A systematic approach to an integrated curriculum model for dental education

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A SYSTEMATIC APPROACH TO AN INTEGRATED CURRICULUM MODEL
FOR DENTAL EDUCATION

By

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ABSTRACT

A Systematic Approach to an Integrated Curriculum Model for Dental Education

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The purpose of this quantitative study was to determine the degree of curriculum integration within dental schools in North America. The intent of the study was to determine how an adaptation of the Fogarty (1991) framework of integration exhibits itself in dental education.

An electronic survey conducted of the Academic Deans of dental schools in the United States and Canada resulted in a response rate of 54.09% (33/61). Frequencies, chi-square and Spearman rho (p) correlation coefficient were used for the statistical analyses of data.

All survey respondents reported that their curricula include all levels of integration which comprise the adapted integration framework. Six demographic variables were selected for analysis: (a) age of the school, (b) years of faculty teaching experience at that specific school, (c) faculty gender, (d) faculty employment status, (e) number of departments, and (f) average class size. Based on the data collected,
statistically significant findings were indicated in only one level of integration. Within
Level 4, within and across learners, significant findings were detected between genders.

Additionally, the findings of this study indicated that there was very little, if any
correlation, between the level of integration and the combined use of technology and
research at responding schools.
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CHAPTER 1

INTRODUCTION

Learning is defined by Driscoll, (2000) as a change in individuals as a result of experience. Formal learning is accomplished through a curriculum which is “a course of study offered by an educational institution” (Merriam-Webster’s Dictionary, 2004, p. 176). Traditional curriculum models are discipline or subject-based. These traditional models are teacher centered, focused on conveying isolated facts, where information is not generally presented in association with a real life context. This model of curriculum supports memorization and recitation of isolated information (Allen & More, 2004; Kysilka, 1998). Integrated curricula take a different approach to curriculum development. Integrated curricula support the idea that education is more learner-centered, actively involves the learners in the learning process, and prepares learners for life long learning.

According to Ertmer and Newby (1993), as learning moves on a continuum from behaviorist to cognitive to constructivist views, the focus of education changes. The instruction shifts from teacher centered to learner centered, from the transfer of facts to the concept of ideas and problem solving, and the learner moves from a passive recipient to an active participant.

Ertmer and Newby (1993) also state that learners’ knowledge changes along a continuum as well. As people acquire more experience with specific content they
progress from needing to know standard rules and facts, to being able to apply more thinking skills, to extrapolating from facts, to developing new forms of understanding.

For several decades there has been a steady trend toward a more holistic approach to learning through the use of integrated curricula. The trend began during the 1930's with the progressive education movement and has continued to the present (Vars, 1991). This trend is evident at all levels of education from Kindergarten through higher education (Kysilka, 1998; Lake, 1994; Shapiro, 2003).

Within higher education, the trend toward integrated curricula is occurring in numerous educational domains. The interest in various types of integrated and interdisciplinary study can be seen in the fields of business, science, engineering, math and environmental studies (Froyd & Ohland, 2005; Schlesinger, 1996; Shapiro, 2003). One area of higher education that has focused on movement toward an integrated curriculum in recent years is dental education.

Background of Dental Education

The first dental school was established in the United States in 1840. That number has grown to 57 in the United States and 10 in Canada today. A general course of study was designed with the intent of preparing professionals to offer quality oral health care to the general public. The course of study evolved over the years to a four year curriculum (Commission on Dental Accreditation, 2007). The traditional discipline-based curriculum is comprised of basic science lecture courses and a few preclinical labs in year 1; preclinical lecture and lab courses, a few science courses, and a clinic preparatory experience in year 2; and primarily clinical activities in years 3 and 4 (Hendricson &
Cohen, 2001). It is a teacher centered discipline-focused pedagogy (ADEA Commission on Change and Innovation, 2006).

In a study on issues in professional education, the Pew Health Professions Commission suggested that traditional dental curricula were having difficulty in adequately responding to emerging trends in science, technology and patient care delivery (O'Neil, 1993). The Commission’s findings were the impetus for a study conducted by the U.S. Institute of Medicine (IOM). The IOM study proposed reform in curriculum content and modernization of teaching and learning methods. Included in the study recommendations were suggestions for dental schools to adopt active learning strategies that help develop critical thinking and problem-solving skills. It also recommended a move toward integrating the disciplines to provide more clinically relevant education (Field, 1995).

In the years following the IOM study, the dental education community acknowledged that preclinical and clinical education has not kept pace or been responsive enough to emerging science, technology, research and modern educational strategies (Boufford & Cassel, 2003; Duderstadt, 2000; Hendricson & Cohen, 2001; Kohn, 2003; & Shuler, 2001). There is a consensus that major reform is needed (DePaola & Slavkin, 2004).

The justification for curricular change in dental education is undeniable. A number of organizations have been working to influence the structure of dental education. Most dental schools have individually devoted considerable time to evaluating and updating their school curriculum to meet the educational challenges of the new millennium (American Dental Education Association, 2004). However, these
organizations operate independently of each other. Each organization approaches curriculum change from a different perspective based on the context of their environment. Overall, change in dental environments tends to be slow and few significant innovations have occurred to date (Iacopino, 2007; Kassebaum & Hendricson, 2004).

The American Dental Education Association (ADEA) is the premier body that provides expert information, resources, advocacy and educational guidance for the dental education community. In 2004, ADEA’s Board of Directors identified curriculum reform as one of the Association’s strategic directions. In 2005, the Board created the ADEA Commission on Change and Innovation in Dental Education (CCI). CCI is responsible for providing leadership to all dental schools, representatives from organized dentistry, and other stakeholders in implementing curriculum change and reform (Haden, Andrieu, Chadwick, Chmar, Cole, George et al., 2006).

The American Dental Association also initiated efforts to encourage change and innovation in dental education. Through its Commission on Dental Accreditation (CODA), the organization began to focus on curriculum integration by revising the dental accreditation standards. These standards require a competency-based dental educational program which can only be accomplished through integrative teaching strategies (Commission on Dental Accreditation, 2007). Under the guidance of CCI, and through the efforts of CODA, the entire dental education community is currently responding to the call for innovative curricular change.

Statement of the Problem

Dental school curricula traditionally have been based on a model of compartmentalized educational delivery, lock-step, which is at least fifty years old.
Emerging science and technology have changed oral health care significantly in the past decade, requiring a shift in paradigm of learning. Innovative changes to the dental school curricula are necessary to enhance the relevance of science, technology, and professional requirements to the clinical experience within dental education.

Members of the dental education community have been operating independently to implement innovative curriculum changes (Haden et al, 2006). There is also no comprehensive data on the status of curriculum integration in North American dental schools.

Purpose of the Study

The purpose of this quantitative cross sectional study was to determine the degree of curriculum integration within dental schools in North America. The intent of the study was to determine how an adaptation of the Fogarty (1991) framework of integration exhibits itself in dental education.

Significance of the Study

For over a decade, the dental education community has advocated changes to their curriculum (Bennett & Boyd, 1996; DePaola & Slavkin, 2004; Haden, Andrieu, Chadwick, Chmar, Cole, George et al., 2006; Iacopino, 2007). The overall purpose of these changes is to make the curriculum more pedagogically sound. A major focus is on moving toward an integrated curriculum. Presently most dental schools are involved in some form of integration (Haden, Andrieu, Chadwick, Chmar, Cole, George et al., 2006; Iacopino, 2007). However, there has been no specific, generally accepted definition or framework from which to evaluate the type or level of integration. In addition, there has been no evaluation or assessment of where dental schools are in terms of integration.
This study contributes much to the professional literature by providing valuable information on the status of integration within the dental schools curricula in Northern America.

Research Questions

1. Based on an adaptation of Fogarty's (1991) curriculum integration framework, to what extent have dental schools integrated their curricula?

2. How are school environmental factors related to the level of curricula integration in dental schools?

3. To what extent does the incorporation of technology and research combined relate to the level of integration?

Limitations

The results of this study may have been affected by the following limitations:

1. Self-reported bias may have posed a threat to the validity of the study. Respondents could have potentially reported data that is not completely accurate. To minimize this potential threat, an electronic survey instrument was used and all data will be kept confidential.

2. The most important items of the questionnaire were closed-format items. Using this format limited the responses and restricted explanation or elaboration by the survey respondents. This format was used to avoid misinterpretations associated with open-ended responses and to reduce self-report bias.

3. Inconsistent use of the survey instrument by the survey respondents may have posed a potential threat to the validity of the study (Fink, 2006). This could
have been caused by poor item construction and/or misinterpretation of the instrument. To minimize this threat, a panel of experts reviewed the questionnaire to establish content validity. Additionally, examples were included in the questionnaire.

4. The survey responses were limited by the knowledge and perception of the individuals actually completing the questionnaire. To reduce this threat, the questionnaire was sent to the Academic Deans of each dental school. The Academic Deans are responsible for curriculum development implementation activities at each school.

5. Non-response or a low percentage of responses could be a potential threat to the validity of the study. This is particularly true because of the small size of sample population of this study. To encourage a high rate of response an online survey tool was used. A three phased email request strategy accompanied the survey tool. Additionally, closed-ended question format was used in an effort to reduce the amount of time necessary for the respondents to complete and return the questionnaire.

Delimitations

The range of the population of the study was limited to dental schools in North America. This only included schools in the United States and Canada. Therefore the results of the study can only be generalized to this population.

Basic Assumptions

The following assumptions were made in conducting the study:
1. Dental schools are utilizing a lock step curriculum which is a fixed schedule of courses that all members of the cohort must take as a group.

2. Questions on the instrument elicited appropriate information with respondents possessing accurate knowledge about the components of their schools curriculum.

3. Academic Deans are responsible for curriculum development and implementation activities in all dental schools.

4. Respondents understood the questions and terminology used on the instrument, and answered all items honestly.

Definition of Terms

**Connected Integration Model.** Content within a discipline is connected to a concept. Key concepts taught in different courses within the department lead to the next course explicitly (Fogarty, 1991; Fogarty & Stoehr, 1995).

**DS1.** First year dental students.

**DS2.** Second year dental students.

**DS3.** Third year dental students.

**DS4.** Fourth year dental students.

**Fragmented Integration Model.** Courses taught using the traditional model with separate and distinct disciplines (Fogarty, 1991, Fogarty & Stoehr, 1995).

**Horizontal Integration.** Concurrent teaching of basic topics in the dental education curriculum (Allen & More, 2004; Kingsley, O'Malley, Stewart, & Galbraith, 2007; Snyman & Kroon, 2005).
**Immersed Integration Model.** Courses are student centered so that the learner filters the content and becomes immersed or absorbed in his/her learning experience. (Fogarty, 1991, Fogarty & Stoehr, 1995).

**Integrated Integration Model.** Interdisciplinary approach where faculty do team planning and/or teaching both within disciplines and across departments. (Fogarty, 1991, Fogarty & Stoehr, 1995).

**Lock Step Curriculum.** Fixed schedule of courses that all members of a class must take together.

**Nested Integration Model.** Multiple skills are taught with a single department or discipline (Fogarty, 1991, Fogarty & Stoehr, 1995).

**Networked Integration Model.** Courses are taught so that students are required to integrate content that lead to external networks in the field of dentistry (Fogarty, 1991, Fogarty & Stoehr, 1995).

**Online Instruction.** The Internet is used to conduct the course in an online distance education environment, or in a blended course (part face-to-face and part distance education).

**Sequenced Integration Model.** Topics within a single department/discipline are arranged to coincide with one another (Fogarty, 1991, Fogarty & Stoehr, 1995).

**Shared Integration Model.** Faculty within a single department/discipline do team planning and/or teaching in which overlapping concepts emerge. (Fogarty, 1991, Fogarty & Stoehr, 1995).
Student Interaction via Technology. Course requires students to use and/or produce a technology resource (such as online journal, wiki, blog, conduct online research using the Internet).

Technology as a Teaching Tool. Technology is used as a teaching tool or resource in delivering a face to face course (PowerPoint, course mgt system).

Threaded Integration Model. Skills are taught in a specific order as they feed to the next topic or skill within and across departments/disciplines (Fogarty, 1991, Fogarty & Stoehr, 1995).

Vertical Integration. Including clinical classes along with biomedical science and behavioral science courses throughout the dental curriculum within and across departments/disciplines (Allen & More, 2004; Kingsley, O'Malley, Stewart, & Galbraith, 2007; Snyman & Kroon, 2005).

Webbed Integration Model. Courses taught where a fertile theme is intertwined within curriculum contents; the common theme is used to sift out appropriate concepts as a base for instruction within and across multiple disciplines (Fogarty, 1991, Fogarty & Stoehr, 1995).

Summary

This chapter provided an overview of dental education and described the elements associated with the dental curriculum. It established the framework for the study. Chapter two will cover the literature related to integrated curricula in general as well as how it relates specially to dental education.
CHAPTER 2

REVIEW OF RELATED LITERATURE

Introduction

Considerable literature is available on integrated curricula covering a diverse group of topics. Topics range from educational settings including K-12, vocational, professional and adult education environments and higher education. This review will discuss the history of curriculum development and present some of the more prevalent integration curriculum models. It will focus on the Fogarty (1991) framework and will subsequently use an adaptation of this framework to categorize integrated curriculum models in adult and higher education, and in dental education.

Curriculum History

Traditional curriculum models are discipline or subject-based. They are teacher centered, focused on conveying isolated facts. Information is not generally presented in association with a real life context. This model of curriculum supports memorization and recitation of isolated information (Allen & More, 2004; Kysilka, 1998). According to Beane (1993), the disciplines, described as silos, are used to impose order on the information conveyed. Little concern is focused on connecting things or integrating ideas within or across subject matters or with life experiences. According to Humphreys, Post and Ellis (1981), "It is taken for granted, apparently, that in time students will see for themselves how things fit together. Unfortunately, the reality of the situation is that they
tend to learn what we teach. If we teach connectedness and integration, they learn that. If we teach separation and discontinuity, that is what they learn. To suppose otherwise would be incongruous” (p. xi).

Humphrey’s position was shared by others because a movement toward a more connected, meaningful education environment has evolved in the United States over several decades. This movement began during the 1930’s with the progressive education movement. Supporters of this movement promoted an integrated curriculum. It is often referred to as the “core curriculum”. This core curriculum called for an approach that focused directly on the learner’s needs, problems, and concerns. It advocated bringing together skills and subject matter from any discipline required to address the learner’s needs (Vars, 1991).

The exponential growth of knowledge, new developments in the study of learning, the emergence of science and technology, and concerns about curriculum relevancy contributed to this evolution toward the interconnectedness of knowledge and skills (Bransford, Brown, & Cocking, 2000; Jacobs 1989). The trend has moved away from teaching isolated facts toward a course of study that connects and organizes facts around important concepts. Bransford et al (2000) refer to it as a new science of learning which emphasizes understanding rather than memorization. Bonds & Cox, (1993) refer to it as a synergistic curriculum. They describe it as a process of organizing and teaching subjects in a manner that they are almost inseparable. Concepts and facts taught in one area of the curriculum are related and reinforced in other subject areas. It adds a new dimension of meaning and relevance to information because of the connection between skills and content across curriculum lines.
Integration Movement

The integration movement is based on a constructivist view of learning which values in-depth learning. This view of learning is based in the work of proponents of a more holistic view of learning such as Piaget, Dewey, Bruner, Vygotsky, and others.

Several early studies were conducted that provide evidence of the effectiveness of integrated curricula. One of the earliest studies was conducted in the public elementary schools of Houston, Texas. Oberholtzer (1937) compared two thousand fourth and fifth graders from every section of the city. The study compared three groups of students. Two of the groups were enrolled in the integrated curriculum where the curriculum was organized around central themes with a third control group that was enrolled in the regular curriculum where subjects were taught in isolation. The study was conducted over a year and a half, or fifty-four school weeks.

Based on standardized test results, daily records of teachers, teacher and student surveys, and attitude questionnaires, the study found that student achievement of those in the integrated curriculum was better than those in the traditional curriculum. The achievement gains were measured in educational age over a period of one year. The study also found that less time was needed for teaching the fundamental skills when the integrated curriculum was used. In addition, the integrated curriculum allowed more time for enriched experiences such as problem solving and creative expression. Teachers found the integrated curriculum students expressed a greater interest and enthusiasm for their school work (Oberholtzer, 1937).

A number of studies were conducted to determine if students of integrated curricula learned facts and skills (Capehart, Hodges & Berdan, 1952; Capehart, Hodges
& Roth, 1953; Gale, 1959; Mickelson, 1957; Schwartz, 1959; Toops, 1955). Groups of integrated curriculum students were compared with groups of traditional curriculum students. Using standardized test scores, analysis of cumulative records, and questionnaires, the general consensus of these studies was that facts and skills were learned in the integrated curriculum. For example, for high school students in Highland Park Illinois, integrated curriculum graduates were as successful with academic subjects and more satisfied with their academic experiences (Gale, 1959); Tenth grade high school students in Oak Ridge Tennessee showed a ten percent increase in effectiveness of expression, better study habits and greater critical thinking skills (Capehart et al., 1952, 1953); and multiple studies showed increased reading skills in students participating in integrated curricula (Mickelson, 1957).

Studies were also conducted to investigate if students of integrated curricula succeed in college. One of the most extensive studies in this area was an eight year study conducted by Chamberlin. He matched 1,475 pairs of high school graduates from integrated curriculum schools and traditional schools and studied their college progress. The findings indicated that graduates of the integrated schools made slightly but consistently higher total grade point averages. The integrated school graduates had higher grade averages in all subject areas except foreign languages. They also received slightly but consistently more honors each year than the traditional comparison group (Mickelson, 1957).

Cook (1951) studied students at West Virginia University who were graduates of an integrated curriculum of the University High School. He compared them with graduates of Morgantown High School, a traditional college preparatory school in the
same geographical area. The study sampled graduates of the two schools between 1928 and 1946. Records were examined for four semesters. Results indicated that the University High School graduates did superior work in English, mathematics, science, and the social sciences (Cook, 1951; Mickelson, 1957).

There is a body of research associated with how people learn that adheres to the integrated approach to learning. This research is based on understandings of how the brain organizes and processes information. Crowell (1989) contends that the brain organizes many things simultaneously. It organizes new knowledge on the basis of previous experience and meanings and can retrieve these experiences quickly and easily. These experiences form patterns that aid in determining the significance of content.

Caine and Caine (1991) support this knowledge base and contributed to it by connecting neuro-psychology and educational methodologies. They found that part of the basic process in the human brain is to search for the meaning and patterns of things. It is their position that the brain may resist learning disjointed facts that are presented in isolation. They applied what they learned about brain functioning from neuroscience to curriculum design. They argue that curricula designed to have students use their brain more fully will teach for meaningfulness. Meaningfulness is the result of a curriculum that is geared toward wholeness and interconnectedness by organizing learning around themes or concepts.

Shoemaker (1989) summarizes the concept of human brain and learning by stating that “the human brain actively seeks patterns and searches for meaning through these patterns, learning should involve the opportunity to explore these pattern concepts”
This brain research implies the combination of interdisciplinary learning, thematic
teaching, and experiential education (Lake, 1994).

Since the 1930’s, there has been a steady movement toward a more holistic
approach to learning. Numerous studies conducted at various educational levels provide
evidence to support this movement. Other research associated with the human brain and
the way people learn add additional support for this trend.

Integrated Curriculum Models

Numerous terms used in the literature refer to integrated curricula. They include
interdisciplinary, thematic, synergistic and holistic curricula (Bonds & Cox, 1993; Good,
1973; Lake, 1994). Many different definitions are associated with each term as well,
although a standardized definition has yet to be established. From the literature it appears
that integrated means whatever someone decides it means as long as it includes a
connection between previously separated disciplines, content areas and or skill areas
(Kysilka, 1998).

Most supporters of integrated curriculum agree on some fundamental beliefs that
they think are the impetuous for integrated curricula. These beliefs are that: (a)
engagement of students in meaningful activity; (b) activities are significant if directly
related to students’ interests and needs; (c) real world knowledge is applied in an
integrated fashion; (d) individuals need to know how to think critically and should not be
receptacles for facts; (e) subject matter is a means, not a goal; (f) teachers and students
need to work cooperatively for successful learning; (g) knowledge is growing
exponentially and changing rapidly, it is no longer static; and (h) technology is changing
access to information, defying lock-step, sequential, predetermined steps in the learning steps (Kysilka, 1998).

Various models define curricula from a single definition, from the perspective of thematic teaching, from an interdisciplinary standpoint, or from a continuum perspective. One of the most prevalent integration frameworks were introduced by Fogarty (1991) and Fogarty and Stoehr (1995). Their framework includes ten models encompassing three domains: (a) integration within single disciplines, (b) integration across several disciplines, and (c) integration within and across learners.

**Figure 1.** Integrated Framework (Fogarty, 1991)
Ten models of Curriculum Integration

1. Fragmented: traditional model of separate and distinct, which fragments the subject areas.

2. Connected: within each subject area, course content is connected topic to topic, concept to concept, one year's work to the next, and relates ideas explicitly.

3. Nested: within each subject, the teacher targets multiple skills: a social skill, a thinking skill, and a content-specific skill.

4. Sequenced: topics or units of study are rearranged and sequenced to coincide with one another. Similar ideas are taught in concert while remaining separated subjects.

5. Shared: shared planning and teaching take places in two disciplines in which overlapping concepts or ideas emerge as organizing elements.

6. Webbed: a fertile theme is webbed to curriculum contents and disciplines; subjects use the theme to sift out appropriate concepts, topics, and ideas.

7. Threaded: the meta-curricular approach threads thinking skills, social skills, multiple intelligences, technology, and study skills through the various disciplines.

8. Integrated: this interdisciplinary approach matches subjects for overlaps in topics and concepts with some team teaching in an authentic integrated model.

9. Immerged: the disciplines become part of the learner's lens of expertise; the learner filters all content through this lens and becomes immersed in his/her own experience.

10. Networked: learner filters all learning through the expert's eye and makes internal connections that lead to external networks of experts in related fields.

Figure 2. Ten Models of Curriculum Integration
Within Single Discipline Models

The within single disciplines area includes the fragmented, connected, and nested models. The fragmented model is the traditional design where the curriculum is taught in separate and distinct disciplines. The connected model views the curriculum through an opera glass. It takes a close-up look of details and interconnections within one discipline connecting one topic, one skill and one concept to the next. The nested model takes a three-dimensional look at the curriculum. It targets multiple dimensions of subject matter and takes advantage of natural combinations (Jacobs, 1989).

Across Discipline Models

The across several disciplines area includes sequenced, shared, webbed, threaded and integrated models. The sequenced model views the curriculum through eyeglasses; separate lenses are connected by a common frame. Units are taught separately, but are rearranged and sequenced to create a broad framework for related concepts. The shared model is like looking at the curriculum through binoculars. It brings two distinct disciplines together into a single image. It does this by using overlapping concepts as organizers. A lot of shared planning must take place when developing this type of approach to integration (Jacobs, 1989).

The webbed model is like viewing the curriculum through a telescope. It uses a theme to integrate subject matter. The threaded model views the curriculum through a magnifying glass. The object is to find the big ideas through all the content and thread them together. The integrated model views the curriculum through a kaleidoscope. It rearranges interdisciplinary topics around overlapping concepts, emergent patterns and designs. This approach integrates by blending (Jacobs, 1989).
Within and Across Learner Models

The within and across learners area includes immersed and networked models. The immersed model views the curriculum through a microscope. This integration takes place within the learner with little or no outside intervention. The learner totally immerses him or herself in a field of study and begins to integrate all data by funneling it through their area of interest. The networked model views the curriculum through a prism. The learners themselves can target the resources as they reach within and across their areas of study through the use of experts (Jacobs, 1989).

Discipline Model

Another integration curriculum model was developed by Jacobs (1989). She defines five options, parallel disciplines, multidisciplinary, interdisciplinary, integrated day, and complete integration. These options are on a continuum from discipline-based to complete integrations. Between the two ends is what she considers degrees of integration.

The parallel disciplines option maintains subjects as separate entities. However, the instructor attempts to sequence topics so that related ideas are taught concurrently. This option is similar to Fogarty’s sequenced model.

The multidisciplinary option brings related disciplines together in a formal way such as humanities, political history, and fine arts. A new course is created based on the relationships between the existing subjects.

In the interdisciplinary option specific courses of study are created to bring together all the disciplines within a school’s curriculum. The units are designed around a theme or an idea. These units do not replace existing courses; they are complementary to
the existing curriculum. The integrated day option is a theme based full day program that focuses on student interests and needs.

The complete integration option is where students determine the curriculum based on their determined needs, interests and experiences. An example of this type of integration is the New College in Sarasota, Florida. Each student’s curriculum consists of courses and activities considered most appropriate for each student’s goals (Kysilka, 1998).

Fogarty’s model provides a solid generic foundation for designing a wide range of curricula regardless of discipline or educational level. It includes numerous categories and types of integration models. It also allows for a mixture of categories within an identified educational unit. For these reasons, this model is used as a framework to present integrated studies found in the literature.

Integrated Curricula in Adult Education

Growing interest in adult and higher education is centered on interdisciplinary study, which promotes curriculum more as a highly integrated learning experience and less as independent courses (Lake, 1994). The level and type of integration seems to vary among the types of integration programs. When reviewing the literature, the higher education programs were organized according to Fogarty’s three categories, integration within single disciplines, integration across several disciplines, and integration within and across learners (Fogarty 1991).

Environmental Science Integrated Curriculum

Shapiro (2003) conducted a case study illustrating the structures and process of developing a holistic curriculum at the California State University Monterey Bay. The
environmental science and policy department set a goal to develop a more integrated curriculum. Their approach was based on a framework for fostering learning that lasts through the integration of learning, development and performance (Mentokowski, 2000). The intent was to create a holistic curriculum that prepared students for an increasingly complex world and increased the effectiveness of their major.

The curriculum is comprised of four major interdependent components, a junior entry course, a capstone experience, a suite of organized learning experience courses, and a writing skills requirement. These components represent all three categories of Fogarty’s model. For example, the junior entry course is a nested course within the major discipline, but it combines environmental content skills with social issues, policy issues, and personal and professional goals. In addition to a writing component, it embeds the university mandated writing exam into this course (Shapiro, 2003).

The writing component represents the across several disciplines category and can be considered webbed. Writing is considered so important that the school has used it as a basic theme and the majority of courses build the class requirements, assignments and projects around writing.

Finally, the capstone experience integrates within or across learners. It can fit into the immersed or networked categories depending upon the topic chosen by the student. The student integrates learning efforts by utilizing a single or combined experts and resources from chemistry, physics, biology, geology, ecology, economics, environmental, ethics and teacher education departments.

The case study revealed that the component activities in their entirety promote ongoing critical thinking, problem solving, and analytical skills that cross disciplines.
Also, the program led to the creation of an innovative tenure-track faculty position with
the primary responsibility for coordinating holistic integrated curriculum development
(Shapiro, 2003).

**Business School Integrated Curriculum**

Porter and McKibben (1988) studied business schools in the 1980’s and
concluded that most lacked an integration of subject matter. They urged business schools
to view management as a process or series of complex, integrated decisions rather than
discrete steps organized by functions. They recommended that MBA programs integrate
their programs to, “reflect, in some way or another, a greater level of cross-functional
integration than is currently the case in order to match the multifunctional nature of
business problems” (Schlesinger, 1996, p. 479).

In response to Porter and McKibben’s recommendations, Babson College initiated
a five year effort to develop a new highly integrated, cross-functional model for their one
year MBA program. The Babson College model represents the across several disciplines
category of Fogarty’s model. The program consists of a summer residency program
followed by a year of course modules. The residency component is integrated because a
team of faculty from marketing, finance, accounting, economics, quantitative methods,
organizational behavior and information technology plan and teach the courses
(Schlesinger, 1996).

The remainder of the program is webbed because it consists of thematic modules
based on topics that are important trends in business and organization of the future. The
modules are taught by faculty members who integrate their material by collaborating,
discussing and often relearning material together. Even the examinations are developed,
administered and scored in an integrated fashion. In addition, a peer evaluation component is used to allow students to evaluate members of their work groups (Schlesinger, 1996).

Student and faculty feedback indicates that students learned the individual functional areas very well. They were also able to integrate the material in a way that may be required in future management positions. Faculty found that as students progressed, they were able to strategize and think outside the functional boxes. In addition, faculty members felt they learned a great deal from each other (Schlesinger, 1996).

Science, Engineering, and Mathematics

Integrated Curricula

One of the largest bodies of literature on integrated curricula in higher education is the result of the work of the Integrated First-Year Curriculum in Science, Engineering, and Mathematics (IFYCSWM). The IFYCSWM was established by the Foundation Coalition, one of eight engineering foundations funded by the National Science Foundation. The member institutions have changed since its formation and now include Arizona State University, Rose-Hulman Institute of Technology, Texas A&M University, Texas A&M University – Kingsville, the University of Alabama, the University of Massachusetts – Dartmouth, and the University of Wisconsin (http://www.foundationcoalition.org).

In addition to the partner schools, programs have also been started at Colorado School of Mines, Drexel University, Embry-Riddle Aeronautical University, Louisiana Technological University, North Carolina State University, The Ohio State University,
The purpose of the coalition is to establish a new culture of engineering education. This new culture is based on seven core competencies which include curriculum integration, cooperative and active learning, and technology-enabled learning (Froyd & Frair, 2000). The Foundation states that “curriculum integration implies restructuring learning activities to help students build connections between topics” (http://www.foundationcoalition.org). Using this as a guide, the partner schools have each developed and implemented integrated curricula that are representative of all three areas of Fogarty’s model.

Rose-Hulman Institute of Technology curriculum is the only one that can be placed in the within single discipline category. They have a nested curriculum that integrates subjects from math, physics, and chemistry into one course per semester for each of three terms. Mechanics Baseline Inventory and Forced Concept Inventory instruments were used as assessment tools. While detailed statistics were not reported, the program reports that student posttest scores were slightly higher than their pretest scores in comparison to the students enrolled in the traditional curriculum (Froyd & Ohland, 2005).

Most IFYCSWM programs implemented curricula that are integrated across several disciplines. Arizona, Alabama, Embry-Riddle and Louisiana have sequenced programs where coordinated topics are taught in physics, calculus, various engineering courses and humanities with students working in teams (Froyd and Ohland, 2005). Curriculum assessments of the various programs reported lower attrition rates in the
integrated programs; higher posttest scores in comparison to traditional programs by up to 30%; and increased student motivation (Duerden, Doak, Garland, Green, Roedel, Williams, et al., 1997; Froyd & Ohland, 2005; Watret & Martin, 2002).

Alabama and Massachusetts have shared curricula where faculty work as interdisciplinary teams to collaboratively organize topics, assignments, and teach. No specific metrics were specified, but assessment reports indicate that student grades have significantly increased for students participating in the shared curriculum programs (Froyd & Ohland, 2005).

Texas and Ohio State have a threaded curriculum where calculus, physics, chemistry, English, and basic engineering courses are offered in successive clusters and students work in teams. Standard testing methods, electronic journals and course grades indicate that the program participants are obtaining higher grades and retaining more information than non program participants. Surveys, focus group discussions and team feedback indicate positive student attitudes. In addition, higher retention rates up to 6% higher for comparison groups are reported (Demel, Merrill, Fentiman, & Freuler, 1999; Froyd & Ohland, 2005).

Colorado, Drexel, Louisiana, North Carolina, Berkeley, and Florida have integrated curriculum programs which include a series of courses and active-learning modules that are planned and taught by faculty teams across departments. Assessment and follow up data show up to 17% higher graduation rates for students from this program; increased levels of student computer skills; improved retention and rate of progress over traditional programs; and an increase in student ability to make connections between disciplines (Froyd & Ohland, 2005; Olds & Miller, 2004; Quinn, 1995).
Pittsburgh is the only curriculum that is networked. The school has cultivated a community atmosphere through the use of student teams with counseling and mentoring being done by upper class students. The students direct the integration by selecting from a network of experts and other resources in math, chemistry, physics, humanities, social sciences, civil and environmental engineering (Froyd & Ohland, 2005).

Curriculum integration at the higher education level has been implemented in various disciplines. Programs from several areas indicate that models representing within single disciplines, across several disciplines, and within and across learners are currently striving. Studies in Business, Engineering, Math, Science and others indicate favorable results which include better problem solving and critical thinking skills, and higher student retention rates. In addition, there are reports of more teacher student involvement in the learning process.

Integrated Curricula in Dental Education

Professional health care education differs from other fields of higher education in that the objective is not only to teach knowledge, but it is also to teach specific skills that must be learned in order to practice the profession. To achieve these objectives, dental education has traditionally employed a discipline-based curriculum. The curriculum is comprised of basic science lecture courses and a few preclinical labs in year 1; preclinical lecture and lab courses, a few science courses, and a clinic preparatory experience in year 2; and primarily clinical activities in years 3 and 4. It is a teacher centered discipline-focused, lecture based pedagogy (Hendricson & Cohen, 2001).

In a study on issues in professional education, the Pew Health Professions Commission suggested that traditional dental curricula were having difficulty in
adequately responding to emerging trends in science, technology and patient care delivery (O'Neil, 1993). The Commission's findings were the impetus for a study conducted by the U.S. Institute of Medicine (IOM), Dental Education at the Crossroads. The IOM study proposed reform in curriculum content and modernization of teaching and learning methods. Included in the study recommendations are suggestions for dental schools to adopt active learning strategies that help develop critical thinking and problem-solving skills, and that better engage the students. The study also recommended a move toward integrating the disciplines to provide more clinically relevant education (Field, 1995).

Since the IOM study, advances in all aspects of biomedical sciences and clinical practices are occurring at an exponential pace. Advances in these areas affect dental education making research a critical component within dental education programs (Iacopino, 2007; Iacopino, Lynch & Taft, 2004; Kingsley, O'Malley, Stewart & Howard, 2008). Biomedical and clinical research programs can enhance critical thinking and problem solving skills. Research adds to the body of knowledge regarding various diseases. Also, knowledge gained through research assignments and courses can become a conduit for motivating students to pursue research careers (Hillman, Fajardo, Wizke, Ardenas, Irion & Fulginiti, 1989; Iacopino, 2007).

Similar to the advances in biomedical science and clinical practice, technology enhancements have also occurred at an exponential rate over the last decade. With these enhancements much attention has been given to integrating technology into teaching and learning at all levels of education (Lake, 1994). Lawless and Pellegrino (2007) suggest that integrating technology into teaching and learning is a complex matter and can occur
in numerous ways. Lawless and Pellegrino further state that technology is not one single thing, but many things that can be woven into the instructional environment.

According to the Technology in Schools Taskforce, practices that synthesize technology into the teaching and learning process can manifest in numerous ways. These practices include various forms of collaborative work and communication, Internet-based research, remote access to courses, and other methods (Lawless & Pellegrino, 2007). Whether technology is used as a teaching tool or if students are required to interact with technology, this fusion can enhance the learning of knowledge and skills. In a study conducted by Lowerison, Sclater, Schmid, and Abrami in 2006, sixty-two percent of the 1966 higher education student participants perceived that the use of technology enhanced their learning process. Fifty-one percent believed that the synthesis of computer technology contributed to a more active learning environment by increasing their interactions with other students and the instructor.

Constructivist theories of learning emphasize the value and importance of active learning (Abrami, 2001). Providing students with the opportunity to use technology in the learning environment is said to support active learning (Institute for Higher Education Policy, 2000; Twigg, 2001). Shuell and Faber (2001) found that when students participated in the use of technology in courses, their perception was that the course was more valuable and that the technology contributed to their learning and their motivation.

Few studies have been published on the subject of curriculum integration within dental education. One general study was conducted in 2002-2003 which examined the format of curricula at North American dental schools. Eighty-seven percent of the forty-eight U.S. schools and eight Canadian schools responded. Sixty-six percent of the schools
who responded reported discipline-based curricula with a few interdisciplinary courses. In terms of integration of major sections of the curriculum, only 7 percent reported a curriculum centered on interrelated themes (Kassebaum, Hendricson, Taft, & Haden, 2004).

The study also reported the use of computer and web-based learning as the most frequent innovation in dental curricula in the preceding three years (Kassebaum et al, 2004). No details were provided on the type of technologies or how technology was being used in the curriculum.

Iacopino, (2007) and Iacopino, Lynch and Taft, (2004) report on a comprehensive curriculum revision at the Marquette University School of Dentistry. This model integrates foundational and clinical science and assimilates research and technology as components within the curriculum. The Marquette curriculum represents the across several disciplines category of Fogarty’s model. The curriculum integrates basic biomedical, behavioral, and clinical sciences content into sequenced educational tracks over a four year period. This appears to represents both the sequenced and threaded models in Fogarty’s framework.

According to Iacopino (2007), this new integrated curriculum, with the inclusion of a research component, and the assimilation of technology has positively changed the culture at the dental school. It has created a supportive environment for research and has altered faculty and student attitudes with regard to integration in dental education. Students overall are more engaged, and there has been a significant increase in the number of students participating in research and scholarship activities.
The University of Nevada Las Vegas (UNLV), school of dental medicine has an integrated curriculum which is based on a thematic format (Sanders & Ferrillo, 2003). The UNLV curriculum represents the within single discipline and across several disciplines categories of Fogarty's model.

One example from the UNLV curriculum is the Integrated Seminar. This first-year course facilitates horizontal and vertical integration of the basic and clinical sciences. Faculty from all three departments, Biomedical, Clinical, and Professional Studies, work as a team to plan, select course topics, and teach the course (Kingsley, O’Malley, Stewart, & Galbraith, 2007). This represents the integrated model of the Fogarty framework.

UNLV also has developed a structured program of research enrichment that is horizontally and vertically integrated into the curriculum. The program is comprised of three components. First, research faculty present research seminars in a first year course, next faculty and students engage in various structured research-related activities, finally students’ present research finding to subsequent integration seminar courses (Kingsley, O’Malley, Stewart, & Howard, 2008).

Most dental schools have individually devoted considerable time to evaluating and updating their school curriculum to meet the educational challenges of the new millennium (American Dental Education Association, 2004). However, these schools operate independently of each other. Each school approaches curriculum change from a different perspective based on the context of their environment. Overall, change in dental environments tends to be slow and few significant innovations have occurred to date (Iacopino, 2007; Kassebaum, Hendricson, Taft, & Haden, 2004).
The American Dental Education Association (ADEA) is interested in addressing curriculum reform from a more global perspective. In 2004, the Board of Directors identified curriculum reform as one of the Association’s strategic directions. In 2005, the Board created the ADEA Commission on Change and Innovation in Dental Education (CCI). CCI is responsible for providing leadership to all dental schools, representatives from organized dentistry, and other stake holders in implementing curriculum change and reform (Haden, Andrieu, Chadwick, Chmar, Cole, George, et al., 2006).

Under the guidance of CCI, the entire dental education community is currently responding to the call for innovative curricular change. CCI has established a liaison committee comprised of representatives from the U.S. and Canadian dental schools. The CCI Liaisons are the conduit to promote discussion, share strategies and assist with information distribution among the North American Dental Schools. CCI held its initial conference in June 2007 and established four goals for the 2007-2008 year. The goals are: (a) to begin a dialogue at each school about factors that influence the quality of dental education, (b) to identify a school project that addresses curriculum innovation at each school, (c) to collaborate with the ADEA CCI on two surveys designed to determine the most pressing curricular issues, and (d) to attend and actively participate in faculty development opportunities on curriculum change and innovation (ADEA, http://www.adea.org).

CCI views change and innovation in dental education as a set of values, attitudes, and behaviors that describe a culture. Through the Liaisons the goal is to establish and promote a process of continuous improvement which includes an integrated dental
education curriculum that adequately responds to emerging trends in science, technology, and teaching methodologies (ADEA, http://www.adea.org).

Summary

Since the 1930's a steady movement away from traditional, discipline based curricula has led to a more holistic approach to learning. This trend has been linked with the rising developments in science and technology and has occurred at all levels of education from elementary through higher education.

Like other fields of higher education, dental education has followed this trend. However, unlike some other fields, the movement toward a more integrated, student centered curriculum has been slow in dental education. In response to recommendations from studies conducted by the Pew Health Professions Commission and the U.S. Institute of Medicine, the dental education community has made a commitment to promote change in the dental curriculum. This change is geared toward a more connected, engaging learning environment.
CHAPTER 3

METHODOLOGY

This chapter includes a discussion of the methodology utilized in the study. The discussion includes a review of the purpose of the study and the research questions. This is followed by a discussion of the design, sample, survey instrument, data collection and data analyses strategies.

Purpose of the Study

Utilizing a quantitative cross sectional design, this study determined the degree of curriculum integration within dental schools in North America. Additionally, the study determined how an adaptation of Fogarty’s (1991) framework of integration exhibits itself in dental education.

Research Questions

Utilizing a cross sectional research design this study sought to answer the following questions:

1. Based on an adaptation of Fogarty’s (1991) curriculum integration framework, to what extent have dental schools integrated their curricula?

2. How are school environmental factors related to the level of curricula integration in dental schools?

3. To what extent does the incorporation of technology and research combined relate to the level of integration?
Design

This study utilized a descriptive cross-sectional survey research design. Baumgartner and Hensley (2006) define descriptive research as studies conducted by collecting information about a present situation or of what people are doing at the moment, and using that information to describe the situation. The cross-sectional approach is a “method for testing many groups and assuming each group is representative of all other groups when they are at that point in time”, (p. 181). Rather than an individual being the unit of measure, the dental school as a whole was the unit of measure.

Sample

The population for this study was the 57 dental schools in the United States and the 10 dental schools in Canada with the dental school being the unit of measure. Dental Schools have a lock-step curriculum. The curriculum is established for each class, DS1 through DS4, and students progress through all four years as a cohort. Therefore the study took the form of a census by studying the study population as a whole rather than a sample (Johnson & Christensen, 2008). The survey was sent to the Academic Deans because they are responsible for all curriculum activity at each institution.

This population was chosen because dental education is a small educational community. These 67 schools comprise the institutional membership of the American Dental Education Association (ADEA). ADEA provides information, expert advice and resources to address education, research and other related oral health concerns. ADEA has appointed a special commission dedicated to promoting integrated curricula and other innovations in dental education (ADEA website, 2008). Therefore it was appropriate to
survey the entire North American dental school population to investigate current curriculum integration status.

Instrumentation

A survey instrument was utilized to collect data. Survey instruments are used to collect information from a sample of people, representing a population (Cozby, 2007). The survey, in the form of a questionnaire, was constructed from information obtained from the literature review. Additional information was obtained from interviews conducted with teaching and research faculty of the UNLV School of Dental Medicine.

The instrument was developed based on the process offered by Fink (2006). The steps included: (a) defining the concepts to be measured, (b) identifying the information needs or hypotheses, (c) determining which questions must be asked to measure the concepts and supply the information needed, (d) determining the type of questions that will provide the data to measure the concept, and (e) writing concrete questions, using a single thought in each question.

Using this process, three major concepts were identified, the extent of integration within dental school curricula, the relationship between school environmental factors and the level of integration, and the association between the inclusion of technology and research combined and the degree of integration. For example, the research states that the dental school curriculum is very traditional and has difficulty incorporating change (Hendricson & Cohen, 2001; Iacopino, 2007; Kassebaum, Hendricson, Taft, & Haden, 2004). This suggests a possible association between some school environmental factors and the degree of curriculum integration. To measure this, questions concerning such elements as the age of the school, composition of the faculty, organizational structure and
class size were developed. The best types of questions for obtaining this kind of information are closed ended survey questions (Fink, 2006).

Fink's (2006) item writing rules for developing closed ended survey questions were followed. These rules are: (a) make each question meaningful to the respondents, (b) use Standard English, (c) make questions concrete, (d) avoid biased words and phrases, (e) check your own biases, and (f) limit each question to a single thought or concept.

Based on Fink's guidelines, the questionnaire consisted of a combination of 27 closed-ended questions (check one or check all that apply), and fill-in the blank questions. The final question was open-ended to allow participants to include comments if they desired (Appendix I). Table 1, Survey Item Summary, summarizes the elements measured by each item on the survey.

Table 1

<table>
<thead>
<tr>
<th>Item(s)</th>
<th>Subscale being measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Items 1, 2, &amp; 3</td>
<td>Levels of integration relative to within a single discipline or vertical integration, fragmented, connected, and nested models.</td>
</tr>
<tr>
<td>Items 4 &amp; 5</td>
<td>Levels of integration relative to across multiple disciplines or horizontal integration, sequenced and shared models.</td>
</tr>
</tbody>
</table>
Table 1

Continued

<table>
<thead>
<tr>
<th>Item(s)</th>
<th>Subscale being measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Items 6, 7, &amp; 8</td>
<td>Levels of integration relative to within single disciplines and across multiple disciplines or vertical and horizontal integration, webbed, threaded, and integrated models.</td>
</tr>
<tr>
<td>Items 9 &amp; 10</td>
<td>Courses designed where the student is responsible for integrating the knowledge learned with their own knowledge base or with other learners, immersed and networked integration models.</td>
</tr>
<tr>
<td>Items 11, 12, 13, 14, 15, 17, &amp; 18</td>
<td>Levels of integration relative to the use of technology within instruction including online instruction, blended instruction, student use of multimedia, use of course management systems and power points.</td>
</tr>
<tr>
<td>Items 16, 19, 20, &amp; 21</td>
<td>Levels of integration relative to the inclusion of research in the curriculum, via the internet, conducting literature reviews, research proposals, and research projects.</td>
</tr>
<tr>
<td>Items 22 – 27</td>
<td>General demographic information</td>
</tr>
<tr>
<td>Item 28</td>
<td>Open ended comment section</td>
</tr>
</tbody>
</table>
Validity

Content validity was established by sending the instrument to a panel of 7 experts for review (Appendix II). According to Crocker and Algina (1986), this is the typical procedure used to judge the soundness of instrument content. The experts have expertise in higher education, healthcare, healthcare surveys, dental education, general dentistry, and healthcare research.

Reliability

The reliability of the instrument was determined through a test-retest for stability-reliability. This method of assessing reliability measures the same individuals at two points in time and determines the degree of relationship between the two results (Cozby, 2007; Crocker & Algina, 1986). A convenience sample of 10 dental school faculty members was asked to participate in the process. Faculty members completed the questionnaire on two separate occasions, one week apart. Results of the test-retest, coefficient of stability, were calculated using Pearson product moment correlation coefficient. Pearson product moment correlation coefficient indicates the strength or weakness of the relationship of the variables (Cozby, 2007; Crocker & Algina, 1986). The coefficient of stability was calculated for each subscale within the instrument as well as for the instrument as a whole.

In addition, Cronback alpha was used to assess internal reliability of each sub set and of the entire instrument. The reliability coefficient was reported. Cronback alpha is often used to assess the degree to which responses are consistent on self-report items (Warner, 2008).
Table 2

*Subscales within Survey Instrument*

<table>
<thead>
<tr>
<th>Item(s)</th>
<th>Subscale being measured</th>
<th>Coefficient* of stability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td></td>
<td>.908</td>
</tr>
<tr>
<td>Items 1, 2, &amp; 3</td>
<td>Levels of integration relative within a discipline</td>
<td>.804</td>
</tr>
<tr>
<td>Items 4 &amp; 5</td>
<td>Across disciplines.</td>
<td>.827</td>
</tr>
<tr>
<td>Items 6, 7, 8</td>
<td>Within and across disciplines.</td>
<td>.938</td>
</tr>
<tr>
<td>Items 9 &amp; 10</td>
<td>Within and across learners.</td>
<td>.830</td>
</tr>
<tr>
<td>Items 11, 12, 13, 14, 15, 17, 18</td>
<td>Technology</td>
<td>.898</td>
</tr>
<tr>
<td>Items 16, 19, &amp; 20</td>
<td>Research</td>
<td>.707</td>
</tr>
</tbody>
</table>

* Cronbach's alpha

Test-retest – Pearson r correlation coefficient (r = .760)
Data Collection

A description of the research protocol was submitted to the University of Nevada Las Vegas Office for the protection of Research subjects to conduct the study. On August 15, 2008, the Office for the Protection of Research Subjects granted permission to conduct the study (Appendix III).

An electronic survey was conducted using the Zoomerang survey tool. An initial email was sent to all academic deans asking for their participation in a curriculum survey (Appendix IV). The email included a link to the online survey location. A reminder email was sent two weeks after the initial email. This was followed by a second reminder email one week after that. Utilizing tools provided by Zoomerang, all data was kept anonymous and confidential.

Data Analyses

Objective data analyses were accomplished by using the Statistical Program for Social Sciences (SPSS version 16.0, 2008). Descriptive statistics was the method used to answer each research question (Hinkle, Wiersma, & Jurs, 2003; Warner, 2008).

Descriptive statistics were used to analyze the data for all the survey items. The “N” values and percentages were computed for items 1 through 20. Demographic totals were computed for items 21 through 27. Six tables were created from this data: (a) Table 1, Demographic characteristics of schools, (b) Table 2, Levels of integration, (c) Table 3, Association between level 1 within discipline integration and environment factors, (d) Table 4, Association between level 2 across discipline integration and environment factors, (e) Table 5, Association between level 3 within and across discipline integration and environment factors, and Table 6, Association between level 4 within and across
learners integration and environment factors. The findings were analyzed to address each research question.

Research Question 1

Based on an adaptation of Fogarty’s (1991) curriculum integration framework, to what extent have dental schools integrated their curricula?

1. Collapsed responses from items 1, 2, and 3 indicated within discipline findings.
2. Collapsed responses from items 4 and 5 indicated across discipline findings.
3. Collapsed responses from items 6, 7, and 8 indicated within and across discipline data.
4. Collapsed responses from items 9 and 10 will indicated within and across learner findings.

Comparisons of these four data sets were used to address research question one.

Research Question 2

How are school environmental factors related to the level of curricula integration in dental schools?

Chi-square’s were calculated for each of the selected demographic variables: (a) age of the school, (b) years of faculty teaching experience at that specific school, (c) faculty gender, (d) faculty employment status, (e) number of departments, and (f) average class size for each level of integration. The chi-square data were analyzed to answer question two.

Research Question 3

To what extent does the incorporation of technology and research combined relate to the level of integration?
Spearman rho (ρ), correlation coefficient was computed using the four levels of integration. The Yes & No responses for items 1 through 10 were collapsed against items 11 through 20. The findings were used to respond to question three.

Summary

The methods for conducting this study were presented in this chapter. Specifically, the design of the study, the population under study, instrumentation, validity, reliability, data collection procedures and analysis of the data were provided.

Chapter 4 reports the findings based upon the research questions developed for the study.
CHAPTER 4

STUDY RESULTS

Introduction

The purpose of this quantitative cross sectional study was to determine the degree of curriculum integration within dental schools in North America. The intent of the study was to determine how an adaptation of the Fogarty (1991) framework of integration exhibits itself in dental education. Results from the statistical analyses of the research data are presented in this chapter. The chapter includes the response rate, demographic information and the results for each research question.

Response Rate

There are 67 dental schools in North America. Fifty-seven of those schools are located in the United States and 10 are located in Canada. A list of the Academic Deans of the 67 dental schools was created from the American Dental Education Association website. The entire dental school population was invited to take part in the survey. An email was sent to the Academic Deans asking them to participate in the electronic survey.

In order to insure an adequate response rate, a three phased design was used. An initial personalized email with a link to access the survey was sent to the academic dean at all schools inviting them to participate. A follow-up email with the link to access the survey was sent 2 weeks later. A third reminder email was sent 1 week after that. Studies
have shown that follow-up and personalization of communications are methods for increasing return rates (Sills & Song, 2002; VanGeest, Johnson, & Welch, 2007).

Five schools were unable to participate because curricula structure and manpower constraints did not allow for tracking the level of content data needed to answer the survey questions (7.46%; 5/67). One school was unable to participate because the curriculum is currently being developed (1.49%; 1/67). Of the remaining 61, 33 schools completed the survey for a response rate of 54.09% (33/61).

Cook, Health, and Thompson (2000) point out that an important element of response rate is that it be representative of the population in order to generalize the results. To further establish the generalizability of the study, follow-up phone calls were made to all schools. During those calls several schools who did not respond voluntarily provided information for why they did not respond to the survey. The information gained during these telephone conversations confirmed that non respondents' demographic profiles were similar to respondents. When asked generally about their use of integration in their curriculum, these individuals reported similar results of those who completed the survey. Since the dental school was the unit of measure and additional information was obtained from non respondents, it is reasonable to assume that the information gained from this sample can be generalized to the North American dental school population.

Demographic Characteristics

Specific information on the characteristics of the respondent schools is indicated in Table 3, Demographic Characteristics of Schools.
The majority (n=18; 56%) of the responding schools reported offering courses in all of the specialty dentistry disciplines. Over fifty percent (n=14; 54%) offered these courses through 6 to 10 biomedical, behavioral and clinical science departments.

More than one-half (n=19; 58%) of the reporting schools indicated they have more than 50 full time faculty members. Most schools reported the largest percentage (59.4%) of faculty yielded between 3 to 10 years teaching experience.

Of the reporting schools, the average school has been in operation for over 30 years; has 6 to 10 departments; a class size of over 50 students; with a majority male faculty who have 3 to 10 years teaching experience. The average school has more than 10 biomedical courses, less than 10 behavioral courses and over 25 clinical courses.
Table 3

**Demographic Characteristics of Schools**

<table>
<thead>
<tr>
<th>Item</th>
<th>Respondents</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of schools who have identified:</td>
<td></td>
<td>Number</td>
<td>Percent</td>
</tr>
<tr>
<td>Full time faculty</td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Schools with the majority that have less than 50</td>
<td></td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Schools with the majority that have more than 50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part time faculty</td>
<td></td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Schools with the majority that have less than 50</td>
<td></td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Schools with the majority that have more than 50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Schools with the majority that have less than 50</td>
<td></td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Schools with the majority that have more than 50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Schools with the majority that have less than 50</td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Schools with the majority that have more than 50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of schools identifying they have instructors with specified years of teaching experience currently on staff</td>
<td>21.90%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 to 5</td>
<td></td>
<td>59.40%</td>
<td></td>
</tr>
<tr>
<td>6 to 10</td>
<td></td>
<td>59.40%</td>
<td></td>
</tr>
<tr>
<td>11 to 15</td>
<td></td>
<td>53.10%</td>
<td></td>
</tr>
<tr>
<td>16+</td>
<td></td>
<td>59.40%</td>
<td></td>
</tr>
<tr>
<td>Years school has been operating</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>1 to 10</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11 to 29</td>
<td></td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>30+</td>
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Table 3

Continued

<table>
<thead>
<tr>
<th>Item</th>
<th>Respondents</th>
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<tbody>
<tr>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>Class size</td>
<td></td>
</tr>
<tr>
<td>&lt; 50</td>
<td>3</td>
</tr>
<tr>
<td>51+</td>
<td>27</td>
</tr>
<tr>
<td>Number of departments</td>
<td></td>
</tr>
<tr>
<td>3 to 5</td>
<td>8</td>
</tr>
<tr>
<td>6 to 10</td>
<td>14</td>
</tr>
<tr>
<td>11 to 15</td>
<td>4</td>
</tr>
<tr>
<td>Type of disciplines</td>
<td></td>
</tr>
<tr>
<td>Endodontics</td>
<td>28</td>
</tr>
<tr>
<td>Oral diagnosis &amp; Radiology</td>
<td>20</td>
</tr>
<tr>
<td>Oral &amp; Maxillofacial Surgery</td>
<td>28</td>
</tr>
<tr>
<td>Oral Pathology/Oral Medicine</td>
<td>21</td>
</tr>
<tr>
<td>Dental diagnostic Sciences</td>
<td>18</td>
</tr>
<tr>
<td>Community Dentistry/Public Health Dentistry</td>
<td>24</td>
</tr>
<tr>
<td>Periodontics</td>
<td>28</td>
</tr>
<tr>
<td>Prosthodontics</td>
<td>22</td>
</tr>
<tr>
<td>Restoration (Restorative Dentistry)</td>
<td>28</td>
</tr>
<tr>
<td>Pediatric Dentistry</td>
<td>26</td>
</tr>
<tr>
<td>General Dentistry</td>
<td>17</td>
</tr>
<tr>
<td>Other</td>
<td>17</td>
</tr>
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</table>
Table 3

Continued

<table>
<thead>
<tr>
<th>Item</th>
<th>Respondents</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td></td>
</tr>
<tr>
<td>Number of courses offered</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biomedical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 to 9</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10+</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioral</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 to 9</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0+</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 to 25</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26 to 50</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51+</td>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N=33

Note: N value may vary because not all respondents reported all factors
Results of Research Questions

The following is a discussion of the survey results as they relate to specific research questions.

Research Question 1

Based on an adaptation of Fogarty’s (1991) curriculum integration framework, to what extent have dental schools integrated their curricula?

To operationalize each level of integration for data analysis, the following was done:

1. Level 1 represents a framework where integration flows within a single discipline. The within discipline level includes traditional curriculum design where the curriculum is taught in separate and distinct disciplines and interconnections within one discipline connecting one topic, one skill and one concept to the next. This level is often called vertical integration. This is operationally defined as any school who answered yes to items 1, 2, or 3. Schools who answered no to all three of these items were coded as a (0) and were considered to have no integration at this level. Those schools who responded yes to any of these items were coded as a (1) and were considered to have some integration at this level.

2. Level 2 represents a framework where integration flows across disciplines. The across discipline integration approach focuses on sharing by bringing two distinct disciplines together into a single image. Units can be taught separately, but are rearranged and sequenced to create a broad framework for related concepts. This level is often called horizontal integration. This is operationally
defined as any school who answered yes to items 4 or 5. Schools who
answered no to both of these items were coded as a (0) and were considered to
have no integration at this level. Schools who responded yes to any of these
items were coded as a (1) and were considered to have some integration at this
level.

3. Level 3 represents a framework where integration flows within and across
disciplines. Within and across discipline integration is a combination of the
first two levels. This approach often uses intertwined themes to integrate
curriculum content. It can include instructors working in teams to develop and
teach across three or more disciplines. It encompasses vertical and horizontal
integration. This is operationally defined as any school who answered yes to
items 6, 7, or 8. Schools who answered no to these items were coded as a (0)
and were considered to have no integration at this level. Schools who
responded yes to any of these items were coded as a (1) and were considered to
have some integration at this level.

4. Level 4 represents a framework where integration flows within and across
learners. The fourth level, within and across learners, includes courses that
require the student to create the integration. Students must synthesize
information and put together integrated case studies and develop and use other
formal integration strategies. This is operationally defined as any school who
answered yes to items 9 or 10. Schools who answered no to both of these items
were coded as a (0) and were considered to have no integration at this level.
Schools who responded yes to any of these items were coded as a (1) and were considered to have some integration at this level.

Table 4 lists the frequencies of the respondent schools for each level of integration. The majority of respondents reported their schools' curriculum included courses within each level of integration; however most reported curricula that represented integration in the lower two levels of integration (within discipline [n=32; 97%] and across discipline levels [n=31; 94%]).
Table 4

*Levels of Integration*

<table>
<thead>
<tr>
<th>Level</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1 – Within discipline</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No classes</td>
<td>1</td>
<td>3.0%</td>
</tr>
<tr>
<td>One or more using any of the types of integration within the level</td>
<td>32</td>
<td>97.0%</td>
</tr>
<tr>
<td><strong>Level 2 – Across discipline</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No classes</td>
<td>2</td>
<td>6.0%</td>
</tr>
<tr>
<td>One or more using any of the types of integration within the level</td>
<td>31</td>
<td>94.0%</td>
</tr>
<tr>
<td><strong>Level 3 – Within and across disciplines</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No classes</td>
<td>6</td>
<td>18.0%</td>
</tr>
<tr>
<td>One or more using any of the types of integration within the level</td>
<td>27</td>
<td>82.0%</td>
</tr>
<tr>
<td><strong>Level 4 – Within and across learners</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No classes</td>
<td>9</td>
<td>27.0%</td>
</tr>
<tr>
<td>One or more using any of the types of integration within the level</td>
<td>24</td>
<td>73.0%</td>
</tr>
</tbody>
</table>

N = 33
Research Question 2

How are school environmental factors related to the level of curricula integration in dental schools?

Data were collected on six school environmental factors: (a) age of the school, (b) years of faculty teaching experience at that specific school, (c) faculty gender, (d) faculty employment status, (e) number of departments, and (f) average class size.

Each environmental variable was dichotomized in order to assess through Chi-Square analysis whether statistical differences existed between the environmental factor and each level of integration. Age of school was divided into schools that were established less than ten (10) years ago or 11 or more. Teaching experience of dental school faculty was established by asking greatest percentage of faculty that had 10 years or less versus 11 years or more. Faculty employment status was established by the number of employees full-time versus the number part-time. Gender (male versus female) and number of departments was established by dividing schools reporting 5 or less versus schools who have 6 or more. Lastly, class size was established by the schools reporting average class size as 50 or less versus 51 or more. Tables 3 through 6 include results of Chi-Square analysis of each environmental factor at each level of integration.
Table 5

*Association Between Level -1 Within Discipline Integration and Environment Factors*

<table>
<thead>
<tr>
<th>School environmental factors</th>
<th>Chi-square</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of school</td>
<td>.071</td>
<td>.790</td>
</tr>
<tr>
<td>10 years or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching experience</td>
<td>3.45</td>
<td>.063</td>
</tr>
<tr>
<td>10 years or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 years or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty gender</td>
<td>.055</td>
<td>.814</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty employment status</td>
<td>1.66</td>
<td>.197</td>
</tr>
<tr>
<td>Full time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of departments</td>
<td>.437</td>
<td>.508</td>
</tr>
<tr>
<td>5 or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class size</td>
<td>.074</td>
<td>.786</td>
</tr>
<tr>
<td>50 or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51 or more</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 33

Note: N value may vary because not all respondents reported all factors
### Table 6

*Association Between Level - 2 Across Discipline Integration and Environment Factors*

<table>
<thead>
<tr>
<th>School environmental factors</th>
<th>Chi-square</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of school</td>
<td>.147</td>
<td>.701</td>
</tr>
<tr>
<td>10 years or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching experience</td>
<td>.327</td>
<td>.567</td>
</tr>
<tr>
<td>10 years or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 years or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty gender</td>
<td>.055</td>
<td>.814</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty employment status</td>
<td>.650</td>
<td>.420</td>
</tr>
<tr>
<td>Full time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of departments</td>
<td>.430</td>
<td>.512</td>
</tr>
<tr>
<td>5 or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class size</td>
<td>.153</td>
<td>.696</td>
</tr>
<tr>
<td>50 or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51 or more</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 33

Note: N value may vary because not all respondents reported all factors
Table 7

*Association Between Level - 3 Within and Across Discipline Integration and Environment Factors*

<table>
<thead>
<tr>
<th>School environmental factors</th>
<th>Chi-square</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of school</td>
<td>0.317</td>
<td>0.574</td>
</tr>
<tr>
<td>10 years or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching experience</td>
<td>0.697</td>
<td>0.404</td>
</tr>
<tr>
<td>10 years or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 years or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty gender</td>
<td>0.117</td>
<td>0.732</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
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<td></td>
</tr>
<tr>
<td>Faculty employment status</td>
<td>2.12</td>
<td>0.145</td>
</tr>
<tr>
<td>Full time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part time</td>
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<td></td>
</tr>
<tr>
<td>Number of departments</td>
<td>2.22</td>
<td>0.136</td>
</tr>
<tr>
<td>5 or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class size</td>
<td>0.238</td>
<td>0.626</td>
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<tr>
<td>50 or less</td>
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<td></td>
</tr>
<tr>
<td>51 or more</td>
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</tr>
</tbody>
</table>

N = 33

Note: N value may vary because not all respondents reported all factors
Table 8  

*Association Between Level - 4 Within and Across Learners Integration and Environment Factors*

<table>
<thead>
<tr>
<th>School environmental factors</th>
<th>Chi-square</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of school</td>
<td>.624</td>
<td>.430</td>
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<td>10 years or less</td>
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<td></td>
</tr>
<tr>
<td>11 or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching experience</td>
<td>3.77</td>
<td>.052</td>
</tr>
<tr>
<td>10 years or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 years or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty gender*</td>
<td>4.21</td>
<td>.040</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty employment status</td>
<td>.891</td>
<td>.345</td>
</tr>
<tr>
<td>Full time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of departments</td>
<td>.317</td>
<td>.574</td>
</tr>
<tr>
<td>5 or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class size</td>
<td>1.21</td>
<td>.272</td>
</tr>
<tr>
<td>50 or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51 or more</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 33; *p<0.05  

Note: N value may vary because not all respondents reported all factors
Statistically significant findings were found in only 1 level of integration: Level 4 (Table 6). Within Level 4 (within and across learners), significant findings were observed between gender ($\chi^2=4.21; p<0.040$). Schools reported that males (80%) were more likely than females (20%) to incorporate within and across learners approach in their classes.

Research Question 3

To what extent does the incorporation of technology and research combined relate to the level of integration?

Spearman’s rho correlation coefficient was calculated to measure the strength of the relationship between two variables. Variable one is the levels of integration and variable two is the use of technology and research combined.

Results indicated a correlation coefficient of $r_s=0.315$ ($p=0.79$). According to Hinkle, Wiersma, & Jurs, (2003), this shows little if any correlation between the two variables. Based on the result, there is no evidence of a strong correlation between schools that use higher levels of integration within their curriculum and their use of technology and research combined.

Open-Ended Question

In addition to the closed-format items, respondents were given an opportunity to make comments in one open-ended question, “Please share any comments you would like to add (optional)”. Of the eight responses received for this question, six found the survey difficult to complete due to lack of tracking of information at their school, and lack of resources to conduct the research required to respond adequately to the questions. One school is still building their curriculum and was not able to provide information for years three and four. One school asked that the survey results be shared with them.
Summary

Results from the statistical analyses of the research data were presented in this chapter. The chapter included the response rate, demographic information and the results for each research question. These analyses will be discussed in Chapter 5.
CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

This chapter provides a summary of the procedures utilized in this study. This is followed by a discussion of the findings. A synopsis of the strengths and limitations of the study are also presented. The chapter concludes with recommendations for future research.

Summary of Purpose and Procedures

The purpose of this study was to discover the degree of curriculum integration within dental schools in North America. The intent of the study was to determine how an adaptation of the Fogarty (1991) framework of integration exhibits itself in dental education.

A twenty-eight question survey was developed to assess dental schools’ perceptions of the level of integration in their curriculum. The survey was also designed to identify specific demographic characteristics of responding schools. As previously noted, the dental school is the unit of study.

An email was sent to the Academic Deans or designees of the dental schools inviting them to participate in the electronic survey. The Academic Deans are responsible for overseeing curriculum design, development, and implementation activities at dental schools. It is important to note that the findings represent curriculum integration from the
Academic Deans’ perspective. Five schools elected not to participate because curricula structure and manpower constraints did not allow for tracking the level of content data needed to answer the survey questions (7.46%; 5/67). One school was unable to participate because the curriculum is currently being developed (1.49%; 1/67). Of the remaining 61, 33 schools completed the survey for a response rate of 54.09% (33/61). Frequencies, chi-square and Spearman rho (p) correlation coefficient were used for the statistical analyses.

Summary of Findings

Research Question 1

Based on an adaptation of Fogarty’s (1991) curriculum integration framework, to what extent have dental schools integrated their curricula?

This study found that all respondents reported they incorporated all levels of curriculum integration included in the adapted integration framework. However, an overwhelming majority of respondents indicated that the highest concentration is at the “within discipline” (97.0%) and “across discipline” (94.0%) levels.

Research Question 2

How are school environmental factors related to the level of curricula integration in dental schools?

Based on the data collected, statistically significant findings were indicated in only one level of integration. Within Level 4, within and across learners, statistically significant findings were observed only with the gender variable.
Research Question 3

To what extent does the incorporation of technology and research combined relate to the level of integration?

Based on the findings of this study, there was very little, if any correlation, between the level of integration and the combined use of technology and research at responding schools.

Discussion of Findings

The following section will discuss the results concerning the degree to which dental schools have incorporated an adaptation of Fogarty’s (1991) integration framework within their curricula. Additionally, it will discuss the relationship of dental school environmental factors and the four levels of integration. Integration levels and the combined use of technology and research will also be discussed.

Research Question 1 - Extent of Integration

All responding schools reported having an integrated curriculum. This represents an increase in the numbers of schools reported in a general study conducted in 2002-2003 (Kassebaum, Hendricson, Taft, & Haden, 2004). However, rather than observing a normal distribution with regard to the number of courses within a curriculum that utilize the various levels, the distribution was more linear. The largest majority of schools reported integration within a single discipline (97.0%). The second largest majority reported course integration across multiple disciplines (94.0%). The third largest was in the within and across discipline level (82.0%), followed by those reporting integration at the within and across learner level (73.0%). This distribution is supported by findings of various studies conducted at the higher education level, the presence of integration
models is greatest at the lower levels of integration (within single disciplines) representing all these levels (Froyd & Ohland, 2005; Shapiro, 2003).

Dental education has traditionally employed a teacher centered, discipline-based curriculum and has a reputation for being slow to adopt and initiate curriculum change (Iacopino, 2007; Kassenbaum, Hendricson, Taft & Haden, 2004). It is reasonable to expect the largest majority of reporting schools employ the lowest level integration. This level of integration is most closely related to a discipline-based curriculum.

Conversely, the within and across learners level is designed to be the most interdisciplinary student centered form of integration, and very different from the traditional dental education model. This is a reasonable explanation for why the smallest majority of respondents implemented this level of integration. Although the lowest reported number, it was unanticipated that responding schools indicated such a large percentage of classes in the within and across learners level of integration.

**Research Question 2 – Environmental Factors**

Statistically significant differences were only found within one level of integration for one demographic variable. Schools reported that males (80%) were more likely than females (20%) to incorporate within and across learners approach in their classes. Therefore caution should be placed on generalizing these results. Further study should be conducted at the faculty member level to confirm these results.

One explanation for lack of statistical significance in most of the variables could be that there is not sufficient power due to disproportionate numbers between the groupings in the demographics (table 3) to be able to assess whether significant differences exist. No data are available in the literature to address these specific variables.
However, the study findings did indicate some interesting patterns of reporting that warrant discussion.

Dental education curricula traditionally have been based on a model of compartmentalized educational delivery, lock-step, which is at least fifty years old. And, a large percentage of dental schools remain organized by traditional disciplinary boundaries (Kassebaum, Hendricson, Taft, & Haden, 2004). For more than twenty years dental schools have had the reputation for being resistant to and slow to initiate curricular change and innovation (Kalkwarf, Haden, & Valachovic, 2005). This information would give the assumption that the older more established dental schools would favor integration within a single discipline.

No information was found in the literature to suggest that gender is a factor in curricula integration. Future studies are needed to examine this demographic characteristic.

Another assumption is that the larger the class size, the harder it would be to implement an integrated curriculum. Since dental schools use a lock step curriculum, a further assumption is that schools with larger class sizes would probably have more integration within the single discipline area because of ease of implementation. Additional study is required to examine and validate these assumptions.

Although schools reported that faculty with less than 10 years experience (70%) were more likely than females (12%) to incorporate any kind of integration approach in their classes, this was not significantly different. The p-value (p=0.52) might suggest that if more schools had reported significant differences might have been found. This might be an area to focus on when doing future research.
No data are available on the relationship between years of teaching experience and curriculum integration. However, the majority of current dental faculty members are pre-millennial students. They are products of educational environments that were discipline based, teacher centered, which emphasized memorization of isolated facts, and did not embrace technology and exploration. Conversely, today's millennial dental students prefer working in teams, view technology developments as tools that allow better organizing and exploration of new opportunities, and prefer learning by doing (http://www.ADEA.org). An assumption can be made that schools with a larger population of teachers who were pre-millennial students will probably have curriculum integration at the simplest level. The opposite could be assumed as more millennial dental students graduate and become dental educators. Future studies are needed to substantiate this assumption.

It is unexpected that no significant differences were found within the full time and part time faculty group. The typical dental school has the largest number of part time faculty members teaching in the clinical sciences area. These faculty members are most often dental practitioners with little or no formal educational training background. Because of the lack of specialized training in curriculum design and development, the expectation would be that curriculum innovations such as integration would be significantly lower. More research is needed to look more closely at the faculty employment status in order to make specific inferences in this area.

It is equally unanticipated that the study findings indicated no significant difference within the number of departments group. Characteristically, dental schools have a large number of departments comprised of a few faculty members in each
department. As a result, biomedical, behavioral, and particularly clinical discipline topics are taught within different departmental boundaries. Thus the assumption could be made that integration in this type of environment would be more difficult for the schools with more departments. Again, additional research is needed to specifically examine this area.

Research Question 3  - Technology and Research

The study findings indicate a very weak correlation between the four levels of integration and the combined use of technology and research in the dental school curricula of the reporting schools. This is an unexpected finding because of the emphasis the dental education community has placed on the assimilation of research and technology as components in innovative curricula and the critical role this incorporation plays in the advancement of the dentistry profession (Iacopino, Lynch and Taft, 2004).

Iacopino, 2007, describes the assimilation of research and technology as major components of integrated curricula as part of the “new science” of dental education. Iacopino suggests that dental informatics, the application of computer and information sciences to improve dental research, is one area that has the potential to contribute much to the field of dentistry. Dental informatics classes use electronic teaching tools and incorporate web-based tools and techniques. They also take advantage of virtual reality technologies to teach preclinical skills (Hillenburg, Cederberg, Gray, Hurst, Johnson & Potter, 2006; Jasinevicius, Landers, Nelson, & Urbankova, 2004). This type of integration allows users to participate in a wide variety of opportunities for research (Robinson, 2003).

Dental education literature identifies three models for the integration of this new science into the dental curriculum. The Marquette University School of Dentistry, the
University of Connecticut School of Dental Medicine, and The University of Texas Health Science Center at San Antonio Dental School, have redesigned their curricula to incorporate this new science at all levels of the curriculum (Iacopino, 2007). But, the findings of this study do not indicate that this new science has been implemented on a large scale at North American dental schools.

Information found in the literature indicated that technology rich scholarly experiences and research activities incorporated as part of the curriculum are most often found in research intensive dental schools (Iacopino, Lynch, & Taft, 2004). The findings of this study appear to support this statement.

A possible contributing factor to the weak relationship of research and technology and integration is the level of computer literacy required to implement this type of integration. Research indicates that today’s millennial dental students enter the educational program with a high degree of computer literacy, but that many dental faculty require significant training in order to take full advantage of computer technologies and subsequent strategies for including these technologies in the educational environment (Greenwood, Grigg, & Stephens, 1997; Robinson, 2003). This suggests that perhaps more faculty development is needed in technology and biomedical informatics and integration.

The process of integrating technology into the teaching environment is a complex matter. It encompasses a multitude of things that must be skillfully woven into the instructional environment (Lawless and Pellegrino, 2007). While training and faculty development may be a key component in promoting the integration of technology and research in dental education some obstacles do exist that can impede these development efforts.
One barrier is that there are some faculty who believe that technology cannot improve teaching and learning (Woodell and Garofoli, 2003). A second barrier is anxiety. Anxiety regarding technology increases when dental educators are asked to incorporate dental informatics into their classrooms (Robinson, 2003). A third impediment is motivation and attitude toward change. Faculty attitudes toward change in the areas of science and technology are prevalent obstacles to faculty development. Even though dental faculty are introduced to new information and materials on a regular basis, many things within the classroom have not changed for decades (Friedman, 2000).

A final barrier that is worthy of mention is faculty capacity. Dental faculty members work on a twelve month schedule with short breaks between semesters. The present system of dental education has an overcrowded curriculum which often results in a heavy workload (ADEA Commission on Change and Innovation in Dental Education, 2006; Iacopino, Lynch, & Taft, 2004). Because of current economic conditions, dental schools have a large number of budgeted vacant positions and have experienced a reduction in part-time faculty positions. A recent study found that these factors hinder faculty development and the implementation of curriculum change (Haden, Hendricson, Ranney, Vargas, Cardenas, Rose, et al., 2008).

The integration between pedagogy, technology, and research informatics in the dental education environment is crucial to the future of dentistry and has the potential to transform the practice of dentistry (Iacopino, 2007). The findings of this study indicate that the relationship between these elements is possibly weak within the dental schools in North America. Given the importance of faculty development in strengthening this
relationship, this suggests that future research is needed to explore and examine current faculty development programs.

Strengths of the Study

This study exhibits the following strengths:

(1) The entire North American dental population or census was surveyed versus a simple convenience sample.

(2) The response rate was 54.09% which suggests strong validity.

Limitations of the Study

Limitations and delimitations were addressed in Chapter 1. These are acknowledged here with respect to the study results.

1. Self-reporting bias may have posed a threat to the validity of the study. Respondents could have potentially reported data that is not completely accurate. To minimize this potential threat, an electronic survey instrument was used and all data collection was confidential.

2. The most important items of the questionnaire were closed-format items. Using this format limited the responses and restricted explanation or elaboration by the survey respondents. This format was used to avoid misinterpretations associated with open-ended responses and to reduce self-report bias. An optional comments question was included to allow respondents to provide elaborations or clarifications.

3. Inconsistent use of the survey instrument by the survey respondents could have posed a potential threat to the validity of the study (Fink, 2006). This could have been caused by poor item construction and/or misinterpretation of the instrument.
To minimize this threat, a panel of experts reviewed the questionnaire to establish content validity. Additionally, examples were included in the questionnaire.

4. The survey responses were limited by the knowledge and perception of the individuals actually completing the questionnaire. To reduce this threat, the questionnaire was sent to the Academic Deans of each dental school because they are responsible for curriculum development implementation activities at each school. There is a wide disparity in terms of tenure in the position among Academic Deans. This may have caused limited curriculum knowledge at some respondent schools.

5. The survey responses were limited to the Academic Deans perspectives on curriculum integration at their schools. The faculty could possibly have different insights regarding integration particularly at the within and across learners level.

6. Reliability of the instrument was a potential limitation that was addressed through a test-retest process. The survey was administered to a convenience sample on two separate occasions to the same individual with a high positive association (r = .76). This helped reduce possible problems regarding the stability of the instrument on repeated uses.

7. The survey was perceived as difficult to complete due to the lack of some school’s ability to track integration information and/or the resources required to gather the information requested. This was indicated by responses to the open-ended questions and related in follow up telephone calls.
Conclusions

The dental education community has acknowledged a need for major reform in the oral health education system. This reform has been driven in part by evolving interdisciplinary expertise and practice requirements, new scientific discoveries and scientific information and the integration of emerging technologies (Boufford & Cassel, 2003; DePaola & Slavkin, 2004; Duderstadt, 2000; Hendricson & Cohen, 2001; & Kohn, 2003). A major part of this reform is innovative curriculum change. Since the dental education curriculum has traditionally been a discipline based, teacher centered curriculum, emphasis has been placed on curriculum integration (DePaola & Slavkin, 2004; Kalkwarf, Haden, & Valachovic, 2005; & Haden, Andrieu, Chadwick, Chmar, Cole, George, et al., 2006).

Curriculum integration has been described in numerous ways. Generally, it includes interdisciplinary or thematic approaches that apply real world knowledge, promote critical thinking, and emphasize student involvement (Good, 1973; Kysilka, 1998; & Lake, 1994). This study utilized an adaptation of Fogarty’s (1991) framework to examine curriculum integration within disciplines, across disciplines, within and across disciplines, and within and across learners.

Dental Schools have been individually developing and implementing strategies to integrate their curriculums, but specialized studies have not been conducted to gather comprehensive data on curriculum integration progress. This study provides information on the extent to which the reporting schools have integrated their curricula, the relationship between school environmental factors and levels of integration, and the
association between the new science, research and technology, and the levels of integration.

Study findings support the idea that dental schools are responding to the request for change and innovation. Data collected indicated that all of the responding dental schools have implemented an integrated curriculum. The study further found that integration exists in all four levels; within single disciplines, across multiple disciplines, within and across disciplines and within and across learners.

Additionally, this study suggests that future research is required in order to determine the association between age of the school, years of faculty teaching experience, faculty gender, faculty employment status, number of departments of the school and class size, in relation to the various levels of integration.

The findings of this study also suggest that more research is needed in the area of combining research and technology in the dental curriculum. Despite the importance of this new science to the future of dentistry, study results indicate a weak association in this area.

Finally, by using an adaptation of Fogarty’s (1991) curriculum integration framework, this study provides the dental education community with a potential instrument for measuring curriculum integration. This framework can possibly be further modified and used as a tool for curriculum design and planning. Additional research needs to be conducted in this area in order to address this possibility.

Recommendations for Future Research

Based upon the research findings of this study, the following five recommendations are offered:
(1) This study utilized a closed-format item survey to collect data. It is recommended that a future study be conducted by interviewing participant dental schools with probing questions. This would help to alleviate inconsistent use of the survey instrument. Additionally, it would allow the interviewer to view curriculum integration through the eyes of dental educators.

(2) The findings of this study report dental school curriculum integration status from the Academic Deans perspective. It is recommended that a future study examine dental curriculum integration by collecting data from individual faculty members at each dental school. Collecting data from program directors that actually design and teach the courses could offer a different viewpoint on integrated curricula.

(3) It is further recommended that a future study examine dental curriculum integration by collecting data from dental students. Collecting data from students will provide information on how students perceive the dental curriculum in terms of integration.

(4) Because study findings indicated that faculty development programs play an integral role in curriculum integration, it is recommended that research be conducted on existing faculty development programs. The study should be designed to examine the extent to which faculty development programs teach curriculum integration strategies and techniques.
(5) It is further recommended that faculty education programs be developed that specially address the use of technology and research within education for dental school faculty.

(6) It is recommended that research be conducted on the types of mechanisms that are used at dental schools to track integration level information. This information would be useful in encouraging more schools to track and report this type of data. This could possibly increase the rate of return for future curriculum integration studies.

(7) Finally, it is recommended that research be conducted on the benefits of integration, research, and technology in the dental curriculum.
APPENDIX I

INTEGRATED CURRICULUM SURVEY

1. Does your curriculum include courses whose content is taught separately in isolation with little to no overlap of other courses within the discipline and no overlap with courses between disciplines? (e.g., a traditional approach to curriculum where content is separate and distinct).
   Yes ____ No

If yes, how many of these courses are offered in the following areas:
   ________ Biomedical   ________ Behavioral   ________ Clinical

2. Does your curriculum include courses where concepts taught in one course within the discipline clearly lead to topics taught in a subsequent course? (e.g., Content taught in one Biomedical sciences course would lead to content taught in another course within Biomedical sciences, but not to courses within Clinical or Behavioral sciences).
   Yes ____ No

If yes, how many of these courses are offered in the following areas:
   ________ Biomedical   ________ Behavioral   ________ Clinical

3. Does your curriculum include courses where multiple skills such as social, critical thinking and/or skills are taught within a single course within one discipline? (e.g., It is necessary to learn a basic clinical skill in order to understand a more complex skill which is taught later in the course).
   Yes ____ No

If yes, how many of these courses are offered in the following areas:
   ________ Biomedical   ________ Behavioral   ________ Clinical

4. Does your curriculum include courses where content is arranged to coincide with courses across multiple disciplines but the courses are taught separate? (e.g., Teaching pharmacology in a Biomedical science course coinciding with actual use of this knowledge in the clinic).
   Yes ____ No

If yes, how many of these courses are offered in the following areas:
   ________ Biomedical   ________ Behavioral   ________ Clinical

5. Does your curriculum include courses where team planning and teaching takes place where instructors share the actual planning and teaching across two disciplines? (e.g., A Behavioral sciences course teaches how to conduct a literature review while students actually conduct a literature review for a presentation in a Biomedical science or Clinical sciences course.)
Yes ____ No

If yes, how many of these courses are offered in the following areas:

Biomedical  Behavioral  Clinical

6. Does your curriculum include courses where a fertile theme is intertwined within curriculum contents; the common theme is used to sift out appropriate concepts as a base for instruction within and across multiple disciplines? (e.g., Each discipline addresses ethics as it is appropriate to their subject matter, such as ethics in research, and ethics working with patients.)

Yes ____ No

If yes, how many of these courses are offered in the following areas:

Biomedical  Behavioral  Clinical

7. Does your curriculum include courses where a meta-curricular approach strings critical thinking, social skills, multiple intelligences, technology, and study skills taught in specific order as they feed to the next skill within and across multiple disciplines? (e.g., Teaching students to use problem solving strategies to resolve clinical issues rather than relying on memorization.)

Yes ____ No

If yes, how many of these courses are offered in the following areas:

Biomedical  Behavioral  Clinical

8. Does your curriculum include courses where an interdisciplinary approach is used where concepts overlap in specific content areas with some team teaching within and across three or more disciplines? (e.g., when instructors work together to find overlapping concepts and ideas, then plan and teach those concepts during a common teaching time. Instructors are not just pulled together; rather a concerted effort is made to identify common themes taught across various disciplines and then teach those themes during a common period class.)

Yes ____ No

If yes, how many of these courses are offered in the following areas:

Biomedical  Behavioral  Clinical

9. Does your curriculum include courses where one area of concentration is integrated by the student? The student is responsible for synthesizing the information, and is in control of what is done with the knowledge learned? The strategies used are shared with other students and faculty. (e.g., Where students take information gained to put together case study presentations of patients and present them in a formal setting to other classmates and faculty.)

Yes ____ No

If yes, how many of these courses are offered in the following areas:
10. Does your curriculum include courses where the student filters all learning through an expert’s eye making internal connections leading to identifying an external network of experts in related fields from multiple areas or disciplines? (e.g., Students take knowledge they have learned, recognize various relationship of the various concepts to help develop external networks from which to continue to learn.)

_____ Yes  ____ No

If yes, how many of these courses are offered in the following areas:

_____ Biomedical  _____ Behavioral  _____ Clinical

11. Does your curriculum include distance education online courses where the student completes content instruction via the internet?

_____ Yes  ____ No

If yes, how many of these courses are offered in the following areas:

_____ Biomedical  _____ Behavioral  _____ Clinical

12. Does your curriculum include blended courses where the student completes a large portion of the course via the internet, but is required to attend a portion of classroom sessions?

_____ Yes  ____ No

If yes, how many of these courses are offered in the following areas:

_____ Biomedical  _____ Behavioral  _____ Clinical

13. Does your curriculum include courses requiring students to use multi-media to develop or present PowerPoint presentations, video conferences, or online journals?

_____ Yes  ____ No

If yes, how many of these courses are offered in the following areas:

_____ Biomedical  _____ Behavioral  _____ Clinical

14. Does your curriculum include courses where students use and/or create wikis or podcasts?

_____ Yes  ____ No

If yes, how many of these courses are offered in the following areas:

_____ Biomedical  _____ Behavioral  _____ Clinical

15. Does your curriculum include courses where students use and/or create discussion boards or blogs?

_____ Yes  ____ No

If yes, how many of these courses are offered in the following areas:
16. Does your curriculum include courses requiring students to conduct research using the internet for class assignments?
   ___ Yes  ___ No

   If yes, how many of these courses are offered in the following areas:
   ______ Biomedical  ______ Behavioral  ______ Clinical

17. Does your curriculum include classroom courses where the instructor uses a course management system as a teaching tool?
   ___ Yes  ___ No

   If yes, how many of these courses are offered in the following areas:
   ______ Biomedical  ______ Behavioral  ______ Clinical

18. Does your curriculum include classroom courses where the instructor uses PowerPoints as a teaching tool?
   ___ Yes  ___ No

   If yes, how many of these courses are offered in the following areas:
   ______ Biomedical  ______ Behavioral  ______ Clinical

19. Does your curriculum include courses which require students to conduct a research literature review?
   ___ Yes  ___ No

   If yes, how many of these courses are offered in the following areas:
   ______ Biomedical  ______ Behavioral  ______ Clinical

20. Does your curriculum include courses which require students to develop a research proposal?
   ___ Yes  ___ No

   If yes, how many of these courses are offered in the following areas:
   ______ Biomedical  ______ Behavioral  ______ Clinical

21. Does your curriculum include courses which require students to complete a research project?
   ___ Yes  ___ No

   If yes, how many of these courses are offered in the following areas:
   ______ Biomedical  ______ Behavioral  ______ Clinical
Please provide the Demographic Information:

22. How many faculty members are:
   ______ Full time
   ______ Part time
   ______ Male
   ______ Female

23. What % of faculty have the following years of teaching experience?
   ______ < 3
   ______ 3-5
   ______ 6-10
   ______ 11-15
   ______ 16+

24. How long has the school been operating?
   ______ 0-10 yrs
   ______ 11-20
   ______ 21-30
   ______ >30

25. What is the average class size? ______

26. What is the total number of disciplines? ______
   Please check ALL clinical disciplines that are included in this number.
   ______ Endodontics ______ Periodontics
   ______ Oral diagnosis & radiology ______ Prosthodontics
   ______ Oral & Maxillofacial Surgery ______ Restoration (Restorative Dentistry)
   ______ Oral pathology/Oral Medicine ______ Pediatric Dentistry
   ______ Dental Diagnostic Sciences ______ General Dentistry
   ______ Community Dentistry/Public Health Dentistry
   ______ Other

27. What is the total number of courses offered within each discipline?
   ______ Biomedical ______ Behavioral ______ Clinical

28. Please share any comments you would like to add (optional).
APPENDIX II

List of Expert Reviewers

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APPENDIX III

IRB Approval Letter

UNLV

Social/Behavioral IRB – Expedited Review
Approval Notice

NOTICE TO ALL RESEARCHERS:
Please be aware that a protocol violation (e.g., failure to submit a modification for any change) of an IRB approved protocol may result in mandatory remedial education, additional audits, re-consenting subjects, researcher probation, suspension of any research protocol at issue, suspension of additional existing research protocols, invalidation of all research conducted under the research protocol at issue, and further appropriate consequences as determined by the IRB and the Institutional Officer.

DATE: August 15, 2008
TO: Dr. Kendall Hartley, Curriculum and Instruction
FROM: Office for the Protection of Research Subjects
RE: Notification of IRB Action by Dr. Paul Jones, Co-Chair
Protocol Title: A Systematic Approach to an Integrated Curriculum Model for Dental Education
Protocol #: 0807-2810

This memorandum is notification that the project referenced above has been reviewed by the UNLV Social/Behavioral Institutional Review Board (IRB) as indicated in Federal regulatory statutes 45 CFR 46. The protocol has been reviewed and approved.

The protocol is approved for a period of one year from the date of IRB approval. The expiration date of this protocol is August 11, 2009. Work on the project may begin as soon as you receive written notification from the Office for the Protection of Research Subjects (OPRS).

PLEASE NOTE:
Attached to this approval notice is the official Informed Consent/Assent (IC/IA) Form for this study. The IC/IA contains an official approval stamp. Only copies of this official IC/IA form may be used when obtaining consent. Please keep the original for your records.

Should there be any change to the protocol, it will be necessary to submit a Modification Form through OPRS. No changes may be made to the existing protocol until modifications have been approved by the IRB.

Should the use of human subjects described in this protocol continue beyond August 11, 2009, it would be necessary to submit a Continuing Review Request Form 60 days before the expiration date.

If you have questions or require any assistance, please contact the Office for the Protection of Research Subjects at OPRSHumanSubjects@unlv.edu or call 895-2794.

Office for the Protection of Research Subjects
4305 Maryland Parkway • Box 451047 • Las Vegas, Nevada 89154-4047

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Before moving forward, please read the following important information regarding the survey. Your agreement to participate is indicated by clicking the “submit” button at the bottom of this page.

The purpose of this research study is to determine the degree of curriculum integration within dental schools in North America.

You are being asked to participate in the study because you are an academic dean in one of the dental schools in North America and are knowledgeable about your schools curriculum.

If you volunteer to participate in this study, you will be asked to complete a survey that includes questions pertaining to the types of courses offered at your dental school. Most of the questions are in a yes/no format but there will also be opportunity at the end of the survey to provide additional information, if desired, on any of the questions.

There may not be direct benefits to you as a participant in this study. However, you will be contributing much to the professional literature by providing valuable information on the status of integration within the dental school curricula in Northern America.

There are risks involved in all research studies. This study may include only minimal risks.

There will not be financial cost to you to participate in this study. The study will take approximately 1 hour of your time. You will not be compensated for your time.

If you have any questions or concerns about the study, you may contact Kendall Hartley at kendall.hartley@unlv.edu, or Tanis Stewart at tanis.stewart@unlv.edu. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact the UNLV Office for the Protection of Research Subjects at 702-895-2794.

Your participation in this study is voluntary. You may refuse to participate in part or all of this study. You may withdraw at any time without prejudice to your relations with the university. You can skip any question.

All information gathered in this study will be kept completely confidential. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at UNLV for at least 3 years after completion of the study. After the storage time the information gathered will be deleted.
APPENDIX IV
Email to Request Survey Participation

University of (Name of School)
Academic Dean: (Name of Dean)
Address
City, State, Zip Code

Dear Dr. (Last Name):

My name is Tanis Stewart and I am a doctoral student in the University of Nevada Las Vegas (UNLV), Learning and Technology program. I am also a member of the UNLV School of Dental Medicine staff and an ad hoc member of the UNLV CCI Committee. I am in the process of completing the last phase of my doctoral studies, which involves writing my dissertation. Because of my interest in dental education, my research focuses on integrated curricula in dental education.

I am asking that you help me by participating in a confidential survey regarding the dental curriculum at your school. The study will utilize quantitative research methodologies to investigate integrated curricula in North American Dental Schools.

As you know, the dental education environment is a small community, so it is extremely important for me to get the participation of most dental schools in order for the study to be meaningful. All responses will be confidential and will in no way be linked to the responding individual. Your participation in this study will help contribute to the professional literature by providing valuable information on the status of integration within the dental school curricula in Northern America.

If you have any questions, please contact me at tanis.stewart@unlv.edu or 702-774-2565.

Thank you for your support in this endeavor!

Please click on the link below to begin the survey.
http://www.zoomerang.com/Survey/?=WEB22836SMNM4X

Sincerely,
Tanis M. Stewart
UNLV College of Education
Dear Dr. (Last Name):

Recently, you were asked to assist me with my research for my dissertation by participating in a survey on integrated curricula in dental education. If you have already completed the survey, thank you very much. If you have not, I am making a second appeal for your assistance. Your participation is very important to ensure the success of this study. Without a high rate of participation I cannot complete my dissertation or contribute meaningful information on integrated curricula to the dental education community.

If you have any questions or if I can be of assistance, please contact me by email at tanis.stewart@unlv.edu or by phone at (702)774-2565. Your participation is greatly appreciated.

Thank you again for your support in this endeavor!

Please click on the link below to begin the survey.
http://www.zoomerang.com/Survey/?=WEB22836SMNM4X

Sincerely,

Tanis M. Stewart
UNLV College of Education
Dear Dr. (Last Name):

Recently you were asked to participate in a survey on Integrated Curricula in Dental Education. If you have already responded, thank you very much. If you have not, I am making another appeal for your participation. This survey is the last and most important component of my dissertation research for my PhD. and I still need a higher rate of return. Your cooperation in responding would be greatly appreciated.

I realize that this is a very extensive survey and that it may be impossible for you to answer all the questions based on your curriculum. However, any questions that you can answer can make a major contribution to my analysis. I also realize that you are bombarded by such requests daily and I appreciate you taking the time to respond to this survey.

If you have questions or if I can be of assistance, please contact me by email at tanis.stewart@unlv.edu or by phone at (702)774-2565. Your participation is greatly appreciated.

Thank you again for your support in this endeavor!

Please click on the link below to begin the survey.
http://www.zoomerang.com/Survey/?=WEB22836SMNM4X

Sincerely,

Tanis M. Stewart
UNLV College of Education
REFERENCES


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