<td>-0.0913</td>
<td>49</td>
<td>-0.2376</td>
<td>44</td>
<td>-0.3782</td>
</tr>
<tr>
<td>28</td>
<td>-0.2722</td>
<td>29</td>
<td>-0.0975</td>
<td>34</td>
<td>-0.3020</td>
<td>8</td>
<td>-0.4064</td>
</tr>
<tr>
<td>3</td>
<td>-0.2999</td>
<td>56</td>
<td>-0.1324</td>
<td>45</td>
<td>-0.4107</td>
<td>36</td>
<td>-0.4064</td>
</tr>
<tr>
<td>11</td>
<td>-0.3369</td>
<td>38</td>
<td>-0.2671</td>
<td>53</td>
<td>-0.4548</td>
<td>31</td>
<td>-0.4346</td>
</tr>
<tr>
<td>50</td>
<td>-0.3372</td>
<td>34</td>
<td>-0.2717</td>
<td>58</td>
<td>-0.4751</td>
<td>29</td>
<td>-0.4910</td>
</tr>
<tr>
<td>31</td>
<td>-0.4109</td>
<td>50</td>
<td>-0.3158</td>
<td>20</td>
<td>-0.5193</td>
<td>11</td>
<td>-0.5192</td>
</tr>
<tr>
<td>36</td>
<td>-0.4188</td>
<td>6</td>
<td>-0.3220</td>
<td>22</td>
<td>-0.5193</td>
<td>55</td>
<td>-0.5391</td>
</tr>
<tr>
<td>7</td>
<td>-0.4264</td>
<td>55</td>
<td>-0.3630</td>
<td>46</td>
<td>-0.5838</td>
<td>59</td>
<td>-0.5391</td>
</tr>
<tr>
<td>51</td>
<td>-0.4601</td>
<td>28</td>
<td>-0.4126</td>
<td>39</td>
<td>-0.6041</td>
<td>60</td>
<td>-0.5391</td>
</tr>
<tr>
<td>9</td>
<td>-0.4872</td>
<td>20</td>
<td>-0.4451</td>
<td>40</td>
<td>-0.6041</td>
<td>46</td>
<td>-0.5955</td>
</tr>
<tr>
<td>29</td>
<td>-0.6146</td>
<td>3</td>
<td>-0.4505</td>
<td>31</td>
<td>-0.6482</td>
<td>32</td>
<td>-0.6237</td>
</tr>
<tr>
<td>26</td>
<td>-0.6437</td>
<td>44</td>
<td>-0.4552</td>
<td>37</td>
<td>-0.6482</td>
<td>51</td>
<td>-0.7282</td>
</tr>
<tr>
<td>44</td>
<td>-0.6503</td>
<td>36</td>
<td>-0.4915</td>
<td>52</td>
<td>-0.6924</td>
<td>57</td>
<td>-0.7564</td>
</tr>
<tr>
<td>54</td>
<td>-0.7811</td>
<td>26</td>
<td>-0.4993</td>
<td>54</td>
<td>-0.7127</td>
<td>45</td>
<td>-0.8128</td>
</tr>
<tr>
<td>39</td>
<td>-0.8076</td>
<td>59</td>
<td>-0.8569</td>
<td>56</td>
<td>-0.7127</td>
<td>39</td>
<td>-0.8410</td>
</tr>
<tr>
<td>20</td>
<td>-0.8450</td>
<td>17</td>
<td>-1.0404</td>
<td>44</td>
<td>-0.7569</td>
<td>50</td>
<td>-0.8410</td>
</tr>
<tr>
<td>32</td>
<td>-0.9710</td>
<td>24</td>
<td>-1.0829</td>
<td>55</td>
<td>-0.7569</td>
<td>56</td>
<td>-0.8410</td>
</tr>
<tr>
<td>22</td>
<td>-1.0633</td>
<td>27</td>
<td>-1.0876</td>
<td>2</td>
<td>-0.8417</td>
<td>25</td>
<td>-0.8692</td>
</tr>
</tbody>
</table>


Table 8 continued

<p>| | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>-1.0774</td>
<td>43</td>
<td>-1.2153</td>
<td>26</td>
<td>-0.8655</td>
<td>24</td>
<td>-0.8974</td>
<td>51</td>
</tr>
<tr>
<td>24</td>
<td>-1.1949</td>
<td>39</td>
<td>-1.3121</td>
<td>59</td>
<td>-0.9503</td>
<td>27</td>
<td>-1.0019</td>
<td>58</td>
</tr>
<tr>
<td>17</td>
<td>-1.2474</td>
<td>58</td>
<td>-1.3167</td>
<td>29</td>
<td>-0.9944</td>
<td>38</td>
<td>-1.0301</td>
<td>21</td>
</tr>
<tr>
<td>18</td>
<td>-1.2511</td>
<td>60</td>
<td>-1.3601</td>
<td>43</td>
<td>-1.0589</td>
<td>52</td>
<td>-1.1628</td>
<td>29</td>
</tr>
<tr>
<td>19</td>
<td>-1.4563</td>
<td>25</td>
<td>-1.4514</td>
<td>27</td>
<td>-1.1031</td>
<td>20</td>
<td>-1.3038</td>
<td>33</td>
</tr>
<tr>
<td>23</td>
<td>-1.4854</td>
<td>22</td>
<td>-1.4893</td>
<td>60</td>
<td>-1.4051</td>
<td>43</td>
<td>-1.3520</td>
<td>59</td>
</tr>
<tr>
<td>27</td>
<td>-1.5139</td>
<td>31</td>
<td>-1.7138</td>
<td>18</td>
<td>-1.5340</td>
<td>47</td>
<td>-1.3802</td>
<td>34</td>
</tr>
<tr>
<td>52</td>
<td>-1.5994</td>
<td>23</td>
<td>-1.7626</td>
<td>51</td>
<td>-1.7716</td>
<td>6</td>
<td>-1.4366</td>
<td>52</td>
</tr>
<tr>
<td>47</td>
<td>-1.6728</td>
<td>19</td>
<td>-1.8114</td>
<td>25</td>
<td>-1.9889</td>
<td>58</td>
<td>-1.4366</td>
<td>55</td>
</tr>
<tr>
<td>25</td>
<td>-1.9992</td>
<td>18</td>
<td>-1.9019</td>
<td>32</td>
<td>-2.0533</td>
<td>23</td>
<td>-1.6539</td>
<td>12</td>
</tr>
</tbody>
</table>
Consensus Statements

Consensus statements are the concourse statements that have similar scores between the factors (Bartlett & DeWeese, 2015). Consensus statements, along with distinguishing statements, discussed in the next section, assist in factor interpretation, and answer research question number two (Bartlett & DeWeese, 2015). For this research study, six statements were identified as consensus statements. Table 9 identifies the consensus statements along with its factor array scores. Technological advancements (Q14) and the profession’s scope of practice is expanding (Q15) were the highest ranked consensus statements. The ranking of these statements indicate the program directors change the curriculum to accommodate new technological advances as well as changes to the scope of dental hygiene practice. The creation of dental hygiene workforce models (Q11) and the students’ desire to have an active role in their education had a neutral ranking (Q42). The ranking of these statements implies the program directors are impartial to these forces, and yet are open-minded to these forces in initiating curriculum change. Students’ attitudes towards the current curriculum (Q36) and the classroom environment (Q50) were the lowest ranked statements, signifying program directors would not make curriculum changes based on student attitudes.
Table 9: Consensus statements

<table>
<thead>
<tr>
<th>Number</th>
<th>Statement</th>
<th>Factor One</th>
<th>Factor Two</th>
<th>Factor Three</th>
<th>Factor Four</th>
<th>Factor Five</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q11</td>
<td>Dental hygiene based workforce models are being created</td>
<td>-1</td>
<td>1</td>
<td>1</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>Q14</td>
<td>Technological advancements</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Q15</td>
<td>The profession’s scope of practice is expanding</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Q36</td>
<td>Students’ attitudes towards the current curriculum</td>
<td>-1</td>
<td>-2</td>
<td>1</td>
<td>-1</td>
<td>-3</td>
</tr>
<tr>
<td>Q42</td>
<td>Students desire an active role in their learning and experiences</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Q50</td>
<td>Student attitudes towards the classroom environment</td>
<td>-1</td>
<td>-1</td>
<td>0</td>
<td>-3</td>
<td>-2</td>
</tr>
</tbody>
</table>

Focus groups participants addressed the consensus statements with remarks in relation to the statements involving students. One participant from Factor One stated, “It’s important to be student centered in teaching, but not to let students drive curriculum change because they don’t know enough, but don’t discount the importance of student teaching and learning.” A participant from Factor Two stated, “We need to prepare our students for more than private practice.” A participant from Factor Three stated, “We are required to make sure our students graduate with the skills and knowledge within our scope of practice.” She went on to say, “If possible, as program directors, we should implement some changes if it leads to student success.”
Distinguishing Statements

Distinguishing statements are statements that are ranked significantly different by one factor compared to the other factors (Coogan & Herrington, 2011). These statements assist in interpreting and describing the factors (Coogan & Herrington, 2011). When defining the factors, it is also essential to examine the highest and lowest ranked statements for each factor (Bartlett & DeWeese, 2015). Five factors have been identified for this research study on curriculum change in dental hygiene education: Factor One, Accreditation and Administration for Change; Factor Two, Student Success for Change; Factor Three, U.S. Population and Health Care for Change; Factor Four, External Professional Forces for Change; and Factor Five, Science and Practice for Change. The following will be presented for each factor: distinguishing statements, highest and lowest ranked statements, a model sort graphic, analysis of open-ended questions, and a rich description of the factor.

**Factor One: Accreditation and Administration for Change.** Factor one had seven participants, accounting for 26.6% of the variance and 46.7% of the P-set that loaded into a factor. This data insinuates a large proportion of dental hygiene program directors that participated in this study share similar viewpoints on curriculum change forces related to dental hygiene education. This factor was named accordingly because the highest ranked statement for change was accreditation standards (Q4) and the narrative responses in the post-sort questionnaire indicated that accreditation standards are the rules to follow and therefore govern curriculum change. Administration was also added to the factor name because requests from college administration (Q58) was ranked a +3, while all other factors ranked this statement below zero.
Table 10 provides the distinguishing statements for this factor. Participants in this factor felt indifferent to a crowded curriculum (Q33) and availability of financial resources (Q59) as forces for curriculum change. Factors two, three, and four felt strongly about a crowded curriculum initiating change (Q33), while factor five did not perceive this force to be a reason for change. All other factors perceived availability of financial resources (Q59) as a force not initiating change. Factor one felt Q56 (Recommendations from the department), Q57 (Other allied health programs desire collaboration with the dental hygiene program), and Q58 (requests from college administration) were forces for curriculum change. Q56 (Recommendations from the department) and Q58 (Requests from college administration) were both ranked negatively by all other factors. Q57, other allied health programs desire collaboration with the dental hygiene program, was a neutral force to factors two and three, but factors four and five did not perceive it as a force for change.

<table>
<thead>
<tr>
<th>Number</th>
<th>Statement</th>
<th>Factor One</th>
<th>Factor Two</th>
<th>Factor Three</th>
<th>Factor Four</th>
<th>Factor Five</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q33</td>
<td>A crowded curriculum</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>-4</td>
</tr>
<tr>
<td>Q56</td>
<td>Recommendations from the department</td>
<td>2</td>
<td>-1</td>
<td>-2</td>
<td>-3</td>
<td>-1</td>
</tr>
<tr>
<td>Q57</td>
<td>Other allied health programs desire collaboration with the dental hygiene program</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>-2</td>
<td>-2</td>
</tr>
<tr>
<td>Q58</td>
<td>Requests from college administration</td>
<td>3</td>
<td>-4</td>
<td>-1</td>
<td>-5</td>
<td>-3</td>
</tr>
<tr>
<td>Q59</td>
<td>Availability of financial resources</td>
<td>1</td>
<td>-2</td>
<td>-3</td>
<td>-1</td>
<td>-4</td>
</tr>
</tbody>
</table>
Table 11 provides the highest and lowest ranked statements for this factor. The highest ranked statement was dental hygiene accreditation standards (Q4), followed by statements related to research and ensuring graduates are prepared for the workforce. All four statements are from the external environment. The lowest ranked statement was growth in for-profit colleges (Q25), followed by a faculty member in the program (Q47), the quality of students (Q52), and reimbursement for oral health care services (Q27). These statements identify forces from the internal and external environment.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Number</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest</td>
<td>Q4</td>
<td>Dental hygiene accreditation standards</td>
</tr>
<tr>
<td></td>
<td>Q16</td>
<td>Findings from evidence based research</td>
</tr>
<tr>
<td></td>
<td>Q1</td>
<td>New scientific findings are available to incorporate into the curriculum</td>
</tr>
<tr>
<td></td>
<td>Q35</td>
<td>Ensure graduates are prepared for the workforce environment</td>
</tr>
<tr>
<td>Lowest</td>
<td>Q25</td>
<td>The U.S. has seen a growth in for-profit colleges</td>
</tr>
<tr>
<td></td>
<td>Q47</td>
<td>A co-worker in the dental hygiene program</td>
</tr>
<tr>
<td></td>
<td>Q52</td>
<td>Respond to the quality of entering students</td>
</tr>
<tr>
<td></td>
<td>Q27</td>
<td>Reimbursement for oral health care services</td>
</tr>
</tbody>
</table>

The post-sort questionnaire asked participants to address why they chose to place their statements at +6 and -6. The majority of participants’ responses to the ranking of a statement at +6 addressed accreditation standards. One participant wrote, “CODA is the ruling for any change,” while another participant wrote, “Each program must adhere to accreditation
standards.” Another participant wrote, “Program curriculum is driven by accreditation standards; every change we make we have to use the standards as a guide.” One participant wrote, “If curriculum is not in compliance with accreditation standards, then I would make sure to adapt curriculum to comply.” Two participants’ comments addressed the existence of their programs in regards to accreditation, where one wrote, “I have to adhere to their rules or we will no longer be a viable program,” while the other one wrote, “The program must follow accreditation standards to exist and accreditation standards are developed for program and student success.” One participant ranked evidence-based research as +6 and wrote, “Evidence-based research should be the primary driver of program change.”

Comments in regards to the ranking of statements at -6 addressed the following forces: for-profit colleges, the quality of entering students, a colleague at another dental hygiene program, distance education, and dental support organizations (DSOs). In regards to for-profit colleges, one participant wrote, “I don’t think the for-profit college should affect the curriculum,” and another one wrote “I do not work for a for-profit college so that statement does not affect my reason to change curriculum.” In regards to entering students one participant wrote, “I would not change the curriculum to accommodate a weaker student group,” while another one wrote, “The quality of entering students should not affect our curriculum; the curriculum is set at a certain standard and students must meet the standard.” One participant wrote, “While I respect and listen to what other hygiene schools are doing in terms of curriculum change, I base my decisions for the program on research, science, best practices, and what is right for the community our college serves.” Another participant wrote, “We are not a distance
education facility.” Another participant wrote, “I don’t see how DSOs can or should influence dental hygiene curriculum.”

According to the post-sort questionnaire, three of the seven individuals were willing to participate in a focus group follow-up. Based on availability, one individual attended the conference call focus group. This individual stated, “I would have placed myself in that category” and the accreditation standard is “our bible.” The individual further went on to say “who your administration is can influence” curriculum change, and “I have the most supportive administration ever” and “have no negative connotations” towards them so “if they requested a curriculum change, I would look into it.” In response to the lowest ranked statements this individual stated she would “not water down the curriculum to respond to entering students.”

Figure 5 is a model sort for Factor One. This model sort provides the quantitative data on which curriculum change forces motivate dental hygiene program directors to change the existing curriculum according to this factor.
Factor Two: Student Success for Change. Factor two had three participants, accounting for 16% of the variance and 20% of the P-set that loaded into a factor. This factor was named accordingly because four of the distinguishing statements dealt with student success and were ranked higher when compared to other factors. This factor’s highest ranked statement was to connect theory course content with clinical content (Q40), which is a key component of student success. An individual in this factor stated, “I am always looking for ways to improve the program so any statements focused around student learning had the greatest impact.”

Table 12 provides the distinguishing statements for this factor. This factor felt strongly about changing the curriculum to connect theory course content with clinical content (Q40) and
to prepare students for life-long learning (Q53). Factors one, four, and five did perceive Q40 as a force for change, but factor three did not perceive this force as a motivation to change.

Textbook authors and publishers (Q31) were not perceived as a force for change, and one participant even stated, “a textbook should enhance your class but not make a class.” Factors one, three, and four also did not perceive Q31 as a force for change, but factor five felt motivated to change the curriculum because of this force. Enhance rigor of course (Q51) and respond to the quality of entering students (Q52) were ranked slightly above neutral with scores of 1 and 2, respectively. All other factors ranked these statements negatively implying these forces did not motivate them to make changes.

Table 12: Distinguishing statements for Student Success for Change

<table>
<thead>
<tr>
<th>Number</th>
<th>Statement</th>
<th>Factor One</th>
<th>Factor Two</th>
<th>Factor Three</th>
<th>Factor Four</th>
<th>Factor Five</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q31</td>
<td>Textbook authors and publishers</td>
<td>-1</td>
<td>-5</td>
<td>-2</td>
<td>-1</td>
<td>3</td>
</tr>
<tr>
<td>Q40</td>
<td>To connect theory course content with clinical course content</td>
<td>2</td>
<td>6</td>
<td>-2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Q51</td>
<td>Enhance rigor of course</td>
<td>-1</td>
<td>1</td>
<td>-5</td>
<td>-2</td>
<td>-3</td>
</tr>
<tr>
<td>Q52</td>
<td>Respond to the quality of entering students</td>
<td>-5</td>
<td>2</td>
<td>-2</td>
<td>-4</td>
<td>-5</td>
</tr>
<tr>
<td>Q53</td>
<td>Prepare students for continuous, lifelong learning</td>
<td>2</td>
<td>5</td>
<td>-1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 13 provides the highest and lowest ranked statements for factor two, Student Success for Change. The three highest ranked statements were internal forces that dealt with connecting didactic and clinical course content (Q40), and students (Q35 and Q53). The fourth highest statement was evidence-based research (Q16), an external force. These statements imply participants in factor two are motivated to change the curriculum to prepare students for the profession of dental hygiene. The lowest ranked statements were forces from the external environment, and dealt with the U.S. population (Q18 and Q23), government control of healthcare (Q19), and textbook authors and publishers (Q31). The ranking of these forces indicates factor two is not motivated to change the curriculum in response to U.S. population and healthcare trends.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Number</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest</td>
<td>Q40</td>
<td>To connect theory course content with clinical course content</td>
</tr>
<tr>
<td></td>
<td>Q35</td>
<td>Ensure graduates are prepared for the workforce environment</td>
</tr>
<tr>
<td></td>
<td>Q53</td>
<td>Prepare students for continuous, lifelong learning</td>
</tr>
<tr>
<td></td>
<td>Q16</td>
<td>Findings from evidence based research</td>
</tr>
<tr>
<td>Lowest</td>
<td>Q18</td>
<td>The U.S. is experiencing a move towards urbanization</td>
</tr>
<tr>
<td></td>
<td>Q19</td>
<td>Government control of healthcare is increasing</td>
</tr>
<tr>
<td></td>
<td>Q23</td>
<td>The U.S. population desires convenient oral health care at a low cost</td>
</tr>
<tr>
<td></td>
<td>Q31</td>
<td>Textbook authors and publishers</td>
</tr>
</tbody>
</table>
The post-sort questionnaire asked participants to address why statements were placed at +6 and -6. All three participants’ reasons behind ranking a statement at +6 dealt with students. One participant wrote, “I believe it is important that students can make that connection.” Another participant wrote, “Course content should be related to what the students are learning and practicing in the clinic; this will help the students retain and understand the information better.” Another participant wrote, “I feel we can’t prepare graduates for the workforce if we don’t help prepare them to be lifelong learners when workforce needs change.”

Responses in regards to the ranking of the -6 statement dealt with a textbook, government control of healthcare, and college administration. One participant wrote, “To change a curriculum should not be because of a textbook; a textbook should enhance your class but not make a class.” One participant wrote, “The governments control on healthcare at this point does not have direct effect on the curriculum content within the dental hygiene program.” Another participant wrote, “Administration doesn’t force curricular change at our institution.”

According to the post-sort questionnaire, all three were willing to participate in a focus group follow-up. Based on availability, one individual attended the conference call focus group. This individual stated “the motivation for me has always been the student and student-learning outcomes” and “changes need to be student focused and prepare them for the workforce.” This individual also stated there is a “disconnect in what we do in education and what gets translated into private practice.” The individual mentioned “healthcare is too slow of a change for me to identify it as a factor.” On the other hand, the individual stated changes could be made to “help students expand their horizons in terms of healthcare in general and their role in healthcare to have a broader understanding.”
Figure 6 provides a model sort for factor two, Student Success for Change. This model sort provides the quantitative data on which curriculum change forces motivate dental hygiene program directors to change the existing curriculum according to this factor.

<table>
<thead>
<tr>
<th>Most unlike my viewpoint</th>
<th>Most like my viewpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>18 31 58 17 20 56 7 45 48 37 4 35 40</td>
<td></td>
</tr>
<tr>
<td>23 60 24 3 38 41 42 52 5 1 53</td>
<td></td>
</tr>
<tr>
<td>19 25 27 44 34 2 51 9 33 15 16</td>
<td></td>
</tr>
<tr>
<td>22 43 36 50 13 11 46 14 49</td>
<td></td>
</tr>
<tr>
<td>39 26 6 47 30 8 54</td>
<td></td>
</tr>
<tr>
<td>59 55 57 32 12</td>
<td></td>
</tr>
<tr>
<td>28 21 10</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td></td>
</tr>
</tbody>
</table>

Figure 6: Model sort for Factor Two

**Factor Three: U.S. Population and Health Care for Change.** Factor three had two participants accounting for 12.2% of the variance and 13.3% of the P-set that loaded into a factor. This factor was named accordingly because the highest ranked statement the U.S. population is becoming more culturally diverse (Q6), was also a distinguishing statement for this factor. The statement in regards to the change in the healthcare delivery system (Q8) was also a
distinguishing statement and another high-ranking statement. Participants indicated “current curriculum and future changes that may need to be made,” as well as, “what I’ve learned and been through in school” had the greatest impact on their sorting of the Q set.

Table 14 provides the distinguishing statements for this factor, U.S. Population and Health Care for Change. This factor felt impartial to new scientific findings (Q1) as a force for change, while all other factors perceived this statement as a motivating force for change. Participants did not perceive alumni feedback (Q2) as a force for change, while factors one, two, and five were impartial to this force and factor four perceived this statement as a force for change. This factor felt motivated to change the curriculum based on culture changes to the U.S. population (Q6) and the healthcare delivery system (Q8). Other factors felt impartial to these forces or did not perceive them to be a motivating force for change. The schedule flexibility of the dental hygiene program (Q32) was the force that motivated this factor the least due its ranking of -6. Factors one, four, and five also felt unmotivated to make changes due to schedule flexibility (Q32), but it was not their lowest ranked statement. Participants in this factor also perceived connecting didactic and clinical course content (Q40) as a non-motivating force for change, while the other factors perceived this force as one for change, with factor two ranking it the highest statement.
Table 14: Distinguishing statements for U.S. Population and Health Care for Change

<table>
<thead>
<tr>
<th>Number</th>
<th>Statement</th>
<th>Factor One</th>
<th>Factor Two</th>
<th>Factor Three</th>
<th>Factor Four</th>
<th>Factor Five</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>New scientific findings are available to incorporate into the curriculum</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Q2</td>
<td>Alumni surveys provide topics to incorporate into the curriculum</td>
<td>1</td>
<td>0</td>
<td>-3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Q6</td>
<td>The U.S. population is becoming more culturally diverse</td>
<td>0</td>
<td>-1</td>
<td>6</td>
<td>-5</td>
<td>0</td>
</tr>
<tr>
<td>Q8</td>
<td>The healthcare delivery system is changing</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>-1</td>
<td>1</td>
</tr>
<tr>
<td>Q32</td>
<td>Schedule flexibility of the dental hygiene program</td>
<td>-3</td>
<td>1</td>
<td>-6</td>
<td>-2</td>
<td>-1</td>
</tr>
<tr>
<td>Q40</td>
<td>To connect theory course content with clinical course content</td>
<td>2</td>
<td>6</td>
<td>-2</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 15 provides the highest and lowest ranked statements for factor three, U.S. Population and Health Care for Change. Four of the highest ranked statements are external forces specific to society changes on healthcare and the U.S. population. The second highest ranked statement was Q4 (Dental hygiene accreditation standards). One participant wrote on the post-sort questionnaire, “accreditation standards dictate what goes into our curriculum.” The lowest ranked statements are forces from all three environments. The lowest ranked statement is an internal force and signifies the factor would not make changes due to schedule flexibility (Q32). The second lowest ranked statement is an external force indicating the factor does not perceive the growth of for-profit schools (Q25) as a motivating force for change. This factor
also perceives enhancing the difficulty of a course (Q51) and the U.S. trend of urbanization as non-motivating forces for change (Q18).

Table 15: Highest and lowest ranked statements - U.S. Population and Health Care for Change

<table>
<thead>
<tr>
<th>Rank</th>
<th>Number</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest</td>
<td>Q6</td>
<td>The U.S. population is becoming more culturally diverse</td>
</tr>
<tr>
<td></td>
<td>Q4</td>
<td>Dental hygiene accreditation standards</td>
</tr>
<tr>
<td></td>
<td>Q8</td>
<td>The healthcare delivery system is changing</td>
</tr>
<tr>
<td></td>
<td>Q7</td>
<td>The U.S. population is aging</td>
</tr>
<tr>
<td></td>
<td>Q13</td>
<td>National healthcare is trending towards interprofessional collaboration to treat patients</td>
</tr>
<tr>
<td>Lowest</td>
<td>Q32</td>
<td>Schedule flexibility of the dental hygiene program</td>
</tr>
<tr>
<td></td>
<td>Q25</td>
<td>The U.S. has seen a growth in for-profit colleges</td>
</tr>
<tr>
<td></td>
<td>Q51</td>
<td>Enhance rigor of course</td>
</tr>
<tr>
<td></td>
<td>Q18</td>
<td>The U.S. is experiencing a move towards urbanization</td>
</tr>
</tbody>
</table>

The post-sort questionnaire asked participants to address why statements were placed at +6 and -6. In regards to the +6 ranking, one participant wrote, “The U.S. is known as the melting pot and was given because so many people immigrate here for a chance at their American Dream.” While the other participant wrote, “Accreditation standards dictate what goes into our curriculum.” The reasoning behind the -6 ranking dealt with for-profit schools and program difficulty. One participant wrote, “The growth in for-profit schools does not affect me.”
While the other participant wrote, “The program I am in is difficult and professional enough as it is; if it got any more rigorous, I might as well go to medical school.”

According to the post-sort questionnaire, one out of the two individuals in this factor was willing to participate in a focus group follow-up. This individual stated, “the majority of changes we have made are based on accreditation.” As a program, we are “required to make sure our students graduate with the skills and knowledge within our scope of practice.”

Figure 7 provides a model sort for factor three, U.S. Population and Health Care for Change. This model sort provides the quantitative data on which curriculum change forces motivate dental hygiene program directors to change the existing curriculum according to this factor. Due to rounding of the z-scores for each statement, this model sort is not a force distribution Q sort matrix.
Most unlike my viewpoint | Most like my viewpoint
--- | ---
-6 | 6
-5 | 5
-4 | 4
-3 | 3
-2 | 2
-1 | 1
0 | 0
1 | 1
2 | 2
3 | 3
4 | 4
5 | 5
6 | 6

Figure 7: Model sort of Factor Three

**Factor Four: External Professional Forces for Change.** Factor four had two participants accounting for 10.0% of the variance and 13.3% of the P-set that loaded into a factor. This factor was named accordingly because all highest ranked statements are external professional forces of curriculum change, and two of the lowest ranked statements were forces from the internal and organizational environment. The post-sort questionnaire indicated that both participants in this factor agreed that new scientific evidence (Q1) is the key force in changing the dental hygiene curriculum. The greatest impact on their sort related to, “My
experience,” and “My years of teaching and the opinions that I have developed from those years of observing students and the profession.”

Factor four only had one distinguishing statement, Q6 (The U.S. population is becoming more culturally diverse). This factor ranked this statement a -5, making it one of the lowest ranked statements for this factor. Factor one, two, and five felt impartial to this statement, with rankings of zero, -1, and zero respectively. Factor three ranked this statement as a 6 implying this force is a considerable force for changing the curriculum.

Table 16 provides the highest and lowest ranked statements for factor four, External Professional Forces for Change. The highest ranked statements are all forces from the external environment. This factor perceived an amalgamation of external forces as motivators for change, as the forces were new scientific findings (Q1), scholarly research on educational best practices (Q5), advisory board recommendations (Q12), healthcare trends (Q13), and technological advancements (Q14). The lowest ranked statements are forces from all three environments, with two statements dealing with U.S. population trends (Q6 & Q23). This factor also perceived requests from college administration (Q58) and a co-worker in the dental hygiene program (Q47) as reasons not to change the curriculum.
Table 16: Highest and lowest ranked statements for External Professional Forces for Change

<table>
<thead>
<tr>
<th>Rank</th>
<th>Number</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest</td>
<td>Q1</td>
<td>New scientific findings are available to incorporate into the curriculum</td>
</tr>
<tr>
<td></td>
<td>Q5</td>
<td>Scholarly research on educational best practices</td>
</tr>
<tr>
<td></td>
<td>Q12</td>
<td>Recommendations from advisory board members</td>
</tr>
<tr>
<td></td>
<td>Q13</td>
<td>National healthcare is trending towards interprofessional collaboration to treat patients</td>
</tr>
<tr>
<td></td>
<td>Q14</td>
<td>Technological advancements</td>
</tr>
<tr>
<td>Lowest</td>
<td>Q23</td>
<td>The U.S. population desires convenient oral health care at a low cost</td>
</tr>
<tr>
<td></td>
<td>Q58</td>
<td>Requests from college administration</td>
</tr>
<tr>
<td></td>
<td>Q6</td>
<td>The U.S. population is becoming more culturally diverse</td>
</tr>
<tr>
<td></td>
<td>Q47</td>
<td>A co-worker in the dental hygiene program</td>
</tr>
</tbody>
</table>

Responses from the post-sort questionnaire indicated the following in regards to why a statement was placed at +6: “because it is the most important”, and “I think scientific findings are the most important aspect when changing curriculum, all curriculum should be based on scientific findings.” Responses from the post-sort questionnaire indicated the following in regards to why a statement was placed at -6: “a colleague from another dental hygiene program is least important,” and “I don’t think that a textbook should have any bearing on the curriculum itself, as the textbook should be picked based on the curriculum.” One of the two individuals in this factor indicated she would participate in a focus group; however, the individual did not respond to the request to set-up a date and time for the call.

Figure 8 provides a model sort for factor four, External Professional Forces for Change. This model sort provides the quantitative data on which curriculum change forces motivate dental hygiene program directors to change the existing curriculum according to this factor. Due
to rounding of the z-scores for each statement, this model sort is not a force distribution Q sort matrix.

<table>
<thead>
<tr>
<th>Most unlike my viewpoint</th>
<th>Most like my viewpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>-6</td>
<td>-5</td>
</tr>
<tr>
<td>23</td>
<td>47</td>
</tr>
<tr>
<td>6</td>
<td>52</td>
</tr>
<tr>
<td>58</td>
<td>20</td>
</tr>
<tr>
<td>43</td>
<td>25</td>
</tr>
<tr>
<td>24</td>
<td>45</td>
</tr>
<tr>
<td>27</td>
<td>55</td>
</tr>
<tr>
<td>59</td>
<td>44</td>
</tr>
<tr>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

Figure 8: Model sort of Factor Four

**Factor Five: Science and Practice for Change.** Factor five had one participant accounting for 7.9% of the variance and 6.67% of the P-set that loaded into a factor. This factor was named accordingly because the highest ranked statements dealt with scientific and technological advances, as well as the practice of dental hygiene. This factor relies on scientific evidence to make changes, instead of input from the dental community as evident with the ranking of Q12, recommendations from advisory board members, as a -6. The participant wrote, “I didn’t think it was that important,” in regards to Q12. The participant indicated on the post-
sort questionnaire that the reasoning behind ranking Q1 as +6 was “so that students can have evidence to make decisions on their patients.” The participant in this factor indicated on the post-sort questionnaire that “life-long learning and evidence-based scientific research” had the greatest impact on the way the curriculum change forces were sorted. The participant in factor five did not agree to a focus group on the post-sort questionnaire.

Table 17 provides the distinguishing statements for this factor. Factor five’s perspective of curriculum change forces was extremely different than the other factors, which is evident by the ranking of the forces. This factor perceived Q5 (Scholarly research on educational best practices), Q12 (Recommendations from advisory board members), and Q33 (A crowded curriculum) as forces not initiating change; however, all other factors perceived these forces as reasons to change with the exception of factor three feeling impartial to Q12, and factor one feeling impartial to Q33. Factor five did not perceive Q21 (An increase in chronic diseases) as a force for change, while majority of other factors felt impartial to this force. Q31 (Textbook authors and publishers), and Q39 (Students’ attitudes towards lab equipment), were perceived as motivating forces for change for factor five. However, all other factors did not feel motivated to change the curriculum due to these forces. This factor did not perceive Q34 (Outcomes of calibration exercises) as a force for change, while two factors were impartial to this force and the other two factors felt motivated by this force.
Table 17: Distinguishing statements for Science and Practice for Change

<table>
<thead>
<tr>
<th>Number</th>
<th>Statement</th>
<th>Factor One</th>
<th>Factor Two</th>
<th>Factor Three</th>
<th>Factor Four</th>
<th>Factor Five</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q5</td>
<td>Scholarly research on educational best practices</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>-2</td>
</tr>
<tr>
<td>Q12</td>
<td>Recommendations from advisory board members</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>-6</td>
</tr>
<tr>
<td>Q21</td>
<td>The U.S. is seeing an increase in chronic diseases with treatment options that require oral health care services</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>-4</td>
</tr>
<tr>
<td>Q31</td>
<td>Textbook authors and publishers</td>
<td>-1</td>
<td>-5</td>
<td>-2</td>
<td>-1</td>
<td>3</td>
</tr>
<tr>
<td>Q33</td>
<td>A crowded curriculum</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>-4</td>
</tr>
<tr>
<td>Q34</td>
<td>Outcomes of calibration exercises among educators</td>
<td>3</td>
<td>-1</td>
<td>0</td>
<td>2</td>
<td>-5</td>
</tr>
<tr>
<td>Q39</td>
<td>Students’ attitudes toward lab equipment</td>
<td>-2</td>
<td>-3</td>
<td>-2</td>
<td>-3</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 18 provides the highest and lowest ranked statements for factor five, Science and Practice for Change. The highest ranked forces are mainly from the external environment, with the fourth highest ranked statement identified as an internal force. This factor felt compelled to make changes due to scientific findings (Q1) and technological advancements (Q14), as well to accommodate changes to the profession’s scope of practice (Q15) and to ensure graduates are prepared for the workforce (Q35). The lowest ranked statements are forces from all three environments. This factor did not perceive advisory board recommendations (Q12) as a motivating force for change, as well as to make the institution one of distinction and prestige.
(Q55). This factor also did not feel the need to change the curriculum to respond to the quality of incoming students (Q52), or to the outcomes of calibration exercises (Q34).

Table 18: Highest and lowest ranked statements for Science and Practice for Change

<table>
<thead>
<tr>
<th>Rank</th>
<th>Number</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest</td>
<td>Q1</td>
<td>New scientific findings are available to incorporate into the curriculum</td>
</tr>
<tr>
<td></td>
<td>Q14</td>
<td>Technological advancements</td>
</tr>
<tr>
<td></td>
<td>Q15</td>
<td>The profession’s scope of practice is expanding</td>
</tr>
<tr>
<td></td>
<td>Q35</td>
<td>Ensure graduates are prepared for the workforce environment</td>
</tr>
<tr>
<td>Lowest</td>
<td>Q12</td>
<td>Recommendations from advisory board members</td>
</tr>
<tr>
<td></td>
<td>Q55</td>
<td>Make an institution of distinction and prestige</td>
</tr>
<tr>
<td></td>
<td>Q52</td>
<td>Respond to the quality of entering students</td>
</tr>
<tr>
<td></td>
<td>Q34</td>
<td>Outcomes of calibration exercises among educators</td>
</tr>
</tbody>
</table>

Figure 9 provides the Q sort from factor five, Science and Practice for Change. This Q sort provides the quantitative data on which curriculum change forces motivate dental hygiene program directors to change the existing curriculum according to this factor.
Most unlike my viewpoint  
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6  
Most like my viewpoint  

<table>
<thead>
<tr>
<th></th>
<th>12</th>
<th>34</th>
<th>21</th>
<th>18</th>
<th>5</th>
<th>13</th>
<th>6</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>9</th>
<th>14</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>52</td>
<td>29</td>
<td>19</td>
<td>20</td>
<td>32</td>
<td>7</td>
<td>8</td>
<td>17</td>
<td>31</td>
<td>16</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>33</td>
<td>36</td>
<td>30</td>
<td>37</td>
<td>10</td>
<td>23</td>
<td>26</td>
<td>39</td>
<td>28</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>51</td>
<td>47</td>
<td>45</td>
<td>11</td>
<td>44</td>
<td>41</td>
<td>40</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>50</td>
<td>48</td>
<td>22</td>
<td>46</td>
<td>42</td>
<td>54</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>56</td>
<td>24</td>
<td>49</td>
<td>43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>25</td>
<td>53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 9: Q sort from Factor Five

**Participant Demographics**

This study sought to determine the perceptions of curriculum change among dental hygiene program directors employed in two-year institutions. Eighteen program directors completed the Q sort along with a post-sort questionnaire, with 15 individuals being placed into one of the five factors. The post-sort questionnaire is provided in Table 19, and provides the qualitative aspect of Q methodology, assisting with interpretation (Bartlett & DeWeese, 2015).
Table 19: Post-sort questionnaire

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Narrative and demographic questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Why did you place your “strongly agree” statement under +6?</td>
</tr>
<tr>
<td>2</td>
<td>Why did you place your “strongly disagree” statement under -6?</td>
</tr>
<tr>
<td>3</td>
<td>Were there any specific statements that you had difficulty placing? If yes,</td>
</tr>
<tr>
<td></td>
<td>choose one, list the statement, and describe why.</td>
</tr>
<tr>
<td>4</td>
<td>What had the greatest impact on how you sorted/ranked the forces?</td>
</tr>
<tr>
<td>5</td>
<td>Gender</td>
</tr>
<tr>
<td>6</td>
<td>Ethnicity</td>
</tr>
<tr>
<td>7</td>
<td>Age</td>
</tr>
<tr>
<td>8</td>
<td>What is your highest degree or level of school?</td>
</tr>
<tr>
<td>9</td>
<td>How many years have you worked in education?</td>
</tr>
<tr>
<td>10</td>
<td>Which region of the country do you live?</td>
</tr>
<tr>
<td>11</td>
<td>Which of the following describes your institution’s location?</td>
</tr>
<tr>
<td>12</td>
<td>Which of the following describes your institution?</td>
</tr>
</tbody>
</table>

Majority of participants were female (94.4%) and Caucasian (83.3%). The ages for all participants ranged from 20 to 62 years old, with an average age of 47.94 (SD = 2.83). The average years for years worked in education was 15.44 (SD = 2.84), with a range of zero years to 38 years. Majority of participants held a master’s degree (66.7%) and were employed at public institutions (88.9%). The most selected geographic region was the Midwest (44.4%), with most institutions being located in an urban area (50.0%). Table 20 provides the demographic data, questions five through nine from the post-sort questionnaire, on the 18 program directors. Table 21 provides the demographic data which were collected as questions 10 through 12 from the post-sort questionnaire, on the participants’ institution.
Table 20: Participant demographics

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Factor One</th>
<th>Factor Two</th>
<th>Factor Three</th>
<th>Factor Four</th>
<th>Factor Five</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1</td>
<td>5.6</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Female</td>
<td>17</td>
<td>94.4</td>
<td>7</td>
<td>100</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic / Latino</td>
<td>1</td>
<td>5.6</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>White / Caucasian</td>
<td>15</td>
<td>83.3</td>
<td>7</td>
<td>100</td>
<td>2</td>
<td>66.7</td>
</tr>
<tr>
<td>Black / African American</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>11.1</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>2</td>
<td>11.1</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>30-39</td>
<td>2</td>
<td>11.1</td>
<td>1</td>
<td>14.2</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>40-49</td>
<td>3</td>
<td>16.7</td>
<td>2</td>
<td>28.6</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>50-59</td>
<td>9</td>
<td>50.0</td>
<td>3</td>
<td>42.9</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>60-69</td>
<td>2</td>
<td>11.1</td>
<td>1</td>
<td>14.2</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>Highest Degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor’s</td>
<td>2</td>
<td>11.1</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Master’s</td>
<td>12</td>
<td>66.7</td>
<td>7</td>
<td>100</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>Doctorate</td>
<td>4</td>
<td>22.2</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Years in Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-9</td>
<td>6</td>
<td>33.3</td>
<td>3</td>
<td>42.9</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>10-19</td>
<td>5</td>
<td>27.8</td>
<td>3</td>
<td>42.9</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>20-29</td>
<td>5</td>
<td>27.8</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>30-39</td>
<td>2</td>
<td>11.1</td>
<td>1</td>
<td>14.2</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>Region</td>
<td>Overall</td>
<td>Factor One</td>
<td>Factor Two</td>
<td>Factor Three</td>
<td>Factor Four</td>
<td>Factor Five</td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
<td>------------</td>
<td>------------</td>
<td>--------------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Midwest</td>
<td>8</td>
<td>44.4</td>
<td>3</td>
<td>42.9</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>Northeast</td>
<td>3</td>
<td>16.7</td>
<td>1</td>
<td>14.2</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>Southeast</td>
<td>4</td>
<td>22.2</td>
<td>1</td>
<td>14.2</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>Southwest</td>
<td>3</td>
<td>16.7</td>
<td>2</td>
<td>28.6</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>West</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>9</td>
<td>50.0</td>
<td>3</td>
<td>42.9</td>
<td>2</td>
<td>66.7</td>
</tr>
<tr>
<td>Suburban</td>
<td>8</td>
<td>44.4</td>
<td>3</td>
<td>42.9</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>Rural</td>
<td>1</td>
<td>5.6</td>
<td>1</td>
<td>14.2</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Institution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>16</td>
<td>88.9</td>
<td>6</td>
<td>85.7</td>
<td>2</td>
<td>66.7</td>
</tr>
<tr>
<td>Private</td>
<td>1</td>
<td>5.6</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>Proprietary</td>
<td>1</td>
<td>5.6</td>
<td>1</td>
<td>14.3</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Chapter Summary

In Chapter Four, the data collected from 18 dental hygiene program directors employed in two-year colleges were analyzed, resulting in 15 participants in the final analyses. Quantitative and qualitative data were used to develop the conclusions. Factor analysis was performed on the Q sorts completed by the program directors, providing the statistical data. The post-sort questionnaire completed by the program directors provided the qualitative data, which further defined the perceptions of curriculum change forces. Five factors emerged from the data analysis.

Factor one, “Accreditation and Administration for Change,” can be defined as those participants who feel curriculum is changed by accreditation standards and administration requests. These individuals feel strongly about following the standards set by the accrediting body of dental hygiene programs. This group also illustrates the chain of command that is found in postsecondary institutions.

Participants in factor two, “Student Success for Change,” can be described as those who are motivated to change curriculum to improve student success. The forces for change among these individuals are to ensure graduates are prepared for the workforce and to ensure a connection before didactic and clinical content.

Factor three, “U.S. Population and Health Care for Change,” can be expressed as those participants who change curriculum based on the current U.S. environment, in regards to the population and health care. The U.S. population is becoming more culturally diverse and the health care system is changing with trends towards interprofessional collaboration. This group
illustrates a need to change the curriculum based on specific trends in the U.S. that affect the workforce environment of the dental hygiene profession.

Participants in factor four, “External Professional Forces for Change,” felt motivated to change the curriculum based on several external forces. These forces included new scientific findings, recommendations from advisory board members, national healthcare trends, and technological advancements. This group demonstrates several external forces related to the profession can cause change.

Factor five, “Science and Practice for Change,” felt motivated to change the curriculum based on science and the dental hygiene profession. The one individual in this factor indicated she makes changes due to new research and technology, and because the profession’s scope of practice is expanding.

Based on the data analyses, the dental hygiene program directors in this study have different perceptions on curriculum change forces with a few similarities. The differences are explained through the analyses of their distinguishing statements and narrative responses. Similarities are evident through the consensus statements. The forces of curriculum change identified by the different groups of program directors will have implications on practice, policy, and research, which will be explored in greater depth in Chapter Five.
CHAPTER 5: DISCUSSION AND IMPLICATIONS

Introduction

This study sought to determine the perceptions of curriculum change forces among dental hygiene program directors employed at two-year colleges. Dental hygiene program directors were asked to rank a Q set of 60 statements on an agreement scale of -6 to +6 based on which forces motivate them to change the existing dental hygiene curriculum. Studies have been conducted on forces of curriculum change, but these studies did not explore the perceptions of dental hygiene program directors on internal, external, and organizational forces on curriculum change. This identified gap in the literature allows the current study to provide important findings to curriculum change in dental hygiene programs.

This chapter discusses the findings and implications for this study. The first section will discuss the relevant findings for each research question. The second section will discuss these findings in relation to the theoretical framework. The next sections will discuss limitations to the research study, as well as implications for practice, policy, and research. The final section of this chapter will provide recommendations for future studies.

Conclusions

This research study sought to answer the following questions:

1. How many viewpoints toward curriculum change forces emerge, and what are the characteristics of these viewpoints?

2. Which curriculum change forces are distinct by the groups and which forces have consensus across the groups?
3. Which forces do dental hygiene program directors perceive to have the most
significant impact and least significant impact on curriculum change?

**Finding 1.** *How many viewpoints toward curriculum change forces emerge, and what
are the characteristics of these viewpoints?* A five-factor solution emerged from the data
analysis, indicating five different viewpoints on curriculum change. The researcher provided a
short, but descriptive name to each factor according to the characteristics of the viewpoints.

- **Factor One:** Accreditation and Administration for Change
- **Factor Two:** Student Success for Change
- **Factor Three:** U.S. Population and Health Care for Change
- **Factor Four:** External Professional Forces for Change
- **Factor Five:** Science and Practice for Change

A comprehensive description of each factor is provided in Chapter Four. The
characteristics of each factor are also addressed in Chapter Four, by discussing the distinguishing
statements and highest and lowest ranked statements for each factor. These five-factors indicate
five different points of view at the time of data collection regarding curriculum change forces in
dental hygiene education. The factors identify the range of forces that motivate dental hygiene
program directors to change the existing curriculum.

**Finding 2.** *Which curriculum change forces are distinct by the groups and which forces
have consensus across the groups?* Four of the factors had several distinguishing statements,
while only one factor had one distinguishing statement. Distinguishing statements for all five
factors are presented in Table 22. These statements identify forces from all three environments,
external, internal, and organizational; however, organizational forces are not as notable as the other environments.

Table 22: Distinguishing Statements for the Five Factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Number</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>One: Accreditation and Administration for Change</td>
<td>Q33</td>
<td>A crowded curriculum</td>
</tr>
<tr>
<td></td>
<td>Q56</td>
<td>Recommendations from the department</td>
</tr>
<tr>
<td></td>
<td>Q57</td>
<td>Other allied health programs desire collaboration with the dental hygiene program</td>
</tr>
<tr>
<td></td>
<td>Q58</td>
<td>Requests from college administration</td>
</tr>
<tr>
<td></td>
<td>Q59</td>
<td>Availability of financial resources</td>
</tr>
<tr>
<td>Two: Student Success for Change</td>
<td>Q31</td>
<td>Textbook authors and publishers</td>
</tr>
<tr>
<td></td>
<td>Q40</td>
<td>To connect theory course content with clinical course content</td>
</tr>
<tr>
<td></td>
<td>Q51</td>
<td>Enhance rigor of course</td>
</tr>
<tr>
<td></td>
<td>Q52</td>
<td>Respond to the quality of entering students</td>
</tr>
<tr>
<td></td>
<td>Q53</td>
<td>Prepare students for continuous, lifelong learning</td>
</tr>
<tr>
<td>Three: U.S. Population and Health Care for Change</td>
<td>Q1</td>
<td>New scientific findings are available to incorporate into the curriculum</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>Alumni surveys provide topics to incorporate into the curriculum</td>
</tr>
<tr>
<td></td>
<td>Q6</td>
<td>The U.S. population is becoming more culturally diverse</td>
</tr>
<tr>
<td></td>
<td>Q8</td>
<td>The healthcare delivery system is changing</td>
</tr>
<tr>
<td></td>
<td>Q32</td>
<td>Schedule flexibility of the dental hygiene program</td>
</tr>
<tr>
<td></td>
<td>Q40</td>
<td>To connect theory course content with clinical course content</td>
</tr>
<tr>
<td>Four: External Professional Forces for Change</td>
<td>Q6</td>
<td>The U.S. population is becoming more culturally diverse</td>
</tr>
<tr>
<td></td>
<td>Q5</td>
<td>Scholarly research on educational best practices</td>
</tr>
<tr>
<td></td>
<td>Q12</td>
<td>Recommendations from advisory board members</td>
</tr>
<tr>
<td></td>
<td>Q21</td>
<td>The U.S. is seeing an increase in chronic diseases with treatment options that require oral health care services</td>
</tr>
<tr>
<td></td>
<td>Q31</td>
<td>Textbook authors and publishers</td>
</tr>
<tr>
<td></td>
<td>Q33</td>
<td>A crowded curriculum</td>
</tr>
<tr>
<td></td>
<td>Q34</td>
<td>Outcomes of calibration exercises among educators</td>
</tr>
<tr>
<td></td>
<td>Q39</td>
<td>Students’ attitudes toward lab equipment</td>
</tr>
</tbody>
</table>
The data showed six statements that had consensus across all five factors. The statements included:

1. (Q11) Dental hygiene based workforce models are being created
2. (Q14) Technological advancements
3. (Q15) The profession’s scope of practice is expanding
4. (Q16) Students’ attitudes towards the current curriculum
5. (Q42) Students desire an active role in their learning and experiences
6. (Q50) Student attitudes towards the classroom environment

This list provides the forces that had consensus among the five groups. These consensus statements identify forces that are internal or external. Forces from the organizational environment were not identified as consensus statements.

Finding 3. Which forces do dental hygiene program directors perceive to have the most significant impact and least significant impact on curriculum change? To answer this research question, the researcher examined the highest and lowest ranked statements for each factor. Table 23 presents the highest ranked statements for each factor, while Table 24 presents the lowest ranked statements for each factor. These statements were utilized in the naming process of each factor. The highest ranked statements are forces from the external or internal environment only. These findings imply program directors are motivated more by external and internal forces when making changes to the existing dental hygiene curriculum. The lowest ranked statements are forces from all three environments; however, the organizational environment is not as notable as the other two environments.
Table 23: Highest Ranked Statements for the Five Factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Number</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>One: Accreditation and Administration for Change</td>
<td>Q4</td>
<td>Dental hygiene accreditation standards</td>
</tr>
<tr>
<td></td>
<td>Q16</td>
<td>Findings from evidence based research</td>
</tr>
<tr>
<td></td>
<td>Q1</td>
<td>New scientific findings are available to incorporate into the curriculum</td>
</tr>
<tr>
<td></td>
<td>Q35</td>
<td>Ensure graduates are prepared for the workforce environment</td>
</tr>
<tr>
<td>Two: Student Success for Change</td>
<td>Q40</td>
<td>To connect theory course content with clinical course content</td>
</tr>
<tr>
<td></td>
<td>Q35</td>
<td>Ensure graduates are prepared for the workforce environment</td>
</tr>
<tr>
<td></td>
<td>Q53</td>
<td>Prepare students for continuous, lifelong learning</td>
</tr>
<tr>
<td></td>
<td>Q16</td>
<td>Findings from evidence based research</td>
</tr>
<tr>
<td>Three: U.S. Population and Health Care for Change</td>
<td>Q6</td>
<td>The U.S. population is becoming more culturally diverse</td>
</tr>
<tr>
<td></td>
<td>Q4</td>
<td>Dental hygiene accreditation standards</td>
</tr>
<tr>
<td></td>
<td>Q8</td>
<td>The healthcare delivery system is changing</td>
</tr>
<tr>
<td></td>
<td>Q7</td>
<td>The U.S. population is aging</td>
</tr>
<tr>
<td></td>
<td>Q13</td>
<td>National healthcare is trending towards interprofessional collaboration to treat patients</td>
</tr>
<tr>
<td>Four: External Professional Forces for Change</td>
<td>Q1</td>
<td>New scientific findings are available to incorporate into the curriculum</td>
</tr>
<tr>
<td></td>
<td>Q5</td>
<td>Scholarly research on educational best practices</td>
</tr>
<tr>
<td></td>
<td>Q12</td>
<td>Recommendations from advisory board members</td>
</tr>
<tr>
<td></td>
<td>Q13</td>
<td>National healthcare is trending towards interprofessional collaboration to treat patients</td>
</tr>
<tr>
<td></td>
<td>Q14</td>
<td>Technological advancements</td>
</tr>
<tr>
<td>Five: Science and Practice for Change</td>
<td>Q1</td>
<td>New scientific findings are available to incorporate into the curriculum</td>
</tr>
<tr>
<td></td>
<td>Q14</td>
<td>Technological advancements</td>
</tr>
<tr>
<td></td>
<td>Q15</td>
<td>The profession’s scope of practice is expanding</td>
</tr>
<tr>
<td></td>
<td>Q35</td>
<td>Ensure graduates are prepared for the workforce environment</td>
</tr>
</tbody>
</table>
Table 24: Lowest Ranked Statements for the Five Factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Number</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>One: Accreditation and Administration for Change</td>
<td>Q25</td>
<td>The U.S. has seen a growth in for-profit colleges</td>
</tr>
<tr>
<td></td>
<td>Q47</td>
<td>A co-worker in the dental hygiene program</td>
</tr>
<tr>
<td></td>
<td>Q52</td>
<td>Respond to the quality of entering students</td>
</tr>
<tr>
<td></td>
<td>Q27</td>
<td>Reimbursement for oral health care services</td>
</tr>
<tr>
<td>Two: Student Success for Change</td>
<td>Q18</td>
<td>The U.S. is experiencing a move towards urbanization</td>
</tr>
<tr>
<td></td>
<td>Q19</td>
<td>Government control of healthcare is increasing</td>
</tr>
<tr>
<td></td>
<td>Q23</td>
<td>The U.S. population desires convenient oral health care at a low cost</td>
</tr>
<tr>
<td></td>
<td>Q31</td>
<td>Textbook authors and publishers</td>
</tr>
<tr>
<td>Three: U.S. Population and Health Care for Change</td>
<td>Q32</td>
<td>Schedule flexibility of the dental hygiene program</td>
</tr>
<tr>
<td></td>
<td>Q25</td>
<td>The U.S. has seen a growth in for-profit colleges</td>
</tr>
<tr>
<td></td>
<td>Q51</td>
<td>Enhance rigor of course</td>
</tr>
<tr>
<td></td>
<td>Q18</td>
<td>The U.S. is experiencing a move towards urbanization</td>
</tr>
<tr>
<td>Four: External Professional Forces for Change</td>
<td>Q23</td>
<td>The U.S. population desires convenient oral health care at a low cost</td>
</tr>
<tr>
<td></td>
<td>Q58</td>
<td>Requests from college administration</td>
</tr>
<tr>
<td></td>
<td>Q6</td>
<td>The U.S. population is becoming more culturally diverse</td>
</tr>
<tr>
<td></td>
<td>Q47</td>
<td>A co-worker in the dental hygiene program</td>
</tr>
<tr>
<td>Five: Science and Practice for Change</td>
<td>Q12</td>
<td>Recommendations from advisory board members</td>
</tr>
<tr>
<td></td>
<td>Q55</td>
<td>Make an institution of distinction and prestige</td>
</tr>
<tr>
<td></td>
<td>Q52</td>
<td>Respond to the quality of entering students</td>
</tr>
<tr>
<td></td>
<td>Q34</td>
<td>Outcomes of calibration exercises among educators</td>
</tr>
</tbody>
</table>

Connecting Findings to the Theoretical Framework

Lewin’s force field analysis and model for change provided the theoretical framework for this research study. This theory identifies a three-step process for change; unfreezing, changing, and refreezing, and addresses the forces acting both for and against the change (Lewin, 1947,
1951). Lewin’s theory allows individuals to identify the forces, as well as the impact these forces have on change, as forces can be either facilitators or barriers to change (Bess & Dee, 2012; Lewin, 1951).

This study sought to determine the perceptions of dental hygiene program directors employed at two-year colleges regarding the forces impacting curriculum change in their programs. Participants were asked to sort the forces on an agreement scale based on which forces motivated them to change the existing dental hygiene curriculum. The results of the data analysis indicated five statistically different groups according to the sorting of the forces. These groups identified the driving forces for curriculum change, as well as the forces that do not promote change. These groups were named accordingly based on the driving forces they identified. The facilitating forces identified provide program directors, educators, and policy makers with an understanding of why curriculum changes are implemented.

Lewin’s concept of change suggests a planned change ensues when the stable environment at the current level becomes a stable environment at the desired level (Lewin, 2015, p. 224). Change occurs when the driving forces are increased or the restraining forces are decreased, or an amalgamation of the two (Bess & Dee, 2012; Lewin, 1951). Curriculum change is a planned process with forces acting for and against the change. This research project identified forces that make curriculum unfreeze and move from the current state to the desired state and refreeze with implemented changes. These forces included ones from the external, internal, and organizational environment.

One participant included in the post-sort questionnaire that “curriculum is driven by the accreditation standards and every change we make has to use the standards as a guide.” This
statement is indicative of her factor group that felt most strongly for accreditation as force for change. Another participant wrote, “I am always looking for ways to improve the program, so any statements focused around student learning had the greatest impact.” This statement represents her factor group that felt most strongly for student success as a force for change. An additional participant wrote, “I think scientific findings are the most important aspect when changing curriculum.” This statement expresses the views of his factor group that felt most strongly for external professional forces driving change.

**Limitations**

This research study sought to determine the perceptions of dental hygiene program directors toward curriculum change forces. Two-year and four-year colleges received the link to participate in the Q study, with a total of 24 directors completing the sorting activities, six four-year directors and 18 two-year directors. When the data were analyzed, the data from the four-year colleges caused cross loading on multiple viewpoints, and therefore were removed from the overall analysis. Consequently, the results cannot be generalized to all dental hygiene program directors.

Dental hygiene directors, due to their job description, are responsible for administrative duties as well as teaching duties. These extra responsibilities take up time during the workweek, and do not always allow for downtime to complete research studies. Dental hygiene program directors are usually the ones who receive request to participate in research studies, and could have impacted the response, as the individuals would decide which ones they would complete. The research study request was also sent out at the end of the 2016 Fall Semester and the
beginning of the 2017 Spring Semester. This transitional time between semesters is a busy time, as grades are due and preparation for the next semester is well under way.

The research design and instrument could have also played a key factor in the response rate. A few directors emailed back indicating the Q methodology research was too time consuming. One director indicated a Likert Scale design would have been better because she felt strongly about several forces and did not like the force distribution of the instrument. Some directors emailed back regarding technology issues, stating they were unable to access the link or reached a certain step and were unable to move forward. One director informed me her institution’s IRB needed to approve the study prior to her participation. A request was made to the institution’s IRB with no further correspondences received.

The research design in general also has limitations. On the post-sort questionnaire, several participants did not like the force distribution of the Q sort. Participants indicated they wanted to place certain statements under a ranking category, but were forced to move it because of the specific number of statements allowed for each ranking category. One participant indicated there were too many statements to sort. A few participants also indicated they had questions about the meaning of certain statements, and since the Q sort was web-based, the researcher was unable to address their concerns.

Demographic location of the P set could have also played a role in the findings from the Q sorts. While all dental hygiene programs follow accreditation standards, state practice acts ultimately determine what duties a dental hygienist is able to perform once licensed by the state. Some states have more restricted state practice acts compared to others. With a more
geographically homogeneous group, some statements may have been more significant than what this study revealed.

**Implications**

While it was not the objective of this research to generalize the findings to all dental hygiene program directors, it does provide the viewpoints dental hygiene program directors employed at two-year colleges towards curriculum change, and therefore adds to the literature on curriculum and curriculum change. The five viewpoints can be used to develop an understanding of the dental hygiene program directors. During the change process, it is important to assess the environment of the forces for and against the change to determine the origin, the strength, and implications of these forces (Eckel, Green, Hill, & Mallon, 1999). The major forces that were distinct in the viewpoints toward curriculum change included forces from the external, internal, and organizational environment. While the majority of the factors were described based on one environmental influence, one group was described based on external and organizational forces. These findings have implications for practice, policy, and research in regards to the different influential environments acting on curriculum change.

**Implications for practice.** This research showed different perspectives of forces encouraging curriculum change in dental hygiene programs, which has implications for all dental hygiene program directors and educators. Having the knowledge of the forces encouraging curriculum change allows clear communication on the changes occurring, creating an atmosphere of awareness and energy for change (Eckel, Green, Hill, & Mallon, 1999). Being knowledgeable of the forces further allows the program directors and educators to determine the strength of these forces to assist with determining which changes require “immediate attention”
or which ones can be handled at a later time (Eckel, Green, Hill, & Mallon, 1999, p. 11).

Identifying these forces will assist those individuals involved with identifying how much change will occur and who will be involved (Eckel, Green, Hill, & Mallon, 1999). These factors are all important to ensure the change is successful (Eckel, Green, Hill, & Mallon, 1999).

These research findings can also assist with professional development programs for program directors and educators. Professional development programs can be tailored to assist program directors and educators with changes related to specific content, and teaching and evaluation methods (Eckel, Green, Hill, & Mallon, 1999). These professional development programs can assist the educators involved with the feeling of competency to reduce fear and anxiety caused by the changes (Eckel, Green, Hill, & Mallon, 1999).

**Implications for policy.** The perspectives on curriculum change forces that emerged from this research study have implications for policymakers. As the research study indicated, the perspective with the largest participants was the Accreditation and Administration for Change, showing program directors follow the accrediting “rules.” The accrediting body for dental hygiene programs creates the standards that programs must follow to be accredited. Accreditation ensures that graduates are able to take national board exams and apply for state licensure. State practice acts provide the scope of practice for the dental hygiene profession.

The additional perspectives that emerged from this research study provide policymakers with the knowledge of other forces that motivate program directors to make changes to the existing dental hygiene curriculum. The other motivating forces may encourage policymakers to examine these forces when making changes themselves to accreditation standards and state practice acts. Policymakers may be more supportive of curriculum changes knowing other
forces motivate program directors to make changes. Their support could be in the form of flexibility when conducting accrediting site visits by working with programs on changes and seeing where those changes fit with the current accreditation standards. The research results indicated program directors change curriculum based on forces beyond the governing bodies, which reveals program directors desire independence from policymakers when making changes. While policymakers are the governing bodies of dental hygiene education and the profession, more program directors were factored into groups with forces from other external influencers, as well as internal influencers.

**Implications for research.** The research study revealed different perspectives on the forces that motivate dental hygiene program directors to make changes to the existing dental hygiene curriculum, which has implications for the current body of literature. The findings revealed changes are made due to forces from three environments, external, internal, and organizational; however, the previous literature did not provide a research study that examined all three environments at one time. This knowledge can encourage future researchers to include forces from all three environments in their studies.

Four of the five factors had their highest ranked statements related to scientific research, which is an indication that dental hygiene program directors value dental research. Program directors are motivated to make changes to the curricula based on new scientific evidence and evidence-based research. These findings are encouraging to researchers as it provides evidence that their studies are being utilized to educate the new professionals.
**Recommendations for Future Studies**

The dental hygiene workforce has been proposed as a solution to assist with the access to care issue in the U.S. (NGA, 2014; DHHS, 2015c). To utilize the workforce, curriculum changes are needed to prepare dental hygienists for the oral health care needs of the public (ADHA, 2015d). Given this information, it is the researcher’s intentions to further investigate the forces of curriculum change among dental hygiene program directors and dental hygiene educators. According to Lewin (1947, 1951), the change process has forces that encourage or impede change, and indicates these forces must be altered for change to occur. Future studies altering the current Q methodology study could include additional program directors, different statements in the Q set, additional post-sort questions, as well as the inclusion of dental hygiene educators.

This research study provided the viewpoints of program directors employed by two-year colleges. Future research to include program directors employed by four-year colleges gain perspectives of curriculum change forces at a university, revealing different factors than this research study. These future studies could use the same Q set to determine if time changes their perspective or utilize a new Q set if forces have changed over time. As the dental hygiene profession evolves to meet the oral health care needs of the public, different forces may emerge, which would produce different perspectives on curriculum change. New factors would emerge utilizing a new Q set, and could be compared to the current study to show similarities and differences. With a new Q set, the number of statements may be decreased, which would assist the P set with sorting, as one participant mentioned there were “too many statements to choose from.”
The post-sort questionnaire for the studies mentioned above could include additional questions not included in this study to further enhance the qualitative aspect of Q methodology. One question could ask participants to discuss more than one statement they had difficulty placing, as the original questionnaire asked for one statement only. Questions related to a specific curriculum change would allow participants to discuss a recent change while providing information on what forces encouraged or impeded the change. A question could ask participants to discuss how often they implement curriculum changes and the amount of time involved in implementing these changes. Participants could also include statements they feel should be included in the Q set. Another question could have participants discuss any recommendations they would provide to the Commission on Dental Accreditation (CODA), the accrediting body for dental hygiene programs, in regards to ensuring dental hygiene graduates are prepared for the current and changing work environment.

The current study identified curriculum change forces from three influential environments, external, internal, and organizational. Research studies specific to one environmental category may be beneficial to identify the most and least significant influences on curriculum change according to each category. The definition of curriculum, addressed in Chapter One, involves numerous aspects of curriculum from content to delivery to evaluation. Future studies could be specific on content changes, as well as delivery and evaluation methods, allowing further insights on forces specific to curriculum areas. Future studies addressing curriculum management plans could further enhance the literature on curriculum change in dental hygiene programs. These findings may provide additional insight on the forces behind
curriculum change as well as the process of change identified in Lewin’s (1947, 1951) three-step model for successful change.

Additional studies surveying dental hygiene educators who are not program directors would also be advantageous. While program directors have the responsibility to change the curriculum based on their administrative role, dental hygiene educators also have the responsibility to change their courses to ensure competent and prepared graduates. Accreditation standards require programs to “have a formal, written curriculum management plan,” which requires dental hygiene educators to contribute and participate in the plan (CODA, 2017, p. 28). A new P set to include dental hygiene educators would reveal more perspectives on curriculum change forces, further enhancing the literature on the motivating forces of curriculum change.

The method of administering future Q methodology studies could also change to obtain more participants. A face-to-face sort administered by the researcher could be completed with program directors as well as dental hygiene educators. Several opportunities exist throughout the year where educators gather at state or national meetings, which would increase the likelihood of more participants. Collecting the data in a face-to-face environment would allow for more qualitative data as focus groups could be conducted immediately following the analysis of the Q sort. For ease of data collection and to decrease the time between the sorting activity and focus groups, the web-based program can be utilized during the face-to-face sort with quick analysis of the sorts using R Statistical Data Analysis Software.

**Chapter Summary**

This research utilized Q methodology to explore the perceptions of dental hygiene program directors employed at two-year colleges towards curriculum change forces. A total of
18 participants completed the sorting activity of 60 statements on a scale of -6 to +6, and also completed a post-sort questionnaire to collect demographic data and further insights on the reasoning behind the ranking of the statements. Analysis indicated five distinct factors. These factors were Accreditation and Administration for Change, Student Success for Change, U.S. Population and Health Care for Change, External Professional Forces for Change, and Science and Practice for Change. While the five factors sorted six statements in a similar manner, all five groups had distinct statements that emphasized their differences on motivating forces to change the existing dental hygiene curriculum.
REFERENCES


(UMI No. 35113901).

http://qhr.sagepub.com/prox.lib.ncsu.edu/content/6/4/561.full.pdf+html


http://www.merriam-webster.com/dictionary/change

http://search.proquest.com/prox.lib.ncsu.edu/docview/221135314?pq-origsite=summon

Commission on Dental Accreditation (2016). *Accreditation standards for dental hygiene education programs.* Chicago, IL. Retrieved from  
http://www.ada.org/~/media/CODA/Files/dh.pdf?la=en


http://www.lmu.edu/Assets/Academic+Affairs+Division/Intercultural+Affairs/President$!27s+Leadership+Development+Initiative/pldiretreat2012+reading1b.pdf


http://www.lmu.edu/Assets/Academic+Affairs+Division/Intercultural+Affairs/President$!27s+Leadership+Development+Initiative/pldiretreat2012+reading1.pdf


http://search.proquest.com.prox.lib.ncsu.edu/docview/1518646265?pq-origsite=summon


APPENDICES
Appendix A: Q set

Q01 New scientific findings are available to incorporate into the curriculum.
Q02 Alumni surveys provide topics to incorporate into the curriculum.
Q03 Support from professional organizations.
Q04 Dental hygiene accreditation standards.
Q05 Scholarly research on educational best practices.
Q06 The U.S. population is becoming more culturally diverse.
Q07 The U.S. population is aging.
Q08 The healthcare delivery system is changing.
Q09 Workplace environments are evolving beyond the traditional dental office.
Q10 Practice regulation by state laws
Q11 Dental hygiene based workforce models are being created.
Q12 Recommendations from advisory board members.
Q13 National healthcare is trending towards interprofessional collaboration to treat patients.
Q14 Technological advancements.
Q15 The profession’s scope of practice is expanding.
Q16 Findings from evidence based research.
Q17 The U.S. population is growing.
Q18 The U.S. is experiencing a move towards urbanization.
Q19 Government control of healthcare is increasing.
Q20 A colleague from another dental hygiene program.
Q21 The U.S. is seeing an increase in chronic diseases with treatment options that require oral health care services.
Q22 Dental Support Organizations (DSOs) are growing in the U.S.
Q23 The U.S. population desires convenient oral health care at a low cost.
Q24 The U.S. has seen a growth in distance education.
Q25 The U.S. has seen a growth in for-profit colleges.
Q26 Dental products on the market.
Q27 Reimbursement for oral health care services.
Q28  The need to educate policy makers on oral health care
Q29  The “scope creep” on the dental hygiene profession by other professions
Q30  The underserved U.S. population
Q31  Textbook authors and publishers
Q32  Schedule flexibility of the dental hygiene program
Q33  A crowded curriculum
Q34  Outcomes of calibration exercises among educators
Q35  Ensure graduates are prepared for the workforce environment.
Q36  Students’ attitudes towards the current curriculum.
Q37  Results of an internal review of the current curriculum.
Q38  Student feedback on course evaluations.
Q39  Students’ attitudes toward lab equipment
Q40  To connect theory course content with clinical course content.
Q41  To accommodate the learning needs and abilities of the students.
Q42  Students desire an active role in their learning and experiences.
Q43  Adoption of a new textbook
Q44  An educator’s background
Q45  An educator’s educational beliefs
Q46  Student success in the course on formal measurements, such as quizzes, tests, and other graded
Q47  A co-worker in the dental hygiene program
Q48  The opportunity for meaningful student interactions
Q49  The program’s mission
Q50  Student attitudes towards the classroom environment
Q51  Enhance rigor of course
Q52  Respond to the quality of entering students
Q53  Prepare students for continuous, lifelong learning
Q54  Prepare students for a higher educational degree
Q55  Make an institution of distinction and prestige
Q56  Recommendations from the department
Q57  Other allied health programs desire collaboration with the dental hygiene program.
Q58  Requests from college administration
Q59  Availability of financial resources
Q60  Available human resources for curriculum change.
Appendix B: IRB Approval Email

From: IRB Administrative Office <pins_notifications@ncsu.edu>
Date: November 14, 2016 at 5:19:00 PM EST
To: james_bartlett@ncsu.edu
Subject: Bartlett - 9398 - IRB Protocol assigned Exempt status

Dear James Bartlett:

IRB Protocol 9398 has been assigned Exempt status
Title: Perceptions of Curriculum Change among Community College Dental Hygiene Program Directors
PI: Bartlett, James E

The research proposal named above has received administrative review and has been approved as exempt from the policy as outlined in the Code of Federal Regulations (Exemption: 46.101. Exempt b.2). Provided that the only participation of the subjects is as described in the proposal narrative, this project is exempt from further review. This approval does not expire, but any changes must be approved by the IRB prior to implementation.

1. This committee complies with requirements found in Title 45 part 46 of The Code of Federal Regulations. For NCSU projects, the Assurance Number is: FWA00003429.
2. Any changes to the protocol and supporting documents must be submitted and approved by the IRB prior to implementation.
3. If any unanticipated problems or adverse events occur, they must be reported to the IRB office within 5 business days by completing and submitting the unanticipated problem form on the IRB website: http://research.ncsu.edu/sparcs/compliance/irb/submission-guidance/.

Please let us know if you have any questions.

Sincerely,
Deb Paxton
919.515.4514

IRB Administrator
dapaxton@ncsu.edu
NC State IRB Office

Jennie Ofstein
919.515.8754
IRB Coordinator
irb-coordinator@ncsu.edu
NC State IRB Office
Appendix C: Survey Recruitment

Date: [INSERT DATE]
To: Dental Hygiene Program Director
From: Jessica Kiser
Re: Inviting your participation in a research study of curriculum change forces

Dear Dental Hygiene Program Director,

You are invited to participate in a research study on curriculum change forces. The purpose of this study is to determine your viewpoint on forces that motivates you to make changes to the existing dental hygiene curriculum. Data collection involves a sorting activity via a web based program and a brief post-sort questionnaire. The combined activities will take approximately 30 to 40 minutes to complete.

Your perspectives will provide insight on forces that encourage and restrain curriculum change as the dental hygiene curriculum evolves to ensure graduates are prepared to serve the oral health care needs of the U.S. population.

The North Carolina State University Institutional Review Board has approved this study. By completing the sorting activity and post-sort questionnaire, you are consenting to participating in this research project. You do not have to answer any question you do not want to answer. You may withdraw your participation at any time and your data will not be saved.

If you are interested and willing to participate in a follow-up focus group, please provide your email address at the completion of the survey. The focus groups will provide additional information to define and describe the groups that emerged from the initial data analysis. If you are not interested in participating in a follow-up focus group, please enter the following email address: abc@123.com. Providing your email address is completely voluntary and does not exclude you from initial data analysis.

If you are willing to participate, please use this link to access the online research study.
https://application.qsortware.net/user/jrkiser82/ Select either the two-year college or four-year college survey, depending on your institution.

Thank you for your consideration and time! Please contact me if you have any questions or concerns.

Best Regards,
Jessica Kiser
EdD Candidate, North Carolina State University
jkriser@ncsu.edu 919.749.0921
Appendix D: Initial Sort View from Online Q Sort Instrument

This research study seeks to determine your perceptions of curriculum change forces, and in particular, which forces motivate you to make changes to the existing curriculum. For the initial sort, please sort the statements of forces into three categories: most unlike my viewpoint, neutral, and most like my viewpoint.

Drag the following item into one of the boxes below:

New scientific findings are available to incorporate into the curriculum.

- Most unlike my viewpoint
- Neutral
- Most like my viewpoint
Appendix E: Final Sort View from Online Q sort Instrument

This research study seeks to determine your perceptions of curriculum change forms and in particular, which forms motivate you to make changes to the existing curriculum. For the final sort, please sort the statement of forms based on your viewpoint of which forms motivate you to make changes to the existing curriculum on a scale from -6 to +6, strongly disagree to strongly agree.

<table>
<thead>
<tr>
<th>Strongly disagree (-4)</th>
<th>-3 (3)</th>
<th>-2 (4)</th>
<th>-1 (5)</th>
<th>Neutral (0)</th>
<th>+1 (7)</th>
<th>+2 (6)</th>
<th>+3 (5)</th>
<th>+4 (4)</th>
<th>+5 (1)</th>
<th>Strongly agree (+6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

Continue
Appendix F: Post-sort Questionnaire View from Online Q sort Instrument

Post Sort Questionnaire

User Information

Why did you place your “strongly agree” statement under +6:

Why did you place your “strongly disagree” statement under -6:

Were there specific statements that you had difficulty placing?:

Yes

If yes, choose one, list the statement, & describe why:

What had the greatest impact on how you sorted/ranked the forces:
Appendix G: Demographic Information View from Online Q sort Instrument

Demographic Information

User Information

Please specify your gender: Male
Ethnicity: Please specify your ethnicity: Asian or Pacific Islander
Please specify your age: 
Education: What is your highest degree or level of school?: Bachelor's degree
Which region of the country do you live?: Midwest
Which of the following describes your institution's location?: Urban
How many years have you worked in education?: 
Which of the following describes your institution?: Public
Which of the following describes your institution?: 2 year/community/technical college
Are you interested in participating in a follow-up focus group?: Yes

OK
Appendix H: Focus Group Recruitment Letter

Date: [INSERT DATE]
To: Dental Hygiene Program Director
From: Jessica Kiser
Re: Inviting your participation in a follow-up focus group

Dear Dental Hygiene Program Director,

Thank you for your recent participation in a research study on curriculum change forces! At the completion of the study, you provided your email address as an indication of your willingness to participate in a focus group of individuals with similar viewpoints. I am contacting you to set-up a date and time for the focus group via this doodle poll link.

http://doodle.com/poll/cp3arzcm586vvu2g

By completing the doodle poll, you are consenting to participating in the focus group session. Once a date and time have been selected, the focus group will meet via a web based conference call service. Your additional input in this focus group will provide additional information to define and describe your particular group that emerged from the initial data analysis.

The North Carolina State University Institutional Review Board has approved this study. Your participation in the focus group is completely voluntary and you may withdraw your participation at any time.

Thank you for your consideration and time!

Best Regards,
Jessica Kiser
EdD Candidate
North Carolina State University
jkiser@ncsu.edu
919.749.0921
Appendix I: Focus Group Protocol

The following questions will be discussed during the focus group discussion.

1. Why did you place your “very strongly agree” statements under +6?

2. Why did you place your “very strongly disagree” statements under -6?

3. Were there specific statements that you had difficulty placing?

   a. If yes, choose one and please list the statement and describe your dilemma.

4. What has had the greatest impact on how you sorted/ranked your statements the way you did?