

Application of a Conceptual Framework for Distance Learning in Dental Hygiene Education and Allied Health Disciplines

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Introduction

In response to more flexible learning options, Distance Education (DE) use continues expanding rapidly in post-secondary education, especially over the previous decade.¹ Almost 3.5 million students, or nearly 20%, are taking at least 1 online class, with the largest growth noted within 2 year associate degree granting institutions.² In the Sloan Consortium's 2008 report, results indicate that while DE growth continues, it is slower than in previous years.³ With an estimated 3 million students, DE enrollments are expected to increase another 19% by 2013.³ Of the institutions currently using DL, 90% employed the Internet for asynchronous computer-based instruction.³

Currently, 3 graduate programs, 35 undergraduate and 12 dental hygiene degree completion programs in the United States employ various forms of DL. Relying heavily on DL for offering educational programs leaves an unanswered question: Is learner performance on dental hygiene standard benchmark assessments impacted when technology is used as a delivery system? Some standard benchmark assessments in dental hygiene education include the National Board of Dental Hygiene Examination (NBDHE) scores, dental hygiene course grades and course grade point averages (GPAs). Allied health disciplines also rely on course grades, GPA and national registry examinations, including the NCLEX (National Council Licensure Examination—Registered Nurse) for nurs-

Abstract

Purpose: Distance education (DE) and distance learning (DL) technologies use continues to experience exponential, global growth. Various DE delivery platforms are being used for dental hygiene and allied health programs offered in post-secondary education. However, a need exists to analyze factors of program and student success using DL modalities. Administrators and educators should consider building educational programs on sound pedagogical principles when using DL for their delivery mechanism. This paper offers an applied conceptual framework as a model when developing DE/DL programs for preparing professionals in dental hygiene and allied health careers.

Key Words: Distance Education; Distance Learning; Outcomes; Benchmarks; Dental Hygiene; Assessment; Student Performance; Allied Health; Conceptual Framework; Developmental Model

This study supports the NDHRA priority area, Professional Education and Development: Validate and test measures that evaluate student critical thinking and decision making skills.

ing, PTCB (Pharmacy Technician Certification Board) for pharmacy and the NPTE (National Physical Therapy Examination) for physical therapy as benchmark indicator data documenting performance outcomes and program effectiveness.

Seven research gaps were identified by Phipps and Merisotis⁴ while reviewing the research on DL in higher education. They also questioned the overall quality of previous DL research, rendering previous study results inconclusive. They based their conclusions on the following: the research reviewed did not attempt to control extraneous variables, thus not showing "cause and effect," most studies did not use actual subjects, validity and reliability of the test instruments used were questionable and many studies did

not adequately measure attitudes of learners and faculty. The 7 research gaps Phipps and Merisotis⁴ identified included:

1. Research focused on learner outcomes for individual courses rather than entire academic programs
2. Research did not take into account personal differences among learners
3. Drop-out rates for distance education were higher and not explained
4. Research did not account or measure different learning styles
5. Research did not look at the impact of using individual technologies versus the interaction of multiple technologies
6. Research did not include a theoretical or conceptual framework

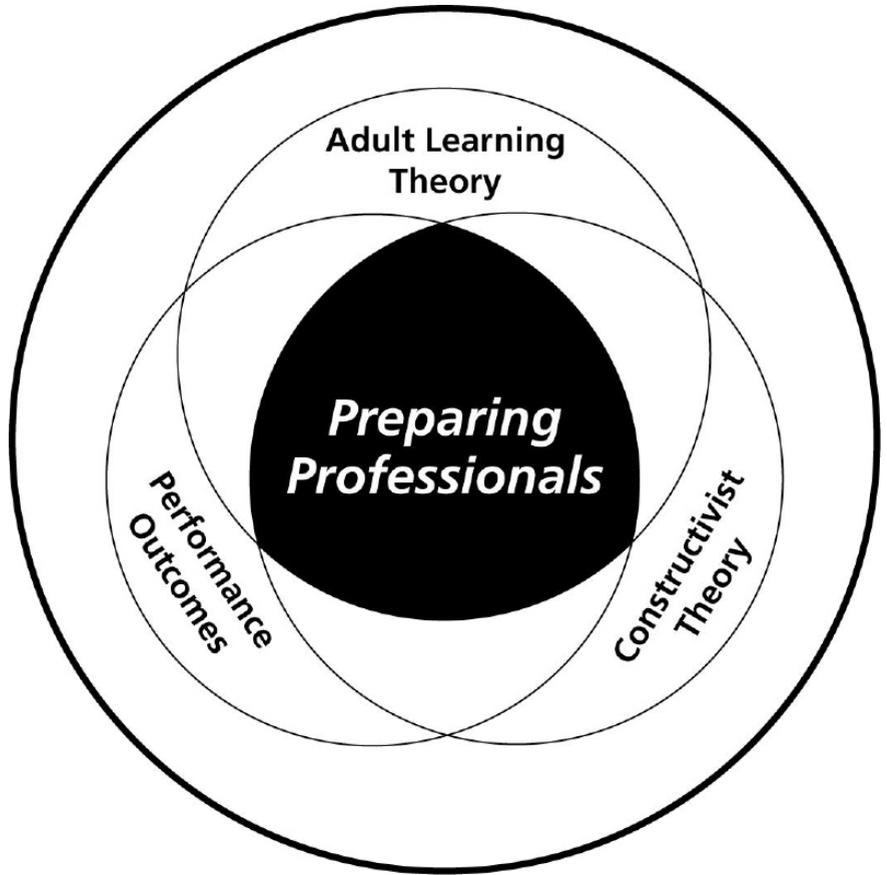
7. Research did not adequately address the effectiveness of the use of digital libraries and their potential limitations

The first of those concerns was addressed through Olmsted's research,⁵ which documented learner performance for an entire dental hygiene academic program, rather than individual courses over a 7 year period.⁵ In addition, the current paper offers a theoretical or conceptual framework for using DL which was a gap identified by Phipps and Merisotis⁴ (Figure 1).

Offering a practical, applied conceptual model based on sound, pedagogical learning principles for dental hygiene and allied health education provides groundwork for administrators and educators to continue implementing future DL programs. Administrators and educators developing and implementing DE/DL programs should base their decision making on informed, educational research. Programs are often developed and implemented based on outside pressures, and are not developed based on sound pedagogical principles of educational practice. The model/framework proposed here was developed based on 20 years of informed, educational research. If administrators in occupational areas, including dental hygiene, allied health or general and post secondary education, are considering developing a new DE program, or evaluating an existing one, this platform provides a theoretical framework for use. It is a basis for developing, implementing, evaluating and modifying DL programs informed by the pedagogical principles of Adult Learning Theory, Constructivism and Performance Outcomes.

Educational technology continues transforming dental hygiene and allied health education at a rapid pace. Traditional, undergraduate dental hygiene programs focusing on developing entry-level clinical skills might not use distance or advanced technology for educational purposes. However, with the ongoing improvement of clinical simulation

Figure 1: Preparing Professionals



programs, undergraduate dental hygiene preparation might have unique opportunities for incorporating clinical skill development differently. As dental hygiene graduate and degree completion programs typically do not have clinical components in the curricula, it is easier to incorporate a variety of technological advancements into program and course delivery. As educational fees continue rising, cost containment continues to be an issue, whether in the need and use of maintaining and upgrading undergraduate education clinical facilities or graduate programs use of advanced technological options for DE/DL program delivery. Educational institutions and program administrators taking into consideration implementation of alternative delivery methods for teaching and learning can consider using various program delivery system models.⁶⁻¹² Refocusing on DE and DL, Grimes'⁹⁻¹¹ body of research in asynchronous dental hygiene environments also

raises several crucial concerns for consideration. Amongst those issues are faculty and student satisfaction with learning and using the various technologies, sample sizes of data currently being gathered and analyzed and course hybridization. Two other significant concerns Grimes' work identifies includes learner self-directedness and concern for the perceived lack of relationship development using asynchronous learning networks. As the use of DL as a delivery modality increases, there is a need for sound pedagogical theoretical constructs to serve as the underlying framework for the development, implementation, evaluation and modification of educational experiences. Conceptual models offered by Gussy et al¹³ and Magnusen¹⁴ for e-learning were primarily one-dimensional, based solely on the principles of Constructivism. Their work spoke at length about re-focusing direction from educators as subject matter experts to fa-

cilitators of learning in DL environments. Their work did not consider multiple pedagogical principles or a multi-faceted approach in offering a DL model forwarding sound educational principles of teaching and learning. Rather, the model posited here for administrators and educators' consideration suggests a more holistic, multi-dimensional, pedagogical approach. In addition, as the dental hygiene profession advances through the expansion of educational opportunities for degree completion as suggested by Monson and Engeswick,¹⁵ it is crucial that assessment of outcomes of DL academic performance continues.⁵ The model under consideration also provides a conceptual framework for future research relating to DL (Figure 1). Not just applicable to dental hygiene or allied health education, the model has broader implications for use by post secondary administrators and educators wherever DL is being considered as a delivery mechanism, and should be tested accordingly.

Preparing Professionals: An Applied Conceptual Framework

Previous research has not offered applied conceptual frameworks justifying the continued use of DE as a learning modality for the preparation of health care professionals. Recent studies¹³⁻¹⁴ have begun providing frameworks for institutional administrators and educators to use in developing DL educational programs. DL is used not only in educational settings, but also in business and industry throughout the world.¹⁶ Conceptual frameworks must be established and used as a structure upon which to build programs. These models must take into account a myriad of differing factors while remaining simple enough to be applied across disciplines. Adult Learning Theory, Constructivist Theory and Program Outcomes in relation to DL inform 3 major areas of overlapping consideration for the conceptual framework posited here by the researcher.

Adult Learning Theory

While preparing professionals for entering the workforce as health care providers, it is important to consider several adult learning theories and their impact on the development of future workers. Adults are often self-motivated, seeking to make sense of their own existence and purpose in life, and will compare their learning experiences against their own intrinsic needs, values and life experiences.¹⁷ Adults tend to learn more effectively from experiential techniques and want to gain skills that can be applied immediately in real-world circumstances.¹⁸ Notable characteristics of adult learners include their willingness to be results-driven problem solvers, self-directed, responsible and reflective about what is being learned in comparison to real life experience.¹⁷ They desire timely, to-the-point training directly related to their needs. Yang¹⁹ proposed a holistic theory of knowledge acquisition for adult learners that is multi-faceted. Yang's model effectively bridges various paradigms of learning proposed in the adult learning literature and incorporates knowledge as a social construct.

Constructivist Theory-Building Community & Shared Meaning

Another component to be considered in the development of a conceptual framework supporting preparing professionals is the recognition of learners' needs. Such recognition can be used to develop a profound sense of community during the learning experience. Constructivist learning is defined as "meaningful action during the development of complex and unfolding knowledge."²⁰ Several grounding assumptions for constructivist learning, as identified by Brooks and Brooks,²¹ include:

1. Knowledge is constructed
2. Multiple perspectives reflect the diversity of individually constructed world views
3. Knowledge is dependent on context
4. Learning is social and based on dialogue

Yet DL is not for everyone. If individuals are not self-directed, motivated and capable of setting personal time and deadline priorities, they may not succeed in DL programs. An inventory and understanding of personal learning styles can aid potential learners in identifying whether a DL program of study is appropriate for them. It is important for adult constructivist learners to understand in advance what is expected of them in the DL community.²² Furthermore, it is important that DL facilitators carefully cultivate a positive environment supporting active participation and learner engagement.²² While advantages and disadvantages for both synchronous and asynchronous learning environments exist, it is a facilitator's obligation to develop and build positive learning communities focused around the educational objectives while meeting each participant's needs. Facilitators must convey primary concepts and "big" ideas while seeking and valuing their learner participants' points of view.²¹ Clear expectations must be established in advance, and learners should have prior knowledge of their personal learning styles in order to succeed in the DL environment.²³⁻²⁷

Individuals constructing courses or programs using DL must appreciate the audience engagement in the learning experience.²² The DL environment must allow socio-cultural opportunities for relationship construction so that learners can build their own contextual meaning. In this form, learning develops from authentic, real-world experiences. Sharing experiences through socio-cultural interactions strengthens the ability of learners to apply meaning in clinical contexts. Content knowledge and advanced skills continue developing based on the framework of the participant's previous knowledge. Breadth and depth of curriculum, especially in programs employing DL delivery mechanisms, must proceed from simple to complex matters in order to maximize learning. Learning is not discovering more – it is re-interpreting concepts

through different schemata.

According to Novotny²⁸ and Doolittle,²⁹ students in DL courses and programs differ from those in traditional brick and mortar classrooms. Although content is similar, differences exist between how students access and transform information into functional knowledge. Initially, differences might appear as barriers, but with appropriate instructional and technical support, these perceived barriers often diminish, if not disappear. Students develop new strengths and new pathways to learning. Nursing students in DL classes believed their cultural perspective experiences, critical analysis, self-assessment, resource development, discussion and self-management were strengthened during their learning experience.^{30,32-33} Both Brooks and Brooks²¹ and Vela²⁷ believed learners construct meaning based on their experiences, and there is a need for facilitators to develop activities that challenge learners' suppositions, while posing problems and questions of emerging relevance.²⁴ Assessment is considered a segment of the learning continuum, rather than a separate and distinct activity. In DL environments, it is imperative these principles are embedded in the context of the program and courses to maximize learner growth and development.³¹

Learner Outcomes

Numerous researchers have examined learners' performance in relation to DL.³⁴⁻⁴² It is important to note that, while many studies have shown no statistically significant differences in performance,³⁴⁻³⁷ there have also been mixed results reported regarding learner performance in DL environments.³⁸⁻⁴⁰ Another key consideration is that the majority of studies reviewed have assessed only 1 or 2 courses, or course section results, rather than entire academic programs before drawing their conclusions.^{34-39,41-42} In addition, other than Olmsted's work,⁵ none of these studies were conducted over significant periods of time, and the re-

sults identified might be spurious in nature. Reported results in studies undertaken within shorter periods might not provide enough data for making recommendations for change or laying the groundwork for further research by testing proposed conceptual frameworks.^{34-39,41,43}

Preparing Professionals for the Future

The paradoxes facing distance educators include learners reporting they do not want to learn at a distance, but would rather engage with a learning group or with an instructor because they value the informal social interactions occurring both in and outside the classroom.^{1,3} Other evidence suggests that learners are increasingly demanding opportunities to learn at a distance, desiring supplementation or replacement of conventional learning experiences via distance education because of the multiple roles placed on them by a complicated global society.^{1-4,33,45} This paradoxical relationship provides the underpinnings of the conceptual framework presented here as a model for the development, implementation, evaluation and modification of DL educational programming. The model (Figure 1) also provides a conceptual framework for future research related to using distance education, and is not just applicable in the areas of dental hygiene and allied health care education, but has broader application for all circumstances when distance education is considered as a delivery mechanism when considering the research gaps in DL noted by Phipps and Merisotis.⁴

Preparing Professionals—Additional Questions for Consideration and Study

Studies by Olmsted⁵ and Grimes¹⁰ concluded that DL as a delivery mechanism was as effective as traditional means, and can be used as a tool for expanding the delivery of dental hygiene and allied health education to areas distant from established educational programs, as evidenced by learner performance

on established national benchmark assessments like course grades and GPA. Dental hygiene and allied health advanced degree and degree completion programs, unlike entry-level preparatory programs, often do not have registry examination performance benchmark data (NB-DHE, NCLEX, PTCB and NPTE) to use for triangulating student and program performance, with course grades and GPA as indicators of educational performance. Entry-level programs using traditional delivery modalities that evaluate the development of affective, laboratory and clinical skills through direct observation differ significantly from DE/DL degree completion and advanced graduate degree, primarily cognitive programs. Administrator's and educator's decisions about continuing expansion of DE/DL programs in dental hygiene and allied health education should be based on various factors, including sound pedagogical principles, applied conceptual frameworks and performance outcome data. Further investigation should be undertaken for DL programs relying on using multiple technologies, and also solely relying on asynchronous, computer aided (i.e. Internet) delivery modalities. Factors affecting learner performance in relationship to the conceptual framework should be investigated. Should we consider what impact technological changes and upgrades have made on learner performance over time? How have characteristics of adult learners and constructivist learning theories impacted learner performance? The question should be raised as to what factors affect these individuals' performance results and their success as students and working professionals. Is people's self-motivation while using DL environments stronger than other groups? Are distance learners more persistent as adults? Do they construct their own meaning as individuals brought together as groups for a single purpose – that of gaining education for a career? Are personal learning styles a factor in academic success? Are there other

intrinsic or extrinsic factors affecting academic performance, including family considerations? Bender²² reported facilitator need to cultivate positive environments supporting active participation and learner engagement. Are certain courses better suited for strictly face-to-face or hybridized delivery systems? Even though studies by Olmsted⁵ and Grimes¹⁰ revealed no real performance differences for didactic coursework between DL and face-to-face education of dental hygiene professionals while using DL as a delivery system, some materials and learning activities are best suited for traditional face-to-face delivery. All these questions relate back to Phipps and Merisotis⁴ gaps as noted in the DL research literature. Consideration of the model offered provides a conceptual framework for future research strictly relating to DL. It is not just applicable to dental hygiene and allied health education, but has broader implications for use, wherever DL is being considered as a delivery mechanism, and should be tested accordingly.

The questions raised here lead to recommendations for future re-

search. Extensive previous research has been conducted on predictors of learner success and satisfaction.²⁻³ If administrators and educators are not using data for making changes or modifications to program admissions policies, performance outcomes will remain the same. It is important to implement changes within programs based on indicator data. If reasons for selecting DL as a delivery medium continue to hold true today, it is necessary for administrators and educators to continue examining the myriad, multi-dimensional and complex factors discussed in association with this conceptual framework. As we consider being informed by and associated with the persistence of the adult learner, constructivist perspectives of learning and actual benchmark performance in outcomes assessments for both DL and face-to-face instruction assuring learner and program success, administrators and educators can use subjective and objective data generated by this conceptual model as a tool for evaluating student and program success. Gathering this data can provide the profession with evidence supporting ongoing use of conceptual frame-

works as an underpinning for development, implementation, evaluation and modification of dental hygiene and allied health DL programs as we continue preparing professionals for the workforce.

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Acknowledgement

The author thanks Mary Jo Tietge MT; Amelia Ann Fox, MS, EdS; Robin Mooney, RDH, BSN and Ruth Nyland, Ph.D for their involvement in finalizing this manuscript.

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