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Dental Hygiene Faculty Use of Educational Technologies for Instruction

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Abstract

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BA, Oregon Institute of Technology, 2010

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Dissertation Submitted in Partial Fulfillment

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Abstract

Faculty hesitancy to implement educational technologies for instruction is problematic in dental hygiene education. Little or no scholarly research has been conducted on faculty use of educational technologies for instructional practices in the dental hygiene field. Grounded in the technology acceptance model, the purpose of this inquiry was to explore the perceptions of dental hygiene faculty regarding their attitudes toward use, usefulness, and ease of use of educational technologies for instruction. The research questions focused on dental hygiene faculty attitudes toward use of educational technologies for instruction, the usefulness of educational technologies for instruction, and the ease of use of educational technologies for instruction. For this basic qualitative study, data were collected through an online synchronous interview of 5 dental hygiene faculty at 1 university in the Midwest. The data were analyzed and coded using open coding; codes were clustered into categories and then broadened to themes. Key findings for the study were that faculty (a) had positive attitudes toward the use of technology, (b) perceived technology as useful for instruction to improve student learning and their own effectiveness, and (c) perceived technology easy to use after practice or training. The results from this study may provide support for dental hygiene program directors, faculty, and other key stakeholders on how to better prepare for using educational technologies for instructional purposes. This study may contribute to positive social change by helping to understand why dental hygiene faculty are hesitant to implement educational technologies despite the rise in the ubiquitousness of technology in everyday life.

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Dedication

I want to dedicate this accomplishment to my amazing husband, James, and our four beautiful children: Sophia, Olivia, Alexander, and Lillyana. Thank you for motivating me and being the light in my life and my forever sunshine. I would also like to dedicate this professional and personal achievement to my parents and siblings, Tom, Susan, Angie, and Nick. Your strength and words of wisdom have guided me throughout this journey and provided an unspoken inspiration to achieve my goals and aspirations. Thank you.

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Chapter 1: Introduction to the Study

Introduction

The tremendous advancements in technology and the use of technology in education are transforming the way students expect to learn and how faculty are expected to teach (Kotcherlakota, Kupzyk, & Rejda, 2017). Researchers Dahlstrom and Bichsel (2016) found in an Educause comprehensive study regarding undergraduate students and information technology that approximately 50% of students use their laptops during class, 40% use a smartphone during class, and just over 50% stated they use social media as a learning tool. Comparably, Sun and Chen (2016) found in their literature review that educators themselves are users of technology, with 49% stating they use handheld devices such as an iPad, and 42% use e-books or e-readers. Although educators are using technology in their personal and professional lives, many have yet to embrace these technologies for instructional purposes in higher education (Kotcherlakota et al., 2017).

Understanding the rapidly changing educational landscape holds significance for the dental hygiene profession because of the movement for change presented by the American Dental Hygienists' Association (ADHA), the largest national U.S. organization working on behalf of the professional interests of dental hygienists. In 2016, the ADHA published a white paper on the direction of dental hygiene entitled, "Transforming Dental Hygiene Education and the Profession for 21st Century." This document outlined the current state of dental hygiene education along with a framework for transformation as implications for change and detailed the need for curricular expansion to include the use of new technology (ADHA, 2016b). To meet this instructional direction from the ADHA,

faculty in dental hygiene education must employ technology effectively to deliver content to students (Magen-Nagar & Shonfeld, 2018). Therefore, in this basic qualitative study, I explored the use of educational technologies for instructional practices among dental hygiene faculty and the faculty's perceptions regarding attitudes toward use, usefulness, and ease of use of those technologies.

In Chapter 1, I describe the background, problem statement, and purpose of the study. The research questions presented align with the conceptual framework, which was created from the technology acceptance model (TAM). The qualitative nature of the study is detailed, followed by definitions and key terms. The assumptions, scope and delimitations, and limitations are clarified. This chapter concludes with a discussion of the significance of the study and its potential contribution to social change.

Background

Numerous researchers have detailed how learning technologies are integrated into teacher practices (Burke, Schuck, Aubusson, Kearney, & Frischknecht, 2017; Scherer, Siddiq, & Tondeur, 2019; Scherer & Teo, 2019). In many studies, researchers have focused on understanding the availability of technology and the challenges that arise from teaching and learning with technology (Rienties, Giesbers, Lygo-Baker, Ma, & Rees, 2016; Salinas, Nussbaum, Herrera, Solarte, & Aldunate, 2017). Although the availability of technology is increasing, individual faculty do not integrate technology at the same rate, and many faculty members limit the types of technologies they use (Nelson, Voithofer, & Cheng, 2019; Smith, Stair, Blackburn, & Easley, 2018; Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich, 2017; Watty, McKay, & Ngo, 2016). Chan, Borja,

Welch, and Batiuk (2016) found that the types of educational technologies faculty have accepted and consistently employ are primarily limited to PowerPoint presentations and the use of course management systems accepted by their institutions. Kearney, Schuck, Aubusson, and Burke (2018) explained attitudes of faculty toward the use of technology as first-order barriers (external factors such as professional development) and second-order barriers (internal factors such as beliefs or pedagogical approaches) from multiple factors, including available resources, adequate compensation, lack of appreciation for embracing the latest technological pedagogies in tenure and promotion results, and lack of adequate technology infrastructure. At present, there is little scholarly literature on how dental hygiene faculty use educational technologies for instruction. With this study, I sought to fill this gap in the educational technology literature.

Statement of Problem

The problem addressed in this qualitative study is the lack of research on the use of educational technologies for instructional practices among dental hygiene faculty and the faculty's perceptions regarding attitudes toward use, usefulness, and ease of use of those technologies. Although higher education faculty's use of educational technology has been explored (Martin, Polly, Coles, & Wang, 2020), as well as attitudes toward use (Jaaskela, Hakkinen, & Rasku-Puttonen, 2016), and ease of use (Garaika & Margahana, 2020), none of the studies have been done with dental hygiene faculty (Ahmad, 2016). Faculty lack of use and possible hesitancy to implement technologies are relevant concerns because students expect higher education to reflect the information accessibility and immediacy of their connected lives (Johnson et al., 2016; Rienties et al., 2016; Teo &

Mingming, 2017). Technology has become integral to students' educational experiences, so it is imperative that students and educators engage with and utilize technologies as part of teaching and learning (Goodchild, 2018). Dental hygiene education programs that offer bachelor's degrees are often located at universities and are offered through a group of schools referred to as a college of health professions, which can offer a variety of healthcare-related programs, such as nursing, physician assistant, physical therapy, speech pathology, medical laboratory sciences, public health sciences, communication sciences disorders, and dental hygiene. Many educators teaching in these programs began their careers as clinicians and have emerged as experts clinically; however, they often have not been formally trained to be educators and have received little guidance or formal preparation for teaching in higher education (Brownstein, Murad, & Hunt, 2015; Chen et al., 2017; Walling, 2018). As a result, educators in health professions require training from academic institutions to excel in the classroom (Uğur & Turan, 2018). Because of this lack in teacher training, faculty are hesitant to implement new technologies and often attribute information technology incompetence, organizational climate, resistance to change, lack of institutional support, lack of financial support, and lack of time as reasons for not using educational technologies (Rizvi, Gulzar, Nicholas, & Nkoroi, 2017). As technology constantly emerges and technology use among dental hygiene students increases, so does the need to develop new teaching approaches and methods. Thus, it is important to explore the use of educational technologies for instructional practices among dental hygiene faculty and their perceptions regarding attitudes toward use, usefulness, and ease of use of those technologies.

Purpose of the Study

The purpose of this basic qualitative study was to explore the perceptions of dental hygiene faculty regarding their attitudes toward use, usefulness, and ease of use of educational technologies for instruction. Understanding faculty perceptions can aid in the appropriate use of technology among dental hygiene faculty members and can support faculty as they enhance student-learning experiences with educational technologies.

Research Questions

RQ1: What are the perceived attitudes of dental hygiene faculty toward their use of educational technologies for instruction?

RQ2: What are dental hygiene faculty perceptions about the usefulness of educational technologies for instruction?

RQ3: What are dental hygiene faculty perceptions about the ease of educational technologies use for instruction?

Nature of the Study

For this study, I chose a basic qualitative approach because this method was best suited for the research problem, purpose, and questions. Qualitative methods are used to understand individual beliefs, experiences, attitudes, behavior, and interactions (Patton, 2015). In this case, I chose a basic qualitative approach because there was only one data source and it was used only to acquire perceptions. The design allowed me to gain a deeper understanding of the experiences and views of the participants by collecting data through a one-time, in-depth interview.

The participants are a critical case purposive sample who work in a homogeneous environment (see Etikan, Abubakar, & Alkassim, 2016). The purposive sampling technique, also called judgment sampling, is the intentional selection of a participant due to the characteristics the participant possesses (Etikan et al., 2016). In other words, the researcher chooses what needs to be known and sets out to find individuals who can and are willing to provide the information based on their knowledge or experience (Etikan et al., 2016). All participants in this study have teaching roles in a dental hygiene department at a higher education institution. I conducted one round of interviews of five dental hygiene faculty members. The qualitative in-depth interviews included open-ended questions with the expectation that participant responses would uncover unexpected patterns (Weller et al., 2018). I used interviews to gather data to answer the research questions.

Conceptual Framework of the Study

The conceptual framework for this study was the TAM by Davis (1989). This model, as applied to this study, provided a foundation to explore the use of educational technologies for instructional practices among dental hygiene faculty and faculty perceptions regarding attitudes toward use, usefulness, and ease of use of those technologies. TAM was designed to provide a useful explanation for why people vary with respect to their success in using technology (Gyamfi, 2017). According to Davis, the success of a system can be determined by user acceptance measured by three factors: (a) perceived attitudes toward using a system (ATU), (b) perceived usefulness (PU), and (c) perceived ease of use (PEU). The TAM has continuously been tested and expanded on

with two major updates, including the technology acceptance model 2 (TAM2; Venkatesh & Davis, 2000) and the unified theory of acceptance and use of technology (UTAUT; Venkatesh, Morris, Davis, & Davis, 2003). TAM2 was created to identify limitations in the original TAM that explain the reason an individual would perceive a system as being useful and to suggest additional qualifications be added to the PU variables in the TAM. Venkatesh and Davis (2000) were also concerned with assessing the function of TAM2 in a mandatory setting. The authors performed a field analysis with 156 knowledge employees using multiple systems, voluntary use, and mandatory use. Venkatesh and Davis (2000) assessed user beliefs and self-reported use at three points in time, preimplementation, 1-month postimplementation, and three-months postimplementation (Lai, 2017). Results showed that TAM2 functioned well in both voluntary and mandatory settings, with the exception of subjective norms (Venkatesh & Davis, 2000). Subjective norms had no effect in a voluntary setting; however, there was an effect in a mandatory setting (Venkatesh & Davis, 2000).

Soon after, Venkatesh et al. (2003) developed a comparative paradigm to the original TAM and TAM2 called the UTAUT. UTAUT was created to recognize four key elements—(a) performance expectance, (b) effort expectancy, (c) social influence, and (d) facilitating conditions—and four moderators—(a) age, (b) gender, (c) experience, and (d) voluntariness—concerned with exploring behavioral intent to use technology and actual technology used primarily in organizational contexts (Venkatesh et al., 2003). Using UTAUT, performance expectancy, effort expectancy, and social influence are analyzed with results, suggesting an effect between behavioral intent to use technology,

whereas behavioral intent and facilitated conditions influence technology use. Numerous combinations of the four moderators were also analyzed, and researchers found an effect between several UTAUT associations (Venkatesh, Thong, & Xin, 2016).

As the intent of this study was to explore the use of educational technologies for instructional practices among dental hygiene faculty and faculty perceptions regarding attitudes toward use, usefulness, and ease of use of those technologies, the original TAM was applied as the conceptual framework for this study. Faculty use of technology is so low that the newer versions of TAM would have been excessive. The TAM2 and UTAUT models are not suitable because mandatory settings, performance, and moderator conditions are not being examined in this study and do not apply. At this point in the research, only a basic understanding is needed, and the best way to accomplish this was using the original TAM framework.

Definition of Terms

Dental Hygienist: Licensed oral health professionals who focus on preventing and treating oral diseases to protect the oral cavity and to protect patients' total health. They are graduates of accredited dental hygiene education programs in colleges and universities and must pass a written national board examination and a clinical examination to obtain state licensure (ADHA, 2014).

Degree Completion Programs: Programs typically structured to allow persons who previously completed a substantial portion of the requirements for an undergraduate degree to complete the credit requirements needed to earn a bachelor's degree (U.S. News University Directory, 2011).

Educational Technology: The study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources (Januszewski & Molenda, 2013).

Entry-Level Programs: Programs that prepare graduates for the clinical practice of dental hygiene. These include a certificate, associate degree, and bachelor's degree programs (ADHA, 2016a).

Perceived ease of use (PEU): The degree to which technology requires the teacher or student to put forth effort (Davis, 1986).

Perceived usefulness (PU): The degree to which computer technology will assist workers to meet their job-related objectives (Davis, 1986).

Perceived attitudes: Attitudes toward a specific information technology is conceptualized as a potential user's assessment of the desirability of using that technology, and according to the TAM, exploring an individual's use of technology (Davis, Bagozzi, & Warshaw, 1989).

Technology acceptance model (TAM): The theory of how a teacher decides whether to include a new technology by considering the PEU and PU (Davis, 1986).

Assumption of the Study

This study was conducted based on several essential assumptions. One assumption was that by assuring confidentiality, the participants would share their perceptions about how they use technology for instructional practices and their perceptions regarding the usefulness and ease of use of those technologies honestly, openly, and to the best of their knowledge. This assumption was important to the

trustworthiness of the results of this study. The second assumption was that all respondents would understand the question items and complete the interview in its entirety.

Scope and Delimitations

To gain insight into the perceptions of dental hygiene faculty members regarding implementing technology for their instructional practices, I purposefully chose a small sample size of dental hygiene educators in entry-level dental hygiene programs from a university in the Midwest. The dental hygiene program where participants were recruited offers a diverse set of courses ranging from oral histology and embryology to community oral health management. Although the faculty members' primary teaching objectives are the same (educate dental hygiene students about the fundamentals of oral health), their approaches, practices, and philosophies had the potential to vary significantly because all had more than 10 years of teaching experience, except for two who had less than 3 years of experience. The TAM provided the conceptual framework for this study. The purpose was to explore the perceptions of dental hygiene faculty members regarding their attitudes toward use, usefulness, and ease of use of educational technologies for instruction.

Limitations of the Study

The limitations of this research study were influences I could not control, including the limited number of dental hygiene faculty available for interviews, the time constraint of collecting data, and the interview questions I created as the researcher. Additional limitations consisted of only including participants from one academic

institution rather than multiple and not having participants from differing departments in the college of health professions (i.e., nursing, public health sciences, physician assistants, etc.).

Technology posed an additional limitation of this study. I used voice over Internet protocol (VoIP) through the Zoom online platform to conduct interviews. VoIP provided me the ability to interview participants with the use of voice and video via a synchronous Internet connection (Lolacono, Symonds, & Brown, 2016). Nonverbal cues may have been affected by using VoIP for interviews because, in most cases, only the face was seen, thus inadvertently preventing me from seeing important signals from the rest of the body. According to Lolacono et al. (2016), "in a head and shoulder presentation the researcher may lose the full range of posture, gestural, and expressive movement that the body conveys, as well as the intentionality that is carried and expressed in that movement" (p. 12). Zoom is supported by technology support staff at the institution where participants were employed; thus, support staff could aid in any technical glitches or unforeseen technical issues that occurred. To address nonverbal cues, I listened carefully to each participant's voice, including tone (Lolacono et al., 2016).

Researcher bias was another possible limitation of this study. I have 8 years of teaching experience as a dental hygiene educator in higher education. My current teaching appointment is 100% online; I am the assistant director of an online dental hygiene degree-completion program. All dental hygiene faculty recruited for this study have academic appointments in the entry-level program, not the degree-completion program, located in the Midwest. To address challenges and bias in the study, I used a

reflective journal to manage any personal biases and remain transparent. I used member checking as a form of triangulation. Triangulation can be achieved by asking the same research questions of each participant (Devault, 2018). I also conducted member checks when I asked participants to review my understanding of the interview data (see Devault, 2018).

Significance of the Study

This study may contribute to existing research by providing insight into faculty perceptions of the use of educational technologies in dental hygiene programs. The results of this study may help with the integration of educational technologies among dental hygiene faculty and provide insight into faculty perceptions of technology use that could enhance student-learning experiences (Burley, 2016). With the advancement of educational technologies in the classroom and the move of clinical health professionals to become educators, the ability to promote and enhance student-learning experiences is vital (Leow, Neo, & Hew, 2016). By understanding the perceptions of dental hygiene faculty members regarding their attitudes toward use, usefulness, and ease of use of educational technologies, directors of dental hygiene programs can better support faculty in using technologies by providing the assistance and training needed to ensure strong implementation. The results of this study may help develop an understanding of why dental hygiene faculty are hesitant to implement educational technologies despite the rise in the ubiquitousness of technology in everyday life.

Chapter Summary

In this chapter, I presented an introduction and outline of the study. I began with a brief overview of the background of key literature examined and followed with the problem, purpose, and research questions. Next, I introduced the conceptual framework to include discussion on how the TAM has been expanded with TAM2 and UTAUT. I described the nature of this basic qualitative study and continued with key definitions, assumptions, scope and delimitations, limitations, and significance.

Chapter 2 includes a discussion of the various frameworks used in the research of technology implementation. Next, I present an examination of the TAM framework, concluding with a review of educational technology in higher education and faculty teaching preparation. Chapter 3 provides a detailed explanation of the process for collecting and analyzing data and a complete description of the participant selection and reliability of the study.

Chapter 2: Literature Review

Introduction

Technology has become an integral component of educational experiences, and student and faculty engagement with and use of technology are likely to continue to increase as part of the teaching and learning process (Goodchild, 2018). This instructional trend is no different for education in colleges of health professions, which can offer a variety of healthcare-related programs, such as nursing, physician assistant, physical therapy, speech pathology, medical laboratory sciences, public health sciences, communication sciences disorders, and dental hygiene. Many faculty teaching in these programs began their careers as clinicians who have emerged as clinical experts; however, they often have not been formally trained to be educators and have received little guidance or formal preparation for teaching in higher education (Brownstein et al., 2015; Chen et al., 2017; Walling, 2018). As a result, educators in health professions may require instructional training from academic institutions to excel in the classroom (Uğur & Turan, 2018). Due to the increasing use of technologies in the classroom, this training should include the use and implementation of educational technologies for teaching.

To assess the degree to which one group of faculty in colleges related to health professions engage with educational technologies in the classroom, I conducted a basic qualitative study of dental hygiene faculty. The purpose of this study was to explore the perceptions of dental hygiene faculty members regarding their attitudes toward use, usefulness, and ease of use of educational technologies for instruction. This study builds on existing research with the intent to provide insight into faculty implementation of

educational technologies for instruction in dental hygiene programs. Furthermore, my research could aid in the proliferation of educational technologies implementation among dental hygiene faculty by gaining insight into their perceptions of technology use that could enhance student-learning experiences (Burley, 2016). At present, there is a gap in the scholarly literature on how dental hygiene faculty use educational technologies for instruction. Therefore, my exploration of how dental hygiene faculty use educational technologies for instructional practices and their perceptions regarding attitudes toward use, usefulness, and ease of use of those technologies helped fill this gap. Faculty hesitation to implement technologies for instruction is a relevant concern because students expect higher education to reflect the information accessibilities of their environment (Johnson et al., 2016; Naylor & Nyanjom, 2020; Rienties et al., 2016; Teo & Mingming, 2017).

Chapter Organization

In this chapter, I discuss foundational research used to inform my study on the perceptions of dental hygiene faculty members regarding their attitudes toward use, usefulness, and ease of use of educational technologies for instruction. In the first section, I explain the strategies used to locate and retrieve relevant peer-reviewed literature. In the second section, I examine the TAM, including its origin and history, theories associated with the model, application of the TAM in previous research, and differing versions of the model. In the third section, I discuss educational technology and provide a description of the history and trends. The chapter concludes with a description of technology use in

higher education, technology use in healthcare professions, and a detailed account of the dental hygiene field to include discussion of current technology uses.

Literature Search Strategy

I used the Eric-EBSCOhost database, an e-library and information resource through the Walden University Library, to locate peer-reviewed scholarly literature focused on dental hygiene and TAM. I expanded my search to include CINAHL & MEDLINE simultaneous search, Academic Search Premier, ProQuest Dissertations and Theses, Education Research Complete, Academic Search Complete, PubMed, ProQuest Nursing & Allied Health Source, and Science Direct. I also reviewed several online journals specific to dental hygiene, including the *Journal of Dental Hygiene Education, Journal of Dental Hygiene, International Journal of Dental Hygiene, Journal of Dental Education, American Journal of Distance Education, Journal of Distance Education,* and *EDUCAUSE Quarterly*. The following educational sites were also consulted: American Dental Hygienists' Association and the American Dental Education Association. I used the following keywords: *dental hygiene education, dental education, educational technology in higher education, technology acceptance, adoption, adoption of technology, technology integration, and technology acceptance model, educational change, educational innovation, educational technology practices,* and *educational technology integration*. To identify seminal research, I accessed the reference lists in scholarly articles, particularly those focused on technology acceptance using the TAM, and analyzed broad TAM search results in Education Source, ERIC, and Google Scholar with publication dates prior to 2015. Although most of my selected articles were

published within the past 5 years, I also studied older empirical studies specific to dental hygiene to understand the scholarly history of the TAM, how it has been researched in the dental hygiene field, and to strengthen my understanding of qualitative studies. By conducting routine searches, I identified newly published research useful to this study.

Throughout the literature search process, I maintained a literature review tracking database in Microsoft Word. I created a table to track my searches by publication date and author(s), database, search terms, methods/design, sample, problem/purpose, summary, and citation. With this table, I was able to identify major themes in the literature.

Conceptual Framework

The conceptual framework for this qualitative study was the TAM. This framework provided a foundation to explore the perceptions of dental hygiene faculty members regarding their attitudes toward use, usefulness, and ease of use of educational technologies for instruction. In this section, I describe the TAM, including its origin and history, theories associated with the model, and its application in previous research.

Technology Acceptance Model

The 1970s brought about new technologies and the birth of the modern computer (Gyamfi, 2017). During this era, technological systems had become widespread in many sections of the world. Although technologies were widely used, individuals were still faced with challenges that led many to resist accepting new technologies, especially in the business sector (Gyamfi, 2017). Although some technological systems were accepted, the majority failed or severely underperformed (Davis, 1986). Because of this,

investigating the relationships between people and technology became a field of interest for many researchers (Gyamfi, 2017). One of the leading researchers in this field was Fred Davis. In Davis's doctoral thesis, while a student at Massachusetts Institute of Technology, the TAM was proposed (Davis, 1986). The premise of the model was to explore system usage by user motivation, which in turn, is directly influenced by a stimulus (Davis, 1986). Davis further developed the original model based on the prior work of Fishbein and Ajzen (1975), creators of the theory of reasoned action (TRA). The most current model of the TAM evolved over time, and the TRA is the starting point of this evolution.

Theory of Reasoned Action

Fishbein and Ajzen (1975) believed there was a relationship between attitudes and behaviors within human action. This idea grew to what is now known as the theory of reasoned action (TRA). TRA is generally used to explore how individuals will act based on their preexisting attitudes and behavioral intentions. Fishbein and Ajzen found that cognitive structure, based on a person's beliefs, and the use of an expectancy value model, can determine a person's attitude. This cognitive structure exists with the intent to resolve the influence of other factors, such as effect on attitude (Rahman, Ko, Warren, & Carpenter, 2016). When assessing the cognitions that determine an attitude, Fishbein and Ajzen stressed the importance of identifying beliefs that align with the attitude in relation to time frame, target, action, and context (Rahman et al., 2016). Consequently, a lack of association may weaken the relationship between beliefs, attitudes, intentions, and behaviors (Rahman et al., 2016). Fishbein and Ajzen (1975) developed TRA to

understand human social behavior and found that actual behavior is characterized by a person's behavioral intent to perform the behavior and is jointly determined by the person's natural attitude toward the behavior and social influences. To fully understand this phenomenon, social influences and behavioral intent are discussed in more depth.

Social influences. Social influence is a concept in which an individual changes behavior to conform to pressures applied by an organization, society, or their peer group (Prieto, Miguelanez, & García-Peñalvo, 2016). Fishbein and Ajzen (1975) described social influence as a perceived pressure to perform or not perform a given behavior. Social influences are highly influenced by subjective norms, which are described as a set of normative beliefs that are assessments of what other people think about the behavior (Miller, Furman, & Jackson, 2018). Some consider this phenomenon to be a subjective belief, in that one could mistakenly believe that others do perform a behavior or would approve or disapprove of it (Mackie & Montei, 2015). Thus, it is important to determine how social influence may affect the commitment of an individual toward their use of a system for understanding and explaining usage and thus accepting a set behavior (Legros & Cislaghi, 2019; Mackie & Moneti, 2015).

Behavioral intent. Fishbein and Ajzen (1975) stated that behavioral intent and attitude can provide a unique perspective into an individuals' actions and can help clarify underlying reasons for acceptance or rejection of a specific technology (Rahman et al., 2016). Behavioral intent is created through a combination of attitudes and subjective norms toward a behavior (Miller et al., 2018). Attitude involves an individual's beliefs about a behavior in question, whereas subjective norms are an individual's perception

that others who are important think they should or should not execute a behavior in question (Miller et al., 2018). Fishbein and Ajzen found that attitude and subjective norms greatly affect an individual's positive or negative feelings (evaluative affect) about performing a particular behavior. In other words, intention is the primary cause of an individual's behavior, whereas intention to behave is decided by subjective norms, an individual's attitude toward a behavior, and their perception of it (Fishbein & Ajzen, 1975). By evaluating the relationships between attitudes and behaviors, researchers can examine unanticipated behaviors by linking the relationship between beliefs, attitudes, intentions, and behaviors (Hahn & Popan, 2018). In the TRA, attitudes and subjective norms independently affect intentions of system usage; however, in the TAM, attitude of a user toward a system is a significant factor in identifying if a user will accept or reject that system. To address the acceptance or rejection of a system, three interrelated factors are discussed.

Factors of Technology Acceptance Model

Davis (1986) stated that the acceptance or rejection of a given system is influenced by three interrelated factors: ATU, PU, and PEU (Mortenson & Vidgen, 2016). PU is the user's belief that a particular information system will help improve job performance and provide benefit or value (Davis, 1986). Davis explained PU as the extent to which people use or not use an application they believe will help them perform their job better (Caporarello, Magni, & Pennarola, 2016). For example, if an educational technology such as virtual laboratories were perceived by the user (dental hygiene faculty) to be a suitable replacement to a conventional lab, where students learn to mix

alginate impressions, it would first have to demonstrate usefulness to the faculty member to be considered useful. Perceived benefits involve the belief that an organizer or individual will experience benefits (Wingo, Ivankova, & Moss, 2017).

PEU is the degree to which the user believes technology is free of effort or easy to use (Davis, 1986). If educational technologies are difficult to use, alternative approaches or staying with what is known and comfortable are likely to be examined further, thereby disregarding a new technology. Davis wrote that PEU plays an important role in attitude toward use through self-efficacy. The easier a system is to use, the stronger the user's sense of efficacy. Thus, there is a correlation between efficacy and personal control regarding a user's ability to carry out the behavior needed to accept technology.

When PEU and PU are combined, a third factor in motivation develops called ATU (Venkatesh & Davis, 2000). This factor refers to the user's overall feelings about the system (Venkatesh & Davis, 2000). If the user perceives an easy-to-use system that can significantly improve a task, their attitude will likely be positive (Venkatesh & Davis, 2000). In contrast, if the user anticipates a system to be problematic, their attitude will likely be negative (Venkatesh & Davis, 2000).

The purpose of this qualitative study was to explore the perceptions of dental hygiene faculty regarding their attitudes toward use, usefulness, and ease of use of educational technologies for instruction. The conceptual framework for this study is the original TAM. As applied within the context of this study, this model may help to understand why dental hygiene faculty are hesitant to implement educational technologies despite the rise in the ubiquitousness of technology in everyday life.

Understanding faculty perceptions can aid in the appropriate use of technology and can support faculty as they enhance student-learning experiences with educational technologies.

Alternative Models

Numerous researchers and organizations have implemented Davis's work and have used it to study and explore their own system use. The TAM has been tested by incorporating new factors and numerous variables. Many TAM users tailor the model to meet their own needs, while others use it as originally proposed. Although numerous researchers have applied the TAM to their research needs, several have recognized that the model may be too generalized, and may represent an oversimplification of a complex relationship between users and technology. As a result, alternative versions of the model have emerged. In this section, I discussed alternative models that have emerged from the TAM, and I provided justification as to my choice for using the original TAM for this study.

The TAM has continuously been tested and expanded upon with two primary updates, the TAM2 (Venkatesh & Davis, 2000) and UTAUT (Venkatesh et al., 2003). TAM2 identified limitations in the TAM by describing reasons for which a person would perceive a given system useful, and therefore proposed that new variables could be added as qualifications to the PU variables in TAM. Venkatesh and Davis were also interested in evaluating the performance of TAM2 in a mandatory setting. A field study was conducted by Venkatesh and Davis (2000) with 156 knowledge workers, who used four differing systems, two of which were for voluntary use and two others of mandatory use.

The study collected user beliefs and self-reported use at three points in time, preimplementation, 1-month postimplementation, and 3-months post implementation (Lai, 2017). Results found that TAM2 performed well in both voluntary and mandatory environments, with the exception that subjective norms had no effect in voluntary settings, but did in mandatory settings.

Venkatesh et al. (2003) created a competing model to the TAM and TAM2 called the UTAUT. UTAUT recognizes four key factors (performance expectance, effort expectancy, social influence, and facilitating conditions) and four moderators (age, gender, experience, and voluntariness) related to exploring behavioral intent to use a technology and actual technology use primarily in organizational contexts. According to UTAUT, performance expectancy, effort expectancy, and social influence were theorized and found to influence behavioral intention to use technology, while behavioral intention and facilitating conditions determine technology use. Various combinations of the four moderators were theorized and found to moderate various UTAUT relationships (Bravo et al., 2020; Venkatesh, Thong, & Xin, 2016).

As the purpose of this study was to explore the use of educational technologies for instructional practices among dental hygiene faculty and their perceptions regarding attitudes toward use, usefulness, and ease of use of those technologies, the TAM was chosen as the conceptual framework for this study. Faculty use of technology is so low that the newer versions of TAM would be excessive. The TAM2 and UTAUT models are not suitable because mandatory settings, performance, and moderator conditions are not being examined in this study and do not apply. At this point in the research, only a basic

understanding is needed and the best way to accomplish this is with the use of the TAM framework. In the next section, I describe how the TAM has been applied across a diverse context of previous research.

Application of the Technology Acceptance Model in Previous Research

As a result of Fishbein and Ajzen's (1975) research, Davis (1989) sought to identify a deeper understanding of determinants of attitude and therefore included the works of Schewe (1967). Schewe explored the major determinants of attitude toward information systems. Schewe assumed that decisions would be based more on facts and less on management intuitions and should therefore be improved with relevant data bank. Management of information system users' attitudes was analyzed as a key determent of system usage behavior (Schewe, 1967). The framework for Schewe's study included four sets of variables: beliefs of system dimensions, exogenous variables outside the information system that may affect attitudes toward the system, attitudes toward the information system, and system usage (Davis, 1986). The sample used in the Schewe (1967) study comprised of marketing managers who worked in food processing companies situated in three Midwestern states. The results did not corroborate his hypothesis of a hierarchy of computer concerns impacting beliefs of usefulness or use (Schewe, 1967). The managers were more concerned with the relationship of systems staff than the technical features of the system (Schewe, 1967). However, Schewe used factor analysis to recognize a large set of variables that affected technology acceptance that, in turn, identified variables affecting the use of technologies.

The findings of Schewe lead Davis to eliminate organizational and interpersonal effects in his research. As an alternative, Davis focused on the effect of two beliefs, PU, and PEU on the perceived or self-reported signs of system use (Davis, 1986). Two major research efforts impacted the TAM and have been credited with strengthening the model. The first was a field study conducted in 1986, consisting of 112 users at IBM Canada. The study was constructed to assess the psychometric properties of the measurement tool (Davis, 1986). The tool appraised the relationship between PU, ease-of-use, and self-reported current usage of a file editor called XEDIT, and an electronic mail system called PROFS (Davis, 1986). Results found that ease of use influenced usage through its effect on usefulness, while usefulness influenced usage directly (Davis, 1986).

The second study examined 107 students enrolled in a Master of Business program and were participants of a laboratory experiment (Davis, 1986). In the study, Davis sought to connect his model to explore usage and behavioral intent (Davis, 1986). Respondents evaluated two graphic packages, one with a videotape demonstration only and the second with a videotape demonstration with a hands-on experience (Davis, 1986). As theorized by Davis, both PU and PEU were significantly correlated to usage and behavioral intent. (Davis, 1986). Moreover, in both studies, the most significant discovery was that usefulness was significantly linked to usage, as opposed to usefulness to ease of use (Davis, 1986). Davis suggested that potential users of a system made their usage decisions based on their beliefs of the quality of the system output and that the expected enjoyment of using the system influenced their attitudes toward using the technology.

PU is subject to a wide range of interpretations and includes occasions where users perceive that information systems may result in improved job performance, competence, usefulness, and extrinsic motivators such as improved assessment scores or improved levels of experience (Wingo et al., 2017). Davis developed the PU construct with the following benefits of use; (a) it would allow users to accomplish tasks quicker; (b) enable users to enhance their performance; (c) increase user productivity; (d) enhance user effectiveness; (e) make it easier to do what users want to do, and; (f) users would find it useful. Mokhtar, Katan, and Hidayat-ur-Rehman (2018) followed the PU method to apply the benefits of use toward learning management systems (LMS). This method is beneficial for effective communication with students and for implementation of technology-based learning processes. The authors argue that the success of LMS depends on the instructors' use of LMS (Mokhtar et al., 2018). The TAM was used for this study with technology factors, personal and psychological factors, and social factors to present a model that could better explain the instructors' use of LMS in higher education (Mokhtar et al., 2018). Results found that the proposed model has good explanatory power to explain the use of the LMS by instructors at higher educational institutions and that PU and PEU are good predictors of technological characteristics (Mokhtar et al., 2018). If instructors find LMS more effective in their academic activities, more compatible, and more convenient to use, they will in turn, find it more useful, easier to use, and their intent to use will be positively affected (Mokhtar et al., 2018).

Joo, Park, and Lim (2018) surveyed 296 undergraduate students enrolled in a required 2-credit teacher certification course from the college of education at three

universities. The purpose was to identify relationships between teacher self-efficacy and PEU for preservice teachers who intend to use technology (Joo et al., 2018). Results showed a positive correlation among teacher self-efficacy and PEU with technology in the classroom when training was provided (Joo et al., 2018). Similarly, Cakiroglu, Gokoglu, and Ozturk (2017) revealed a positive correlation among current use, instructional use, and future use in teaching practices for preservice teacher integration of mobile technologies. The authors hypothesize that TAM may also be useful in explaining future trends of technology for different purposes (Cakiroglu et al., 2017). In looking at the association between PEU and PU, those technologies are easy to use and therefore, contribute to increased performance. Educational technologies that are easier to use have the potential to help educators accomplish more while exerting the same amount of effort.

The TAM has received significant attention regarding its use in exploring the intent to use varying technologies (Wingo et al., 2017). Various researchers have explored different aspects of TAM, ranging from varying areas of e-learning and mobile media to Web 2.0 technologies (Ngafeeson & Sun, 2015). For instance, Tran (2016) examined factors that influence student attitudes toward blended e-learning systems with the use of TAM by utilizing a theoretical model derived from prior research and analyzing quantitative data using a structural equation modeling technique (Tran, 2016). Empirical results of the Tran (2016) study indicated an association between ease of use and attitude in the TAM. Additionally, the study found that increasing communication between students and teachers in blended e-Learning systems (using interactive tools

such as forums and live chat) were effective ways to improve student's attitudes (Tran, 2016).

Cakiroglu et al. (2017) also drew upon the TAM to explore preservice teachers' use of mobile technologies through the influence of current use, instructional use, and future use in their teaching practices. The findings of Cakiroglu et al. (2017) were similar to Tran (2016) in that the current use and instructional use factors had a strong positive correlation. The authors found connections between current, instructional, and future use of mobile technologies supported within the context PU, PEU, and behavioral intention constructs of the TAM (Cakiroglu et al., 2017).

Technology has greatly affected the way people reach their goals, both personally and professionally (Dziak, 2017). The introduction of new technologies can help people, as well as businesses and institutions of higher education, perform necessary tasks quicker and more effectively (Dziak, 2017). Understanding the reasons for accepting or rejecting a technology by users has become one of the most important areas in information technology and education (Momani & Jamous, 2017). Two important elements stand out in the current research on educators' usage of educational technology: technology acceptance and the role of training (Rienties et al., 2016). TAM suggests that the actual usage of a technology system by an individual is affected directly or indirectly by the behavioral intentions, ATU, PU, and PEU of the user (Alzubi, Al-Dubai, & Farea, 2018). The model also describes how external factors influence intention and actual usage by way of mediated effects on PU and PEU (Alzubi et al., 2018).

Educational Technology in Higher Education

The use of educational technology in higher education is important to improve student successes (Morris, 2016). College students' desires access to communication tools and social media at all times of the day and night (Nikou & Economides, 2017). Technology delivers several opportunities for students to individualize their learning experience and to work in partnership with peers in non-traditional learning environments (Nikou & Economides, 2017). Not only do college students depend on technology to associate with peers on social media, they also depend on smartphones and other portable devices as vital elements to academics (Herold, 2016). The Educause Center for Applied Research (ECAR) conducted a longitudinal study regarding undergraduate students' use of technology and access to digital technologies and found that 91% of students own a laptop, 95% own and use smartphones, 4% have access to augmented reality and virtual reality headsets, and 3% reported access to 3D printers (Galanek, Gierdowski, & Brooks, 2018). One significant aspect of the ECAR study is that 65 participants (fewer than 1%) reported having no access to any of the four technologies described, and they believe the most critical technologies to student success are laptops, desktops, and smartphones (Galanek et al., 2018). Students reported that technologies benefit their educational experience by enhancing communication, which can deliver more involved and applicable coursework, and increases productivity (Galanek et al., 2018).

With the substantial growth of technology and reports of student beliefs of technology usage, it is presumed that students are experts in technology before even entering a university setting (Gawlik-Kobylinska & Maciejewski, 2019). For example, a

quantitative study by Henderson, Selwyn, and Aston (2017) reported that incoming cohorts of university students are more digitally adept and digitally attuned than previously determined. The authors conclude that students are expected to use digital technologies for all university studies (Henderson et al., 2017). Despite the shift in the use of technologies among students, it is imperative to identify the difficulties higher educational institutions and faculty face in effectively using technologies to ensure digitally adept students are mastering academic content (Henderson et al., 2017). In this section, I provide a synthesis of technology use in higher education to include current trends impacting higher education as identified in the literature. The section concludes with a review of the evidence pertaining to factors that affect the integration and use of educational technologies. In the following section, evidence pertaining to technology use in healthcare professions is reviewed, the growth of technology in the healthcare sector is argued, and the lack of formal training offered to expert clinicians transitioning to faculty positions is discussed.

Technology Use in Higher Education

The increase of technology in the 21st century has presented challenges to colleges and universities, and many have been slow to meet these challenges (Alexander et al., 2019). Within the classroom, educational technology is still emerging, with few faculty members' operating a vast selection of educational tools (Pomerantz & Brooks, 2017). In the NMC 2019 Horizon Report of Higher Education, several challenges relating to the lack of technology use in higher education were discussed. Key trends included the demand for digital learning experiences and instructional design expertise, the evolving

role of faculty with educational technology strategies, and changing the practice of teaching to improve digital fluency (Alexander et al., 2019). Of the most significant digital fluency requires a rich understanding of the digital environments enabling co-creation of content and the ability to adapt new contexts, including social media (Alexander et al., 2019).

These trends are projected to drive technology planning and decision-making over the next five years (Alexander et al., 2019). Manca and Ranieri (2016) examined digital fluency related to social media with the purpose to explore the digital practices of faculty, focusing on the uses of social media and the barriers of tools for teaching. An online survey was distributed to faculty in order to provide a framework for various social media uses related to personal, teaching, and professional areas of interest in higher education (Manca & Ranieri, 2016). Results were that social media use is limited, and in some cases restricted, and faculty are not motivated to integrate these tools into their teaching (Manca & Ranieri, 2016). However, there were differences among faculty in the ways they use social media or perceived it. These differences were mostly dependent on the academic discipline in which they were associated with. If one faculty member from a specific discipline has integrated technology, more faculty within that same discipline are more inclined to integrate technology as well (Manca & Ranieri, 2016).

The literature indicates the initial approach to understanding the challenges associated with the lack of technology use in higher education began with eLearning (Manca & Ranieri, 2016). The research trends related to eLearning have evolved over time. For example, Harrison et al. (2017) examined the attitudes and experiences of

academics in higher education institutions to online distance learning. The study used a cross-sectional quantitative approach to understand participant's attitudes and experiences of the use and integration of online distance learning. All participants completed an online self-completion survey, which was representative of the population of the university (Harrison et al., 2017). Findings identified key factors on the integration of online learning: lack of institution infrastructure, staff attitudes and attributes, and perceived student expectation in the learning experience (Harrison et al., 2017). Results suggested that faculty are confident using technology for instructional purposes and that they see benefits for their students' learning experience; however, a large proportion wanted an increase in their involvement with online learning (Harrison et al., 2017). Additionally, faculty expressed a need to continue to develop the organizational infrastructure and culture to support the integration of online learning (Harrison et al., 2017). Institutions of higher education need to provide staff with direction, guidance, and support as they implement eLearning, in addition to enough time and resources (Ali, Uppal, & Gulliver, 2018). Recently, virtual and augmented reality, makerspaces, robotics, game-based learning, and coding are added to the list of trends impacting higher education in the 21st century (Johnson et al., 2016). Skills now required by faculty include the ability to engage in independent critical thinking, problem-solving at a high level, and communication/collaboration using technology (Ambler, Solomonides, Smallridge, McCluskey, & Hannah, 2019). These skills need to be addressed by institutional leaders within higher education (Ambler et al., 2019).

In 2018, the Educause Center for Analysis and Research (ECAR) sought to identify specific factors that affect the integration and use of educational technologies among faculty in higher education (Aragon, Eddy, & Graham, 2018). Surveys were sent to faculty members in 2014, 2015, and 2017 to examine how they use technology and what they think about technology as it relates to teaching and learning (Pomerantz & Brooks, 2017). Respondents were given a list of learning technologies and asked to rate their level of agreement with the statement, "I could be a more effective instructor if I were better skilled at integrating this technology into my courses" (Pomerantz & Brooks, 2017). These technologies covered a wide range from the abundant number of smartphones and LMS to more specific advancements such as simulations (Pomerantz & Brooks, 2017). Results found that one-third to two-thirds of participants agreed or strongly agreed that they could be valuable if they were trained to integrate each the technologies listed into their courses (Pomerantz & Brooks, 2017). Overall, faculty have a positive attitude toward new educational trends and believe that the use of technology promotes student learning. However, there are discrepancies between the educational trends faculty favor and what they actually implement into classroom instruction (Loague, Caldwell, & Balam, 2018; Pomerantz & Brooks, 2017). Lawrence and Tar (2018) used a qualitative approach using the theory of grounded theory method to examine why such discrepancies exist by identifying factors that influence educators' decisions to use and integrate technology into the teaching and learning process. Barriers that emerged covered a broad range of issues that included two primary groups: institutional-level barriers and teacher-level barriers (Lawrence & Tar, 2018).

The institutional-level barriers include limitation of infrastructure, lack of training, lack of access, and lack of technical support (Lawrence & Tar, 2018). While the teacher level barriers include lack of teachers' information and communication technology knowledge, lack of time, resistance to change, and complexity of integrating information and communication technology. Sarsar, Kaval, Klasser, and Güneri (2016) found that faculty specifically stated, "they did not know how to use technology" (p. 846). Further perpetuating the fact that faculty want to integrate technology into teaching but need assistance in understanding technology and how to use differing types for instruction (Sarsar et al., 2016).

Many institutions within higher education have recognized the concerns of faculty regarding the lack of preparation for course development and technology use (Kebritchi, Lipschuetz, & Santiague, 2017), and consider impediment of integration as lack of technology knowledge by educators (Lee, Sun, Law, & Lee, 2016). To support educators, the International Society for Technology in Education released a revision of standards for teachers that detailed teacher preparation programs as primary components of reform to combat the lack of faculty preparedness and resistance to utilize technologies in the classroom (International Society for Technology in Education, 2019). Similarly, the U.S. Department of Education's Office of Educational Technology in the 2017 National Educational Technology called for reflection and action on how educators prepare to teach with technology (Arlene & Hansen, 2017). The goal was to ensure that new faculty were prepared to use technology to support student learning (Office of Educational Technology, 2017). In an effort led by the United States Department of Education, a

summit with a group of leaders within the education field gathered to create four guiding principles for the use of educational technology in teacher preparation:

- Focus on the active use of technology to enable learning and teaching through creation, production, and problem-solving.
- Build sustainable, program-wide systems of professional learning for higher education instructors to strengthen and continually refresh their capacity to use technological tools to enable transformative learning and teaching.
- Ensure preservice teachers' experiences with educational technology are program-deep and program-wide rather than one-off courses separate from their methods courses.
- Align efforts with research-based standards, frameworks, and credentials recognized across the field (Arlene & Hansen, 2017).

The focus of the report was to challenge educators, researchers, and policymakers working with technology to ensure that faculty are using technology, are provided with resources to learn how to use technologies, and to ensure students are utilizing effective technologies to help them transition from college settings into the workforce (Arlene & Hansen, 2017). Further, the National Educational Technology Plan 2017 emphasizes that there should be no hesitation to whether a learner entering an elementary classroom or college lecture hall will encounter a teacher fully skilled in the capabilities of technology to enhance learning (Arlene & Hansen, 2017).

Organizations continue to express the need for educational institutions to include technologies to help prepare students for future careers (Lent, 2018; Yusuf, Walters, &

Salin, 2020). From flipped classrooms to massive open online courses (MOOCs), technology has made noteworthy transformations in higher education (Ali et al., 2018). As the paradigm shifts from traditional teaching methods to technology-enabled learning, it is vital for faculty to be well equipped to apply new technologies to instructional practices (Ali et al., 2018). According to Van de Oudeweetering and Voogt (2018) to create efficient learning in the 21st century students need to perform new things, in new ways, to obtain a diverse and improved education because of technology. However, the teaching model in higher education does not align with the technology that drives learners or the organizations that employ them (Ali et al., 2018; Kebritchi et al., 2017). With the growth of technology in higher education, it is imperative that instructors understand both the opportunities and challenges required to meet the demands of an organization to train future students.

Health Professions Education

A pressing challenge within health professions education is the gap between what students learn in education and what they must practice in a clinical setting (Cuff & Hammers, 2018; Ramani et al., 2020). Technology can potentially bridge this gap by forming the kind of team-based learning environments and clinical methods that are essential in the modern healthcare system (Cuff & Hammers, 2018). With the growth of technology in the healthcare sector, it has also become imperative to use technology with students in healthcare fields, including medical, dental, physical therapy, audiology, and other fields. Because many of the educators teaching in these programs began their careers as clinicians and have emerged as experts clinically, they often have not been

formally trained to be educators or scholars and have received limited guidance or formal preparation for teaching in higher education (Brownstein et al., 2015; Chen et al., 2017; Walling, 2018). Chen et al. (2017) found that there are several programs to improve teacher skills and foundational teaching competencies; however, few programs emphasize teacher skills with expanded competencies for scholarship, leadership, learner assessment, or curriculum development/evaluation in health professions education (Chen et al., 2017).

In addition, many existing programs target only one level of learner, while few programs provide a curriculum for multiple levels of learners across the continuum and across professions (Chen et al., 2017). Chen et al. (2017) further describes career paths for educational leaders and scholars in health professions as not well established or understood by learners, and possibly even junior faculty members, who tend to receive little guidance or formal training on their actual job responsibilities. Cantillon, D'Eath, De Grave, and Dornan (2016) discussed how clinical teachers are critical determinants of the quality of clinical learning environments, yet they are usually untrained for their teaching roles. The authors postulate that the limited research that exists on how clinicians become teachers is largely based on the idea that teacher development is intra-individual, meaning that teachers themselves base their personal insight and interpretations of experience construct personal practical knowledge (Cantillon et al., 2016).

According to O'Brien and Battista (2019), clinical educators develop teaching skills by emulating faculty from their own learning experiences. Personal applied

knowledge derives from teachers' professional practice and is based on their past experience, current awareness, and future expectations (Swart, de Graaf, Onstenk, & Knezic, 2018). Using a qualitative approach, Swart et al. (2018) explore how educators who are attentive to their personal applied knowledge of language have an increased understanding of students' language use and may offer better support learning. Whereas Fraiser, Roth, Vogt, and Clauson (2016) argue that teaching requires its own skill-set, as it is not a natural outcome of one's clinical expertise, a healthcare provider who is proficient in practice is not necessarily proficient at teaching others those skills. Fraiser et al. (2016) found that supportive learning environments grounded in andragogy and learning theory are necessary for healthcare providers to transition into the role of an educator successfully, and a well-structured educator pathway is essential in guiding clinicians to become educators. In the next section, I describe the dental hygiene field, including the path toward professional recognition. Next, I review limited evidence on various technologies used in the field. I conclude with a discussion of faculty preparation and the importance of technology use.

Dental Hygiene Field

Dr. Alfred Civilion Fones coined the term dental hygiene in the early 1900s (Nathe, 2017). The first dental hygiene school, Fones School of Dental Hygiene, was founded in 1913 and joined the University of Bridgeport in 1949 (Nathe, 2017). The Fones School of Dental Hygiene, accredited in 1953, was the first school of dental hygiene in the world (Fones School of Dental Hygiene, 2017). The initial focus of the field derived from the idea of prevention specialists called "dental hygienists" (Bowen,

2016). Previous efforts to create formal courses for "dental nurses" failed; therefore, Fones favored the term dental hygienist rather than a dental nurse because of his dedication to providing preventive interventions to children (Bowen, 2016).

In 1914, one year after the inception of dental hygiene, Fones began a project to collect data documenting the success of dental hygienists in school systems that offer assessments and oral prophylaxes, as well as educating students about oral hygiene (Bowen, 2016). The concept was that providing oral hygiene education in early education could affect oral health throughout a lifetime. The Fones Five-Year Demonstration Project began in public schools, offering proof of the success of dental hygienists in education and dental disease prevention (Bowen, 2016). Although dental hygiene education has greatly progressed over the years, the profession has faced a multitude of challenges along the path to professional recognition (Bowen, 2016).

Transforming Dental Hygiene Education

The ADHA, the largest national U.S. organization working on behalf of the professional interests of dental hygienists, published a white paper on the direction of dental hygiene entitled "Transforming Dental Hygiene Education and the Profession for 21st Century." This document outlined the current state of dental hygiene education along with a framework for transformation as implications for change and detailed the need for curricular expansion to include the use of new technology (ADHA, 2016b). To meet this instructional direction from the ADHA, faculty in dental hygiene education must employ technology to engage with and deliver content more effectively to students (Magen-Nagar & Shonfeld, 2018). Faculty members teaching traditional entry-level courses may

be asked to apply technology such as LMS, MOOCs, or other educational technologies (Brame, AlGheithy, Platin, & Mitchell, 2017). Some are even asked to move or develop their course materials into an online format without previous training on the differences between the two teaching models (Brame et al., 2017). Zheng, Wang, Doll, Deng, and Williams (2018) explored faculty members from four universities in the Midwest and found that faculty who are effective at delivering classroom instruction need to also be skilled in using LMS and other educational technologies to administer and deliver course content and design student-centered courses. With increased pressure to use educational technology, the lack of adequate professional development, training, and awareness of best pedagogical practices may make implementation more difficult for faculty. However, what is not yet understood is faculty's use and possibly hesitance to implement technologies for instructional purposes and the lack of research on the use of educational technologies for instructional purposes among dental hygiene faculty. All of which may result in less than optimal outcomes in educational technology integration (Larbi-Apau, Guerra-Lopez, Moseley, Spannaus, & Yaprak, 2017).

Currently, there is a gap in the scholarly literature on how dental hygiene faculty use educational technologies for instruction because none or very little research exists. Research has been conducted on specific technologies in dental and dental hygiene education including social media and e-learning (Al Barbaweel & Dashash, 2018; de Peralta, Fields, Flake, Gallagher, Susin & Valenza, 2019; Rani, Yahya, Rosli, & Mohd-Dom, 2020), yet very little research has been conducted on the impact of technologies on student formation and knowledge (Machado, Bonan, Perex, & Junior, 2020). The dental

hygiene profession has long relied on research originating from other disciplines such as dentistry and nursing (Watwood & Dean, 2019). However, the ADHA (2016) research agenda noted the importance of building upon existing research so the knowledge base can emerge from within dental hygiene itself (ADHA, 2016; Watwood & Dean, 2019). Furthermore, the 2016 revised standards for Clinical Dental Hygiene Practice produced by the ADHA as a guide to dental hygiene practice further emphasized how, "dental hygienists should access and utilize current, valid, and reliable evidence in clinical decision-making through analyzing and interpreting the literature and other resources" (p. 5). Although extensive research exists related to faculty technology use and perceptions of use in other disciplines (Alshehri, 2019; Bozkurt, 2020; Kaewsaiha & Chanchalor, 2020; Mercader & Gairin, 2020), very little empirical research has been conducted in dental hygiene education settings. Therefore, more information is needed to explore how dental hygiene faculty use educational technologies and their perceptions regarding attitudes toward use, usefulness, and ease of use of those technologies to aid in filling this gap and could provide a starting point for scholarly literature. The next section details a collection of various technologies and teaching modalities related to the dental hygiene profession.

Educational Technologies in Dental Hygiene

As a means for dental hygiene educators to progress in the path of professional recognition, one recommendation was to convert entry-level degrees from an associate degree to a baccalaureate degree (Bowen, 2016). This conversion would aid in expanding the body of knowledge and advance the profession by standardizing entry-level

programs. To meet this goal, the ADHA endorsed the advancement of degree-completion programs in a distance-learning format to support licensed hygienists to pursue their baccalaureate degree and prepare hygienists of the future (ADHA, 2014).

As a result of recognizing distance learning as an effective educational strategy for dental hygiene education, the prevalence of dental hygiene online degree-completion programs increased in the United States (Sunell, McFarlane, & Biggar, 2017). The rapid growth of, and demand for, distance education in postsecondary education enabled institutions of higher education to create online programs. A survey conducted by Libby, Boyd, Perry, and Dominick (2017) reported a 3.9% increase in distance learning in all levels of education in the United States, with 28% of students enrolled in at least one distance education class (Libby et al., 2017). The results indicated that if designed properly, a distance education course can be successful in providing quality education, resulting in student satisfaction (Libby et al., 2017). Dental hygiene education is an expanding profession, and the educational requirements must keep pace with the rapid growth and expansion of technology.

Massive Open Online Courses

The success of technology in delivering quality programs to dental hygienists across the country is apparent. Distance learning has not only offered access to degree programs and LMS, but has also been instrumental in providing educational content leading to the certification of auxiliary clinicians (i.e., dental assistants and expanded functions), and as a means of dental hygienists to participate in continuing education (Karthikeyan & Mangalji, 2019). An even broader application of technology for

continuing education can be found by exploring the world of MOOCs. MOOCs are a form of eLearning that currently allows individuals to learn about a wide variety of topics remotely from educators (Karthikeyan & Mangalji, 2019). According to Karthikeyan and Mangalji (2019), "MOOCs are comprised of different elements, including prerecorded content, graded assessments, and discussion forums" (p. 25). Once registered for a MOOC course, there are suggested timelines for completing work and submitting assignments; however, course completion is asynchronous from learner to learner, which can pose difficulties for some (Karthikeyan & Mangalji, 2019).

MOOCs can be produced by educational institutions and presented on online platforms (Karthikeyan & Mangalji, 2019). A study by Kearney, Premaraj, Smith, Olson, Williamson, and Romanos (2016) detailed the strengths and weaknesses of incorporating MOOCs into dental education. The focus of the qualitative article was to explore if MOOCs would affect traditional dental curricula. A number of viewpoints were gathered from dental experts with mostly positive comments. The first viewpoint group ascertained that MOOCs provide an opportunity for students to learn through content and assessment presented online (Kearney et al., 2016). Experts in the first viewpoint also thought that since MOOCs are meant to be open-source, opportunities for dental schools with faculty shortages and financial limitations could integrate MOOC courses into the curricula (Kearney et al., 2016). The second viewpoint group found that the excitement over MOOCs is decreasing due in part to limited research about its value (Kearney et al., 2016). Because face-to-face interaction between students, instructors, and patients is vital to the dental curriculum, MOOCs have yet to show usefulness in replacing more than a

subgroup of didactic courses (Kearney et al., 2016). Moreover, learning professionalism, a crucial characteristic of health professions education, is encouraged by mentorship that offers significant interpersonal contact (Kearney et al., 2016).

Teledentistry

In recent years, widespread progress in clinical dental technology, specifically telecommunications, digital diagnostics, and imaging, has helped dental professionals collaborate, diagnose, manage, and offer dental services in distant locations (ADHA, 2016a). The process of networking, sharing information, consultations, and analysis through technology is called telehealth, of which teledentistry is a part of (ADHA, 2016; Alabdullah et al., 2020; Nikhil, Mayank, Ishan, Khateeb, & Singh, 2017). Teledentistry is a relatively new field that combines telecommunications with advanced dental care (Nikhil et al., 2017). Many dental professionals are not aware of the goals, advantages, and how teledentistry can advance the delivery of oral healthcare as well as decrease costs of services (Nikhil et al., 2017).

Teledentistry offers potential in improving access to oral healthcare, the ability to reduce health disparities, enhance the delivery of services, and provide specialized care in remote areas where a dental hygienist may be the only oral health provider in the area (Nikhil et al., 2017). The National Rural Health Association (NRHA) reports that many rural communities are too small to sponsor a dentist, but may be able to accommodate a dental hygienist who utilizes teledentistry for dental and medical provider consultations (Westphal, 2017). With this knowledge, dental hygienists can provide care with more

inter-collaboration in clinical decision-making, case management, provision of direct care, and patient education on treatment regimens (ADHA, 2016a).

A cross-sectional study by Alawwad, Zakirulla, Alasmari, Alamri, and Alshahrani (2019) sought to identify the knowledge and awareness levels of teledentistry among dental professionals. The authors hypothesize that many dental professionals were unaware of the benefits of teledentistry (Alawwad et al., 2019). A questionnaire with two parts was created to assess the knowledge and awareness of teledentistry and was disseminated to dental professionals enrolled in a dental school (Alawwad et al., 2019). Results confirmed the author's hypothesis and determined that most dental professionals' knowledge about teledentistry was low, and their attitude was found to be good (Alawwad et al., 2019). The authors concluded that awareness must be spread among dental professionals regarding the proper use of teledentistry in future practice (Alawwad et al., 2019). However, Alawwad et al.'s research was conducted with practicing dental professionals, not students studying to work in the clinical setting. As teledentistry continues to expand in the healthcare field, dental hygiene education must prepare for this change. Students who are knowledgeable in the use of information and communication technology, such as teledentistry as a part of dental hygiene practice, must have the ability to use future technological advancements as they occur (ADHA, 2016b). But what is not yet understood, is how dental hygiene faculty provide opportunities to improve students' information and communication technology use as part of their educational experience.

Information Technology

Information technology is the use of computers and computer networks to receive, transmit, and manipulate information (van der Zande, Gorter, Bruers, Aartman, & Wismeijer, 2017). Information technology can also encompass other information distribution technologies such as televisions, phones, computer hardware, and software (van der Zande et al., 2017). Information Technology (IT) in the dental field is affecting higher education at a rapid pace with industries creating toothbrushes that assist with in-home care, software managements systems to manage clinical offices, devices like timers and apps, and location tracking technology to ensure all areas of the mouth are brushed for a specified time (Porter, 2018). The ability to quickly detect basic oral health concerns through imaging and other diagnostics offers patients the ability to access various degrees of dental care while at home (Porter, 2018). This includes those living in rural areas or locations with limited access to dental practices (Porter, 2018). These advances in technology have the potential of lowering dental costs and the ability for practitioners to provide care to individuals of lower socioeconomic status (Porter, 2018). The use of IT in dental hygiene varies; however, IT may be used to assist in the education and competence development of dental hygiene students in both the clinical setting with patients and in the classroom (Dragan, Dalessandri, Johnson, Tucker, & Walmsley, 2018). IT including the use of e-learning, distance learning, simulations, and computer-based assessments have become vital in the shift to an online curriculum due to the demands of the COVID-19 pandemic (Hung et al, 2020). The gap in the literature is in identifying what IT are

currently being adopted into dental hygiene programs and whether they are effective in helping students learn course content.

Dental Hygiene Students and Educational Technology

Many decisions are being made by dental hygiene faculty about how to use educational technologies for student learning (Dragan et al., 2018). Research has been conducted on specific technologies such as e-text books (Pratt, Green, Rasmussen, Lai, & Compton, 2019), the tools experts recommend using in the clinical setting such as powered toothbrushes (Digel, Kern, Greene, & Akimbekov, 2020; Etsi, Salome, Boaz, & Avraham, 2020), and student perceptions of technology use and performance (Havner, Gerkovich, Bray, & Voelker, 2018; Turner, Prihoda, English, Chismark, & Jacks, 2016). Harvner et al. (2018) assessed dental hygiene student perceptions of technology use examined if any relationships existed between technology use and performance. Results from a survey distributed to 351 dental hygiene students found that lecture recording systems increase students' success in one dental hygiene course and could be helpful in other courses (Harvner et al., 2018). The authors concluded that implementing technologies primarily to satisfy student expectations is no longer an adequate rationale for faculty to integrate technologies; but rather, faculty must select appropriate educational technologies suitable for students to achieve specific academic learning goals (Harvner et al., 2018). Similarly, Behar-Horenstein and Horath (2016) found that merely having access to technology does not mean all students have the same level of expertise, experiences, or interest in using technology for learning. The authors examined how the current generation of students can access information more easily than earlier

generations, but low levels of prior knowledge can negatively impact their ability to find appropriate materials for learning (Behar-Horenstein & Horath, 2016). Results were that some dental students were unable to distinguish between types of information which affected their ability to learn new technologies pertaining to dental education (Behar-Horenstein & Horath, 2016). Because so many types of educational technology integration exist, more research needs to be conducted to determine a broader understanding of the utilization of educational technology for dental hygiene education and the most appropriate types that best meet the needs of dental hygiene students.

Faculty and Educational Technology

Considering the technological advancements and the rapid use of technology currently underway due to the COVID-19 pandemic, dental hygiene faculties' pedagogical approach to integrating technology calls for a shift in paradigm from emphasis on learning a new skill to knowledge application (Dragan et al., 2018). Research from Dragan et al. (2019) reported on the 2019 American Dental Educators Association (ADEA) and Association for Dental Education in Europe (ADEE) conference to explore and discuss strategies to support innovative technologies and scientific discoveries to support personalize dental care in an academic and clinical setting. The focus was to ensure faculty, students, and patients are best positioned to develop opportunities that arise from integrating new technological advances (Dragan et al., 2019). Participants of the workshop discussed methods of incorporating new technologies into the education of dental students (Dragan et al., 2019). Specifically participants looked forward ten years in an attempt to predict new technologies that could

impact dental education, and then they discussed best strategies for implementation of these technologies (Dragan et al., 2019). Four categories emerged from discussions including; preclinical education, in classroom learning, telehealth, and patient care (Dragan et al., 2019). The researchers of this study found that although advanced technologies may increase quality of care to patients, the use of such advancements is not naturally accepted by either educators or students (Dragan et al., 2019). Instead, it is considered a futuristic approach, rather than daily practice (Dragan et al., 2019). Incorporating new technology in an existing environment requires a strategic implementation process. To prepare for such advancements, various models of curriculum change have been explored. For example, Fried, Maxey, Battani, Gurenlian, Byrd, and Brunick (2017) examined strengths and weaknesses of current curricula, and proposed educational changes to prepare dental hygienists for practice in the future. The researchers found that the current dental hygiene curricula do not address the necessary content areas and skill sets necessary for advanced technologies of the future (Fried et al., 2017). To better prepare, the researchers recommend changing the current model of education to include bridging the gap between dentistry and medicine by integrating similar program types such as dental hygiene and nursing (Fried et al., 2017). Blending curricula from both professions may increase expanded function opportunities and provide a more diverse set of employment options (Fried et al., 2017).

Technology use in the healthcare sector has potential to impact many processes and practices. Dental educators should examine scientific and technology advances in and consider implementing new technology and pedagogical practices to prepare their

students for clinical practice. Dental hygiene educators are challenged with incorporating teaching methods that appeal to the ever-changing educational landscape (Battersby, 2017). The task of determining which strategies to employ is daunting. More information is needed to understand precise curricular changes needed to promote integration and use of advanced technologies. Although some research has been conducted on MOOCs in dental hygiene education (Karthikeyan & Mangalji, 2019; Kearney et al. 2016), and in teledentistry (Alawwad et al., 2019), IT (Porter, 2018; van der Zande et al., 2017), and dental hygiene student use of educational technology (Havner et al., 2018; Turner et al., 2016). What is missing in the research is literature specific to the dental hygiene profession and specifically in dental hygiene education to determine faculty's use of educational technology to better prepare future dental hygienists.

Chapter Summary

This literature review began with an overview of the conceptual framework, including origin and analysis of the TAM. Followed with a description of the factors used to explore user acceptance, PU, PEU, and behavior. Next, an analysis of educational technology in higher education, trends on the use of educational technologies, and faculty preparation were argued. Then a discussion on the path toward professional recognition. Finally, a brief analysis of the various educational technologies used in the field.

With the advancement of educational technologies and the move of clinical health professionals to become educators, the ability to promote and enhance student-learning experiences is vital (Leow et al., 2016). The original TAM, as applied to this study, provided a framework to explore the use of educational technologies for instructional

practices among dental hygiene faculty and their perceptions regarding attitude toward use, usefulness, and ease of use of those technologies. If faculty find that educational technologies are affective to their instructional efforts, valuable in creating enhanced learning experiences for students, and convenient, they will in turn find it more useful, easy to use, and their intent to use will be positively affected. By understanding if dental hygiene faculty accept or reject the use of educational technologies, directors of dental hygiene programs will be better able to support faculty in using technologies by providing the assistance and training needed to ensure strong implementation. The results of this study may help to understand why dental hygiene faculty are hesitant to implement educational technologies despite the rise in the ubiquitousness of technology in everyday life. It may also address the gap in the literature by establishing a starting point in the scientific literature.

In Chapter 3, the methodology for this study was presented, which is a general qualitative study with a focus on the perceptions of dental hygiene faculty members regarding their attitudes toward use, usefulness, and ease of use of technology for instruction. The need to understand why such factors exist can aid in the proliferation of technology use among dental hygiene faculty members and can support faculty in enhancing student-learning experiences with the use of technology. The intent of chapter three is to detail how a qualitative approach is appropriate for answering the research questions of this study, describe the research design and approach, provide an explanation of the population and sample, and to explain the data collection/analysis plan.

Chapter 3: Research Method

Introduction

The purpose of this basic qualitative study was to explore the perceptions of dental hygiene faculty members regarding their attitudes toward use, usefulness, and ease of use of educational technologies for instruction. Using open-ended interview questions, I explored the experiences of dental hygiene faculty. Although research has been conducted on the use of educational technology in the education field, there is a gap in scholarly literature within the dental hygiene field because little research specific to this field exists. The need to understand why such perceptions exist can aid in the proliferation of technology implementation among dental hygiene faculty members and can support faculty in enhancing student-learning experiences with the use of educational technologies.

In the first section of this chapter, I explain the research design and rationale of the study. In the second section, I explain my role as the researcher. In the third section, I discuss the methodology, including the procedure for participant selection, instrumentation, recruitment, participation, data collection, and data analysis. Lastly, I discuss potential bias and ethical considerations related to this qualitative study. I conclude the chapter with a summary of the research method.

Research Design

The research design for this study includes three research questions:

RQ1: What are the perceived attitudes of dental hygiene faculty toward their use of educational technologies for instruction?

RQ2: What are dental hygiene faculty perceptions about the usefulness of educational technologies for instruction?

RQ3: What are dental hygiene faculty perceptions about the ease of educational technologies use for instruction?

These questions are grounded in all three components of the conceptual framework: ATU, PU, and PEU of educational technologies for instruction (Table 1). The first research question aligns with the TAM component of ATU. The second research question aligns with the TAM component of PU, and the third research question aligns with the TAM component of PEU.

Table 1

Alignment of Research Questions With Conceptual Framework

Research questions	Component of TAM
RQ1: What are the perceived attitudes of dental hygiene faculty toward their use of educational technologies for instruction?	Attitudes toward use
RQ2: What are dental hygiene faculty perceptions about the usefulness of educational technologies for instruction?	Perceived usefulness
RQ3: What are dental hygiene faculty perceptions about the ease of educational technologies use for instruction?	Perceived ease of use

Phenomenon of Interest

The phenomenon of interest for this study was the TAM by Davis (1989). The TAM, as applied to this study, provided a foundation to explore dental hygiene faculty perceptions about technology usefulness and ease of use.

Research Tradition

To explore dental hygiene faculty perceptions of technology use, I used usefulness and ease of use in a qualitative approach. Qualitative methods are used to understand individuals' beliefs, experiences, attitudes, behavior, and interactions (Patton, 2015). I used a basic qualitative study approach, a form of qualitative research. Basic qualitative research is appropriate when the researcher needs detailed information about a person's beliefs and behaviors or would like to discover new issues in greater depth (Creswell, 2009). Kahlke (2014) describes a basic qualitative research design study as,

> having been derived philosophically from constructionism, phenomenology, and symbolic interaction and as being used by researchers who are interested in 1) how people interpret their experiences, 2) how they construct their world, and 3) what meaning they attribute to their experiences. (p. 40)

The overall purpose of educational qualitative research is to improve practices, and the basic qualitative research approach is best suited to obtain an in-depth understanding of effective educational processes (Merriam, 2009; Worthington, n.d.).

Quantitative research was not selected as an approach for this study because the focus of quantitative research is to determine the relationships between independent and dependent variables within a specific population. A quantitative research design is generally descriptive or experimental in nature, meaning an association between variables is identified or causality is determined. In this study, I was not focused on associations among variables or causalities but rather on perceptions regarding the attitude toward use, usefulness, and ease of use of technologies. A basic qualitative research approach

allowed me to describe the experiences of dental hygiene faculty at an exploratory level. Because there is a lack of research on dental hygiene faculty educational technologies use for instructional practices, I used a basic qualitative study approach.

Consideration for Other Designs

Within the qualitative research approach, a researcher can choose to use several designs, including ethnography, grounded theory, and phenomenology. Ethnography is a strategy of inquiry in which the researcher studies cultural groups in a natural setting over an extended period by collected data primarily through observation (Creswell, 2009). Ethnography is typically used in anthropology and often grounded in the disciplinary roots of literary art (Patton, 2015). The focus of the central research question in ethnography is based on identifying the culture of a group. The researcher often analyzes their own experience of a culture to connect with and offer insight about situations, events, or ways of life (Patton, 2015). An ethnography theory design would have been more appropriate in this study if the nature of inquiry leaned toward an anthropological inquiry instead of lived experiences of participants. Therefore, an ethnographic approach was not chosen for this study.

The discovery of emerging patterns through data analysis is known as grounded theory (Creswell, 2009). Grounded theory is used to uncover such things as social relationships and behaviors of groups known as social processes (Noble & Mitchell, 2016). To carry out a grounded theory study, an area of interest is first identified and then analytical procedures and sampling strategies are used (Noble & Mitchell, 2016). The study is complete when theoretical sampling has been reached (Noble & Mitchell, 2016).

Data collected can be qualitative, quantitative, or mixed; however, in-depth interviews using open-ended questions are often used and can be adjusted as the theory emerges (Noble & Mitchell, 2016). Grounded theory was not chosen for this study because the purpose here was not to uncover social relationships or behaviors of dental hygiene faculty members, but rather to understand the perceptions of dental hygiene faculty on their attitudes toward use, usefulness, and ease of use of educational technologies for instructional purposes.

Researchers using the phenomenological method aim to capture the meaning, structure, and essence of a lived experience of a phenomenon for a person or group of people (Patton, 2015). According to Creswell (2009), "Understanding the lived experiences marks phenomenology as a philosophy as well as a method, and the procure involves studying a small number of subjects through extensive and prolonged engagement to develop patterns and relationships of meaning" (p. 13). The guidelines for data analysis can include bracketing, phenomenological reduction, or a synthesis of textural and structural meaning where the researcher sets aside their own experiences to understand those of the participants (Creswell, 2009; Patton, 2015). The goal of my study was not to explore the lived experiences of a group over an extended period, but rather to identify the experiences and views of dental hygiene faculty through a one-time in-depth interview to understand perceptions of educational technologies use. Therefore, I rejected phenomenology as a possible research design.

Role of the Researcher

In quantitative research, a survey, questionnaire, or other measurable tool is used to collect data, whereas in qualitative research, the researcher's role is to serve as the data collection tool (Korstjens & Moser, 2018). My role in this study was to recruit participants, conduct interviews, transcribe and analyze the data, and work toward drawing conclusions. In this role, it is useful to describe relevant aspects of myself, including experiences that qualify me to conduct this research, potential biases, and expectations.

I have 8 years of teaching experience as a dental hygiene educator in higher education and 3 years of experience in administrative work. I am the assistant director of an online dental hygiene degree-completion program. My current appointment is 100% online, with 60% of my role dedicated to teaching, 15% to scholarship, 10% to administrative work, and 15% to service. My position is remote, meaning I work from my personal residence in a different state. All dental hygiene faculty recruited for this study have academic appointments in the dental hygiene entry-level program, which is separate from the online degree-completion program. Because I do have an affiliation with entry-level faculty in the dental hygiene department, potential bias may exist. The entry-level and online degree-completion programs are housed within the same college; however, each is a separate program within the dental hygiene department. None of the participants is a faculty member under my direction, and I do not have any influence on their work in any way. Another potential bias is my own experiences with technology use because of my training and practice as an educator.

I took several steps to manage potential biases and my own experiences. I used a reflective journal to manage any personal biases and to remain transparent. Self-reflection, in the form of journaling, can enable a researcher to discuss their position within the study and how their personal beliefs and past training may influence research findings (Hadi & José Closs, 2016). I kept a reflective journal to record personal feelings and opinions that emerged and that might have influenced the interpretation of the results (Hadi & José Closs, 2016). In addition, I used member checking as a form of triangulation (Devault, 2018). Member checks happen when a researcher asks participants to review both the data collected by the interviewer and the researchers' understanding of that interview data (Devault, 2018). Furthermore, it is imperative for the interviewer to establish a safe and comfortable environment for sharing the interviewee's personal experiences and ATU as they actually occur (Mammen, Norton, Rhee, & Butz, 2016). For this purpose, I used a semistructured, open-ended format for interviews with the purpose of gaining a detailed account of the perceptions of dental hygiene faculty members regarding their attitudes toward use, usefulness, and ease of use of educational technologies for instruction.

Methodology

In this section, I describe the methodology for this basic qualitative study. I begin by explaining participant selection logic. Also discussed are the components of the methodology, including instrumentation, procedures for recruitment, participation, and the data collection plan.

Participant Selection Logic

An important aspect of in-depth qualitative interviews is that participants have knowledge or experience with the problem of interest (Rubin & Rubin, 2012). According to Rubin and Rubin (2012), "In-depth interviewing is the tool of choice for exploring personal and sensitive issues or morally ambiguous choices people have made" (p. 4). The logic for the selection of participants in this study include the target population of interest, sampling strategy, adequate sample size to show common categories, and the approach for recruitment of participants.

The target population were all current dental hygiene faculty members from the same Midwestern institution. All participants have teaching roles in a dental hygiene department in higher education. Dental hygiene programs offer a diverse set of course offerings, ranging from oral histology and embryology to community oral health management. Although the faculty members' primary teaching objectives are the same (educate dental hygiene students about the fundamentals of oral health), their approaches, practices, and philosophies have the potential to vary significantly because all have experience as educators.

Sampling strategy. The sampling strategy for this study was a critical case purposive sample of individuals who work in a homogeneous environment (see Etikan et al., 2016). The purposive sampling technique, also called judgment sampling, is the intentional selection of a participant due to the characteristics the participant possesses (Etikan et al., 2016). In other words, a researcher chooses what needs to be known and sets out to find individuals who can and are willing to provide the information based on

their knowledge or experience (Etikan et al., 2016). In dental hygiene education, faculty members are licensed to practice dental hygiene by the respective state in which they practice dental hygiene. These faculty also hold an advanced degree, master's level or above, to teach didactic courses. To gain insight into the perceptions of dental hygiene faculty members to use technology for their instructional practices, I purposefully chose dental hygiene educators who worked in the entry-level dental hygiene program and practice in the Midwest. Based on the size of the faculty pool available, the goal was to recruit as many participants as possible.

The sample size, according to Patton (2015), is a matter of intellectual judgment based on the logic of making meaningful comparisons and reaching data saturation. In qualitative research, there is no set sample size required (Patton, 2015). The appropriate number of participants for a basic qualitative study should equal the number of interviews needed to meet data saturation (Rubin & Rubin, 2012). Data saturation is reached when there is enough data to replicate the study, when the ability to obtain additional new information has been attained, or when further coding is no longer feasible (Fusch & Ness, 2015). The quantity of the sample size is not a major determinate in qualitative research because the goal is not to gather quantifiable data to perform a statistical analysis in which a large sample size is recommended, but rather the goal is to obtain unique perspectives and insight of technology use among a specific group. Vasileiou, Barnett, Thorpe, and Young (2018) argued that there is no straightforward answer to sample size in qualitative research. The authors discuss several factors that contribute to identifying an adequate sample size: epistemology, methodology, and practical issues

(Vasileiou et al., 2018). When conducting exploratory research, it is recommended to start with five participants and to then scale up if more participants are needed to reach data saturation (Vasileiou et al., 2018). Because this study design was exploratory in nature, I used the study by Vasileiou et al. (2018) as a pattern regarding the size of my study sample. I am not as concerned with generalizing to a large population, and I did not rely on hypothesis testing. Instead, the focus was on a more inductive and emergent process, and therefore a smaller sample size can be used to obtain saturation. A sample size of five to six participants is sufficient to gain data saturation for this study. Therefore, this study included one round of interviews of five dental hygiene faculty members with expert knowledge and unique perspectives.

Inclusion criteria. There are two primary criteria for inclusion in the participant selection pool. The first criteria align with the research questions, which aid in limiting bias and gaining validity of the study. The second is that prospective participants have to be full-time dental hygiene faculty with teaching roles in an entry-level program at a 4-year university with at least one year of teaching experience to be considered knowledgeable in the field. Any individuals that do not meet these criteria were excluded from the study. Participants cannot be faculty in the degree-completion program or a staff member in the department. All individuals that do not meet these criteria were excluded from the study.

Instrumentation

For this basic qualitative study, the primary data collection instrument was an interview guide. An interview guide ensured that the same lines of inquiry were followed

with each participant interviewed (Patton, 2015). The guide acts as a beginning script during the interview to ensure all relevant topics are asked the same way to each participant (Patton, 2015). The interview guide has been crafted from a review of the literature on the phenomenon of interest, the conceptual framework, and any known influences of dental hygiene faculty. In this section, I describe the data collection instrument for this study with an emphasis on the interview guide. Interviews serve as the only data source for basic qualitative interview studies; thus, the instrument is sufficient for answering the research questions for this study (Creswell, 2009).

When I, the researcher, created the interview guide for this study, I planned to use a responsive, semistructured approach (Rubin & Rubin, 2012). In semistructured interviews, the researcher has a specific topic to learn about, has prepared a limited number of questions in advance, and has a plan for follow-up questions if additional probing is needed (Rubin & Rubin, 2012). Therefore, essential questions and statements have been prepared in advance to provide consistency with each interview. Some flexibility was allowed to interact responsively with participants, so they felt comfortable having a responsive discussion with me. In addition to the interview questions and protocols, the interview guide includes a review of the literature, which was used to develop the interview questions, procedures for obtaining informed consent, and guidelines for consistent opening and closing interview statements (Rubin & Rubin, 2012). The complete interview guide is in the Appendix.

The interview guide begins with an introductory script that welcomes participants and explains the purpose of the study. Next, demographic or warm-up questions were

created with the intent of helping participants relax, so that we could have a simple conversation together. In addition, demographic questions were provided to gain basic background information of each participant, such as how many years they have been educators, to help provide context to collected responses. The next section, middle, moves toward specific interview questions related to educational technologies used during teaching. To ensure all parties are clear, a brief description of educational technologies is provided and possible examples explained. Next, individual interview questions and probes were asked, and a closing script followed (see Jacob & Furgeson, 2012).

The interview questions were designed to be open-ended, neutral, and grounded in the TAM. Table 2 shows the alignment between each construct, ATU, PU, and PEU, with the research questions and individual interview questions.

Table 2

Alignment of Research Questions With Individual Interview Questions

Construct	TAM operational definition	Research questions	Individual interview question(s)
Attitudes toward use	Refers to an individual's overall feelings toward the use of educational technology tools.	RQ1: What are the perceived attitudes of dental hygiene faculty toward their use of educational technologies for instruction?	Question #1: To help establish a baseline, please share with me the educational technology tools you use in your instructional practice Questions #2: Describe what the integration process has been like for you.
Perceived usefulness	The belief that educational technology tools will benefit instruction	RQ2: What are dental hygiene faculty perceptions about the usefulness of educational technologies for instruction?	Question #3: Please talk about the usefulness of the educational technologies you for your instructional practice.
Perceived ease of use	The belief that educational technology tools are free of effort or easy to use.	RQ3: What are dental hygiene faculty perceptions about the ease of educational technologies use for instruction?	Questions #4: Please talk about your perceptions of the ease of use of the educational technologies you have integrated into your instructional practices.

Content-rich questions are used to invite participants to engage in conversation related to the types of educational technologies they use when teaching. This approach is recommended in qualitative interview literature (Rubin & Rubin, 2012). The semistructured approach provides consistency between interviews, trustworthiness between interviewer and participant, and the interviewer's ability to gain a rapport with

the participant (Rubin & Rubin, 2012). Dependent upon participant responses, additional probes may be asked.

To establish sufficiency of the interview guide to answer the research questions, I relied heavily on the review of experts. Three individuals with advanced degrees in education contributed to the creation of the interview guide. In the early development of the guide, Dr. Kathleen Lynch reviewed the alignment of the instrument to the research questions. Dr. Paula Dawidowicz and Dr. Cheri Toledo later provided feedback regarding the structure of each individual question and then reviewed the alignment of the instrument to the research questions.

Procedures for Recruitment, Participation, and Data Collection

Before participants were recruited, my dissertation committee had to approve my proposal, and Walden University Institutional Review Board had to approve the study as well. Once this was complete, participants were identified, contacted, and recruited through their institutional email. I invited dental hygiene faculty members to participate in the study by sending an email invitation to their workplace email address that included a personalized Qualtrics link to the informed consent and a link to a scheduling tool to reserve a time for the interview. The email addresses of participants were known by the researcher and did not require permission from any organization. Only participants that meet the criteria were sent the invitation to participate in the study.

Informed consent is an important component because it allows participants to make an informed decision about whether to participate in a study (Borovecki, Mlinaric, Horvat, & Smolcic, 2018). Participants should be informed clearly and in a way that they

understand, with the nature of the study and any potential benefits or harms detailed (Borovecki et al., 2018). Participants were assured that their participation was strictly voluntary, and all information, including their identity, was confidential (see Borovecki et al., 2018). Dental hygiene faculty members provided informed consent by clicking "Yes, I consent" in the personalized Qualtrics link. By agreeing to participate in the study, participants agreed to partake in a one-time individual interview; and, if needed, a follow-up email conversation. A follow-up invitational email was disseminated within one week of the initial invitation to participants that did not respond, asking them to participate.

The informed consent was facilitated via Qualtrics, a web-based software management system that allows users to create surveys or questionnaires and store respective data securely. Once each participant provided consent to participate in the study, they were prompted to the scheduling link to reserve a date and time for the interview. The scheduling link was created through Calendly, an online scheduling tool. I determined several preset days and times for participants to choose from for the interview; this allowed participants to choose a date and time convenient with their personal schedules and mine. The Calendly link was included in the Qualtrics system. This ensured each participant completed all necessary tasks required for participation.

Data were collected through one 60-minute synchronous interview of five participants. For the data source, the Interview Guide provided the interview questions. The interview questions align with both the research questions and the conceptual framework. I used a virtual synchronous meeting tool to complete the interview process. Interviews were conducted online via the use of VoIP in the form of Zoom. Zoom

allowed me the ability to interview participants using voice and video across the Internet via a synchronous connection (see Lolacono et al., 2016). Zoom is supported by the technology support staff at the institution where participants are employed; thus, support staff can aid in any technical glitches or unforeseen technical issues that may occur if needed.

I collected data using a responsive interviewing technique. To address nonverbal cues and to ensure accuracy in data collection, I listened carefully to the participants' voice, including tone (see Lolacono et al., 2016). Interviews were conducted with the use of Zoom meeting software. I used Windows Media Player, a screen recording software to capture audio recordings for each interview. I created interview records by transferring interview data from Zoom and Microsoft Media Player software to my personal computer, which is password protected and stored in a safe location within my home. I then transcribed each interview audio recording by utilizing a voice typing feature in Google Documents. I made notes and corrected any missing data, questions, or responses that were inadvertently skipped or that did not transcribe appropriately. After interview transcribing was completed, a copy of each interview transcript was emailed to participants for review to ensure their responses represented the thoughts they wish to share on the questions asked, as suggested by Loubere (2017). Participants were asked to email back any concerns, corrections, or questions they have regarding their transcripts.

Data Analysis Plan

Qualitative data analysis is a method of organizing or categorizing data that is in a non-numeric form (Nowell, Norris, White, & Moules, 2017). An analysis is an internal

process driven by the research questions (Nowell et al., 2017). An analysis is what happens when the researcher asks pertinent questions prior to writing anything (Nowell et al., 2017). This approach is often used by qualitative researchers who have collected data via interviews or other direct means of contact with research participants. For this basic qualitative study, the most appropriate approach to data analysis is to code the interview transcripts (Patton, 2105; Rubin & Rubin, 2012). There are several approaches to qualitative interview coding, one approach by Rubin and Rubin (2012) is identifying, sorting, weighing, and integrating coded data. Another approach by Yin (2016) recommended that researchers compile, disassemble, reassemble, and interpret codes prior to forming conclusions. I followed Yin's (2016) model when I began transcribing the recordings of each interview. I then conducted open-coding of the data in the first compilation step. Open coding according to DeCuir-Gunby, Marshall, and McCulloch (2011), "allows for exploration of the ideas and meanings that are contained in raw data" (p. 138-139). The next round of analysis included axial coding, which allowed me to cluster repeating patterns that were used to develop categories. Once codes are created using open coding, analyzing them using axial coding is recommended to identify any connections between codes (DeCuir-Gunby et al., 2011). Next, I sorted the categories to discover broader themes. Following this model, I disassembled and reassembled the codes using software programs before developing conclusions for this study.

The software programs that I used to identify, code, and analyze categories and themes including Microsoft Word and NVivo. LaPelle (2004) outlined the process of operating tables in Microsoft Word for coding interview transcripts. The table columns

delineate emerging codes, and Microsoft Word's sorting function supports basic organization of the codes. I used this approach for the open coding compilation and disassembling stages of my data analysis. I reassembled the data with NVivo, utilizing the software's graphical presentation tools to help me visualize and interpret the data. Computer software programs are tools that can assist in data analysis (Patton, 2015). According to Patton (2015), "qualitative software programs facilitate data storage, coding, retrieval, comparing, and linking, but humans do the analysis" (p. 529).

Although the codes used in my analysis process emerged from the data, I constantly referred back to the research questions and conceptual framework. Table 2 presents an alignment of the research questions, conceptual framework, and interview questions. I expected the introduction of additional categories and themes throughout the data collection process, and therefore took a flexible approach to analysis so that emergent categories could guide in my conclusions.

Issues of Trustworthiness

Because this is a qualitative study, issues of trustworthiness are of great concern. There are four primary components used to establish trustworthiness in a study; credibility, transferability, dependability, and confirmability (Patton, 2015; Rubin & Rubin, 2012). In this next section, the four components of trustworthiness are described. The first component discussed is credibility.

Credibility

A major strength of qualitative interviewing is that it produces highly credible results (Rubin & Rubin, 2012). According to Rubin and Rubin (2012), credibility can be

achieved by showing that the researcher talked with participants that are informed about the research concerns. Many researchers use participant experiences to gauge credibility (Rubin & Rubin, 2012). These individuals provide first-hand knowledge of their experiences, which ensures the credibility of data being collected (Rubin & Rubin, 2012). Credibility was achieved because participants are experienced dental hygiene faculty with first-hand knowledge of their experiences with educational technology.

Transferability

Transferability in qualitative research is similar to establishing external validity in quantitative research (Statistics Solutions, n.d.). Transferability is established by providing readers with evidence that the research study's findings could be applicable to other contexts, situations, times, and populations (Statistics Solutions, n.d.). In qualitative research, transferability can be enhanced with detailed explanations of the study content (Patton, 2015). Transferability is accomplished in this study with a detailed discussion of the context to include information regarding the dental hygiene field and qualifications of becoming a dental hygiene faculty member.

Dependability

Dependability is a component of trustworthiness because it determines if the research study's findings are consistent and repeatable (Statistics Solutions, n.d.). To establish a means of dependability in this study, I incorporated triangulation. An approach to triangulation is to combine interviewing and document analysis (Patton, 2015). I used member checking as a form of triangulation to achieve dependability. This

was accomplished when I asked participants to review both the data collected by the interviewer and the researchers' understanding of that interview data (Devault, 2018).

Confirmability

Confirmability is the last condition of trustworthiness that qualitative researchers need to prove (Statistics Solutions, n.d.). This condition has to do with the level of confidence that the research study's findings are based on the participants' narratives and words, rather than potential researcher biases (Statistics Solutions, n.d.). To establish confirmability for this study, I used reflective journaling to identify any potential bias during data collection. I also created a step-by-step log of the research process in the interview guide.

Ethical Procedures

Ethical considerations in research are a critical component of the process. Ethics are the standard for determining what is right and what is wrong (Resnik, 2015). According to Creswell (2009), "researchers need to protect their research participants; develop a trust with them; promote the integrity of research; guard against misconduct and impropriety that might reflect on their organizations or institutions, and cope with new or challenging problems" (p. 87). In accordance with rules substantiated at Walden University, I submitted my proposal to Walden University's IRB for permission to recruit and interview dental hygiene faculty. IRB protocols uphold ethical standards and ensure the rights and welfare of human research subjects are protected. I received IRB approval on June 12, 2020 (06-12-20-0541203), at which time I began recruiting participants and collecting data.

After participants voluntarily agreed to participate, I provided a standard study consent form via email. The consent form was added to a web-based software tool called Qualtrics for dissemination to participants. In the software, participants were forced to either provide consent or discontinue by selecting "Yes- I consent" or "No- I do not consent." Those who agreed to the study conditions were prompted to a scheduling tool to reserve a date and time for the interview. All information obtained by participants was protected. The names of participants are confidential; any potentially identifying information was removed from any transcripts or data analysis tools. I used private application accounts to conduct and/or record interviews that are password protected. To safeguard saved data, I used my own personal computer that is password-locked. All retained data or documents that pertain to this study will be destroyed or deleted after five-years.

Although risks are minimal for participating in this study, an associated concern for any research study is participants' potential to experience emotional or psychological distress when answering questions. Therefore, to minimize the potential risks or discomfort that could occur, participants will be provided appropriate counseling options should emotional or psychological distress occur. The institution that participants are employed at offers services at the counseling and testing center for research study participants if needed.

Summary

In chapter 3, I explained the methodology that was used to explore the perceptions of dental hygiene faculty members regarding their attitudes toward use, usefulness, and

ease of use of educational technologies for instruction. The research design for this qualitative study is a basic qualitative interview approach. I am the key instrument for collecting, dissecting, and translating the data that was gathered. An explanation of the procedures for participant selection was provided, as well as procedures for recruitment, participation, instrumentation, data collection, and data analysis. My approach for ensuring trustworthiness and ethical considerations concluded the chapter. Chapter 4 presents a discussion concerning the research outcomes.

Chapter 4: Results

Introduction

The purpose of this basic qualitative study was to explore the perceptions of dental hygiene faculty members regarding their attitudes toward use, usefulness, and ease of use of educational technologies for instruction. RQ1 asked: What are the perceived attitudes of dental hygiene faculty toward their use of educational technologies for instruction? RQ2 asked: What are dental hygiene faculty perceptions about the usefulness of educational technologies for instruction? RQ3 asked: What are dental hygiene faculty perceptions about the ease of educational technologies use for instruction? In this chapter, I report the results of my dissertation study. I begin by describing the setting for the study, participant demographics, data collection, the data analysis process, and evidence of trustworthiness. I then present the study results, organized by the three research questions. I conclude the chapter with a brief summary.

Setting

The setting for this study included the culture at one university in the Midwest and the professional setting of the study participants. All faculty participants are employed at a university in the Midwest and work in the department of dental hygiene. The primary goal of the department of dental hygiene is to train dental hygiene practitioners to deliver preventive interventions to treat patients in a variety of settings. The dental hygiene program offers a diverse set of course offerings, ranging from oral histology and embryology to community oral health management. Although the faculty members' primary teaching objectives are the same (educate dental hygiene students

about the fundamentals of oral health), their approaches, practices, and philosophies have the potential to vary significantly. The culture at this Midwestern university is firmly focused on technology initiatives that impact the student experience and create an economic driver for the community. I interviewed five participants individually from my home using Zoom on my personal password-protected laptop computer. The length of each Zoom call was approximately 60 minutes. I had no control over each participant's setting during the interviews as each was in a different place, such as their office or home. All participants completed the interview during the COVID-19 pandemic.

Demographics

The potential participants for this study included six full-time female faculty members who teach in the entry-level dental hygiene program at a Midwest university. Of the six, five consented to participate. Each participant is licensed to practice dental hygiene, and each has a master's degree. All demographic information is shown in Table 3. Teaching experience ranged from 3 years to 30 years, with an average of 14.8 years. All participants reported being instructors in the clinical setting, and all reported teaching at least one didactic course; 2.4 was the average number of courses taught per semester. Two participants considered themselves to be technology savvy, one reported somewhat, another reported average, and one self-reported as not being technology savvy. All participants reported using technology in their personal lives, and all listed a specific technology regularly used, with a cell phone as the most often reported.

Table 3

Participant Demographics

	P1	P2	P3	P4	P5
Years of teaching experience	7	3	14	20	30
Years of teaching experience in dental hygiene education	7	3	14	20	30
Instructor in the clinical setting	Yes	Yes	Yes	Yes	Yes
Number of didactic courses taught	2	2	1	3	4
Considers self-technology savvy	Yes	Yes	Somewhat	Average	No
Uses technology in personal life	Yes	Yes	Yes	Yes	Yes
Technologies used	Tablet, cell phone, laptop	Zoom, Google Docs, Facebook	Smart phone	Cell phone, Facebook	Cell phone

Data Collection

Upon IRB approval, I sent an email invitation to participate via Qualtrics to six dental hygiene faculty members. Within 1 week after sending the invitations, I received an automated response indicating that five of the six agreed to participate. They indicated this by selecting “Yes, I consent” in the personalized Qualtrics link and by scheduling their interview via Calendly. I sent a second email invitation within 1 week to the one invitee who did not respond. I did not receive a response from that invitee. Data collection began on June 26, 2020, and was completed on July 13, 2020. All interviews

were conducted via Zoom and recorded using Microsoft Media Player. No technical issues arose with the recording tools; there were usable recordings for every data collection event.

Next, I created interview records by transferring interview data from Zoom and Microsoft Media Player software to my personal computer, which is password-protected. I then transcribed each interview audio recording using a voice typing feature in Google Docs. Once a basic transcript was created, I then simultaneously listened to each audio recording and reviewed each transcript for accuracy. I corrected any missing data, questions, or responses that were inadvertently skipped or that did not transcribe appropriately to ensure accuracy. Then I carefully reviewed each transcript again while playing back the audio recording of each interview to validate the accuracy of each transcript and to ensure that the text was a verbatim record of the audio interview data. Once this process was complete, I copied the transcribed text for each interview into a Microsoft Word document and saved each file under a pseudonym to ensure privacy. Next, I sent an email to each participant asking them to review their transcript for accuracy. No participants suggested any changes to the transcripts. There were no variations from the plan defined in Chapter 3 and approved by the IRB. No unusual circumstances or uncommon situations occurred during data collection.

Data Analysis

My data analysis approach was to identify factors relevant to the three research questions as reflective in the five interviews. Each interview was viewed as a single event. That is, each interview was considered individually in the analysis. Common

categories were identified across the data with regard to addressing the research questions. My data analysis process combined two qualitative analysis methods. My overarching data analysis approach followed Yin's (2016) process for compiling, disassembling, reassembling, and interpreting codes. First, I read all transcripts for initial impressions and to make sense of the transcripts and data. Next, I conducted open coding of the data in which segments of text were identified and labeled. I did this by reviewing the data line by line and using differently colored text highlights to draw attention to specific words, sentences, or sections of text. The next round of analysis included axial coding, which allowed me to cluster repeating patterns that were used to develop categories. I used the table column in Word to delineate codes and the sorting function to organize emerging categories. Next, I sorted the categories to discover broader themes. Once the initial analysis of the data was completed, the data were considered more closely through NVivo software. Using NVivo software, coded items were considered according to the number of references made to the category within the interviews. References were identified as the number of times a response was coded into a specific category. At the end of the analysis process, I identified a total of six themes and 14 categories spread across all research questions. Two themes and four major categories emerged that align to RQ1: (a) faculty choosing to use technology and (b) faculty enjoy variety. The categories identified under Theme 1 were (a) improving or learning to use advanced technology and (b) students' comfort with technology influences faculty use. The categories identified under Theme 2 were (a) positive views about using a variety of technologies and (a) enjoyment of technology use (See Figure 1).

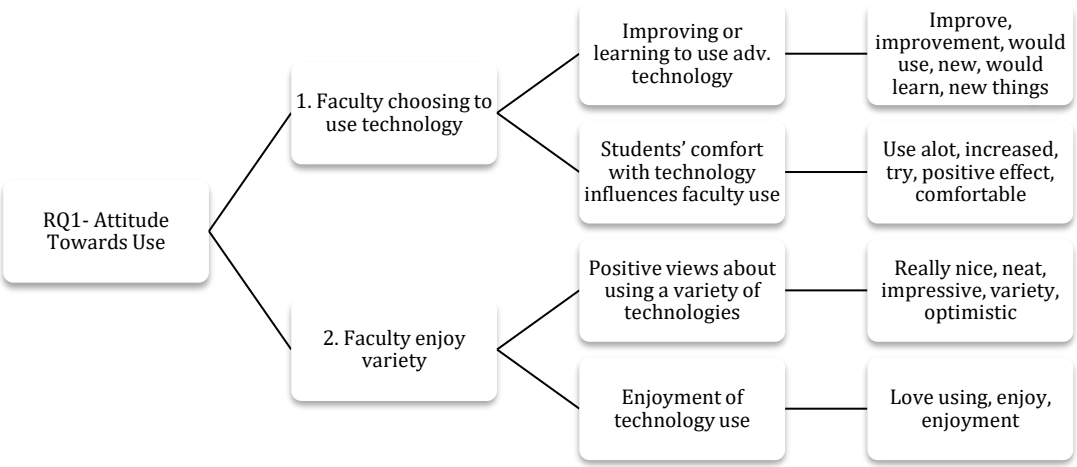

Figure 1. Themes, categories, and codes for RQ1 related to dental hygiene faculty attitudes toward use of technology.

Two themes and six categories emerged that aligned to RQ2: (a) improves learning performance of students and (b) enhances faculty effectiveness in job. The categories identified under Theme 3 were (a) students learn material, (b) supporting hands-on learning, and (c) faculty use keeps students engaged. The categories identified under Theme 4 were (a) assessment and evaluation are easier, (b) improves faculty productivity and performance, and (c) instruction and communication are easier (See Figure 2).

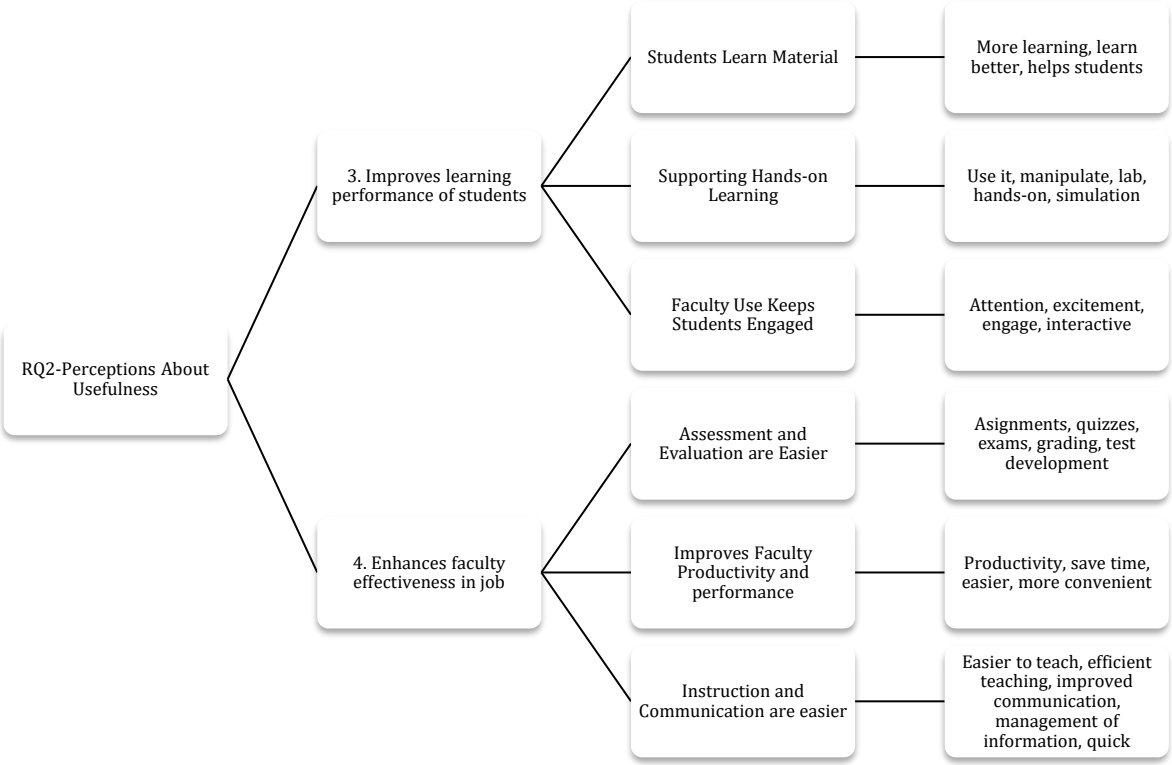

Figure 2. Themes, categories, and codes for RQ2 related to dental hygiene perceptions about usefulness

Two themes and four categories emerged that aligned to RQ3: (a) how to improve ease of use and (b) ease of use varies. The categories identified under Theme 5 were (a) repetition and practice and (b) formal training. The categories identified under Theme 6 were (a) easy to use and (b) not always easy to use (See Figure 3).

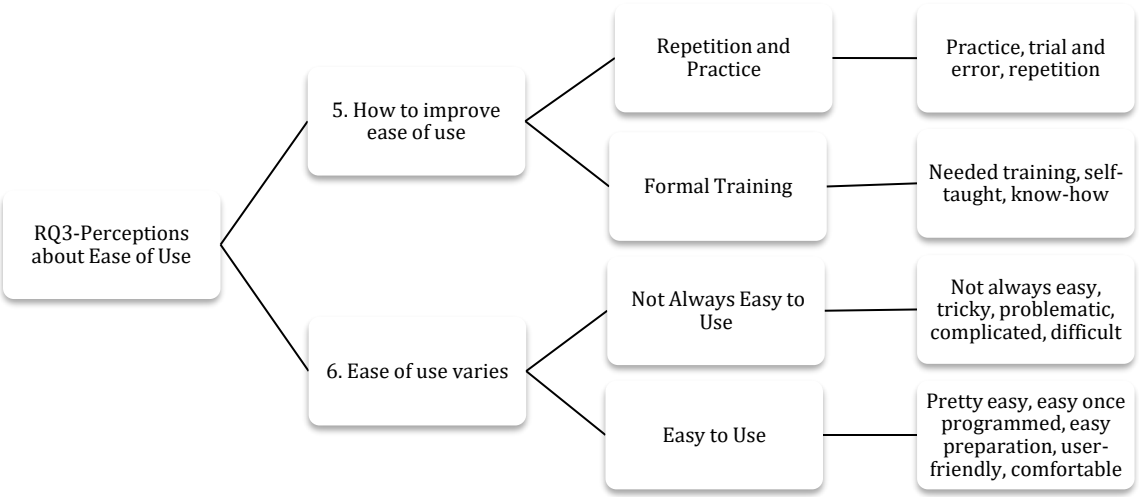

Figure 3. Themes, categories, and codes for RQ3 related to dental hygiene perceptions about ease of use.

Although the categories that emerged aligned with the conceptual framework, the flexible approach to analysis that I took allowed me to recognize that some dimensions of the TAM were emphasized more by some participants than others, and this provided an opportunity for new dimensions to emerge. In addition, within some categories, participants shared discrepant viewpoints. In these instances, differing views were grouped under the same category, but the codes were named using neutral language that encompassed all viewpoints.

Evidence of Trustworthiness

Credibility with internal validity occurred with the triangulation of the in-depth individual interview data, as each was reviewed by the participant to confirm that the data correctly reflected their perceptions and experiences. In addition, I addressed credibility by developing a rich description of the phenomenon of study and by conducting a

thorough literature review. Throughout the study, I modified my work based on feedback from my dissertation committee. Combined, these strategies strengthened study credibility.

Transferability was supported by a detailed depiction of the study setting. This included a description of the culture at this Midwestern university as an organization. The professional settings of the study participants were also described. The purposive sampling also helped support transferability of the research findings to future studies.

I addressed dependability by documenting all the processes in the study in detail to enable future researchers to repeat the study within the same context, methods, and participants to obtain similar results (Korstjens & Moser, 2018). Documentation included the research design, research questions, interview questions included in the interview guide, interview protocols, and a reflective review. The three clearly defined research questions were reviewed throughout the study. In my role as the researcher, I explained the interview protocols and the use of Zoom explicitly to participants. Bias checks throughout the retrieval of all interview data was extremely important to me; therefore, I removed participants' names and assigned pseudonyms. Other components that promoted dependability included using the TAM framework and a reflective review of the triangulated in-depth individual interview process.

I maintained confirmability, similar to objectivity, during the data collection and analysis process by making sure the interview results were from the participants rather than from my opinions or perspectives and were free from research bias. I also used a reflective research journal to observe and record any bias that occurred during the data

collection and analysis phases. By collecting data using an in-depth interview approach, and sending follow-up emails to participants, I provided triangulation, minimizing the influence of my biases.

Results

In this section, I report the study results. During the data coding process, I identified 6 themes and 14 categories. Themes and categories were delineated into three areas, with each area focusing on one of the three research questions. The findings for each research question are summarized, and examples from the interviews are used to illustrate the categories.

Research Question One

RQ1 was what are the perceived attitudes of dental hygiene faculty toward their use of educational technologies for instruction? To answer this research question, I asked dental hygiene faculty to reflect on the types of educational technologies they use while in the classroom, why they began using those technologies, to provide a description of the integration process, what they felt about those technologies now that they use them, and if there are any technologies they wish to use. Two primary themes and four major categories emerged that aligned to RQ1. This section includes a table summarizing the themes, definition of categories, and the number of participants mentioning the category (See Table 4).

Table 4

Themes and Categories For Research Question 1

Theme	Categories	# of participants mentioning the category
1. Faculty choosing to use technology	Improving or learning to use advanced technology	5
	Students' comfort with technology influences faculty use	4
2. Faculty enjoy variety	Positive views about using a variety of technologies	4
	Enjoyment of technology use	3

Faculty choosing to use technology. For Theme 1, *faculty choosing to use technology,* data were organized into two categories: improving or learning to use advanced technology, and students' comfort with technology influences faculty use. Faculty described how their overall decision to use a particular technology is geared toward their motivations to learn to use advanced technologies that could ultimately benefit students learning outcomes. Faculty were particularly interested in specific technologies only if students were comfortable using the technology, and if it had a positive effect on students learning. I organized this section by these two categories.

Improving or learning to use advanced technology. The most occurring category for Theme 1 was improving or learning to use advanced technology. Dental hygiene faculty were open and showed enthusiasm when discussing their interest in improving or learning to use additional advanced technologies. Five participants commented on it and

essentially agreed. Faculty discussed specific technologies such as Go Pros, Nomads, cordless sensors, and iPads. These technologies are considered advanced in the dental hygiene field as they are new to dental hygiene education, and there are fewer users in dental hygiene that use these technologies for instruction. P1 expressed her interest in trying new technologies and how she wants to try to improve her use of current technology because she felt it may help in the teaching and learning process. While P3 described a specific use of advanced technology in which advanced technology would be beneficial during instruction in regards to group activities. P4 and P5 shared their feelings on how they would like to improve upon using advanced technologies. P4 stated how she was willing to take risks and learn about advanced technologies, and that she felt she is ahead of her peers in integrating technology. P5 expressed how she does not necessarily know how to use advanced technologies, but is interested in learning how to use new technologies to expand on technology use during instruction. She said, "I don't really know how to use some of the other things [technologies]… one thing that I probably should know more about would be using an iPad." In conclusion, faculty are interested in using new technology and showed interest in improving their use of technology for the teaching and learning process.

Students' comfort with technology influences faculty use. The next category for Theme 1 was students' comfort with technology influences faculty use. Dental hygiene faculty are particularly influenced by the views of students and their use of educational technologies, four participants commented in similar ways. Faculty discussed student comfort with educational technology, for example P1 commented on how, "They

[Students] are comfortable using technology and it helps them too, especially if their visual learners. It helps them to retain the information better." In reference to the ability of technology to be easy to use for students, P2 explained that, "If it's [technology] easy and it works, I'm buying it, I'll do it!" She further explains how significant technology use is if it positively effects students, and is user-friendly for all parties. In conclusion, if faculty felt students were comfortable using technology and the technology had a positive effect on their learning, they were more likely to use and integrate technology into their teaching practices.

Faculty enjoy variety. For Theme 2, faculty enjoy variety, data were organized into two categories: positive views about using a variety of technology, and enjoyment of faculty use. The dental hygiene faculty that were interviewed described a variety of educational technologies that they currently use or would like to use for instruction. I organized this section by these two categories.

Positive views about using a variety of technologies. The first category related to Theme 2 was positive views about using a variety of technology. Four of the five participants shared their opinions about using specific technologies including PowerPoint, Microsoft Word, Kahoot, and Blackboard. P1 described in great length the types of technologies she uses and why she uses them. She discussed how she places x-rays and digital images on the projector for use in the classroom for simulations. P2 shared how she has used Prezi and PowerPoint presentation. She expressed how she uses YouTube videos when students are bored or dissatisfied with her lectures. Faculty shared how they use Blackboard quite frequently and the tools that Blackboard offers. P4

emphasized that, “I don’t have students hand in anything paper. No paper for me! I do everything through Blackboard.” In conclusion, faculty expressed an overall positive attitude toward using many different types of educational technologies for instruction, and each shared specific scenarios in which they use technologies in the classroom. Faculty were optimistic and generally perceived to be impressed with technology use for instructional purposes.

Enjoyment of technology use. The final category for Theme 2 was enjoyment of technology use. Three dental hygiene faculty commented on it and all agreed. Faculty seemed to genuinely enjoy using educational technologies for instruction. P1 expressed her overall enjoyment for teaching in the dental hygiene department along with teaching with the use of educational technology. She said, I actually enjoy using it [educational technologies] too and I think [technology] helps me even to be more familiar with the material.” P2 explained how she loves teaching with technology and how enjoyable incorporating technology has been in the public health courses that she teaches. She stated that, “I love especially the public health courses. I do, I actually enjoyed this” [referring to the technology used in the public health courses]. In dental hygiene education, dental public health is a core didactic course within the curriculum that uses many educational technologies to allow student to educate vulnerable populations about proper oral healthcare. In a final example of this category, P4 shared her enjoyment of learning to use technologies; however, she expressed not having enough time to do so. She indicated that “My problem is not having time to just even partake in something as enjoyable as learning technologies.” In conclusion, three out of the five faculty shared

about their enjoyment using technology while teaching. They enjoy using technology and would incorporate more technology into their instruction if permitted.

In conclusion, faculty perceived the use of educational technology for instruction as enjoyable, they felt comfortable using educational technology, and they felt it has a positive effect on student comfort, which directly influenced their use of technology. Therefore, the key findings related to RQ1 is that dental hygiene faculty's attitudes toward use is that they choose to use educational technology for instruction and enjoy a variety of technology when they perceive its use as valuable in the teaching and learning process.

Research Question Two

RQ2 was what are dental hygiene faculty perceptions about the usefulness of educational technologies for instruction? To answer this research question, I asked dental hygiene faculty to reflect on the usefulness of educational technology tools that they use for instruction, how they felt their use of available technologies changed over the years, the influence educational technology tools had on their teaching over the years, have educational technology tools made their job easier, and how educational technology tools influenced job performance or productivity. Two primary themes and six major categories emerged that aligned to RQ2. This section includes a table summarizing the themes, definitions of categories, and the number of participants mentioning the category (See Table 5).

Table 5

Themes and Categories For Research Question 2

Theme	Categories	# of Participants mentioning the categories
3. Improves learning performance of students	Students learn the material	4
	Supports hands-on learning	5
	Faculty use keeps students engaged	5
4. Enhances faculty effectiveness in job	Assessment and evaluation are easier	5
	Improves faculty productivity and performance	5
	Instruction and communication are easier	5

Improves learning performance of students. For the Theme 3, improves learning performance of students, data were organized into three categories: students learn the material, supports hands-on learning, and faculty use keeps students engaged. Faculty revealed that they value technology if it improves the learning performance of students. I organize this section by these three categories.

Students learn the material. The first category related to Theme 3 was students learn the material. This category was mentioned by four participants. The four participants agreed that educational technology are useful in helping students learn material in a more efficient manner. For example, P1 said, “I feel like students learn

better or learn quicker and are more productive." She further explained how technology is especially helpful to junior students in the program because students "can see the mistakes that they're making, and then see things that they were doing well...receive reassurance, that would be beneficial because they're so unsure. So I feel like that would increase their learning." Junior students in the dental hygiene program are provided with an abundant amount of information, which often causes them to become overwhelmed early in the program. They are unsure and often hesitant on offering treatment options to patients because they have not performed them before or do not know what options to offer. P2 further noted how using technology can improve student "engagement because they're absorbing the information and its crucial information that they need for national boards." In conclusion, participants felt that technology helps students learn the material in more efficient manner and that technology can help students learn clinical skills that can be applied in a real word context, which is especially important because dental hygiene students will become licensed clinicians that provide services to patients.

Supports hands-on learning. The next category for Theme 3 was supports hands-on learning. This category was mentioned by all five participants and all essentially agreed. Hands-on learning is especially important in dental hygiene education as clinical expertise is essential in the learning process. Students must have the ability to effectively remove oral debris including bacteria, tartar, and calculus. Students learn to remove such debris by use of hands-on learning approaches within the clinical setting. First students learn and practice this skill on typodonts and then they can move to training on mannequins. Once students have mastered this skill on simulation tools, they can begin

applying this skill on live patients. P1, P3, and P5 shared similar experiences. For example, P1 said, “I am going to do a lot more learning activities more hands-on stuff in classroom.” She described her plans on incorporating digital x-rays in the classroom and in the lab so students can practice manipulating materials that are used in the clinical setting. P3 noted how using the Elmo, a document camera, was extremely useful in “manipulating an object with your hands for students to see.” This is especially helpful when teaching students how to hold dental hygiene instruments, also called instrumentation. Using dental hygiene instruments requires tactile sensation within the hands and fingertips, which is often difficult for students to learn. Calculus removal is dependent on students’ tactile sensations and manipulation of dental hygiene instruments. P2 explained how educational technology could be used to support students’ hands-on learning by describing simulation type activities such as “sim labs.” She described accessible simulation labs on campus that allow students the opportunity to develop clinical skills without risking harm to the general public. In conclusion, dental hygiene faculty believed that educational technology is useful in supporting dental hygiene students’ hands-on learning. Participants explained how simulation is valuable in learning concepts and is appropriate for students to learn critical skills related to instrumentation.

Faculty use keeps students engaged. The last category for Theme 3 was faculty use keeps students engaged. All five participants commented on it and all essentially agreed; the differences were that each talked about a different scenario in which they felt technology helped students stay engaged with materials in the classroom. For example, P1 mentioned, “I kind of used it [educational technology] as like little brain breaks

because lecturing can be so long." She discussed how using educational technologies can break up a long lecture and keep students engaged in the topic. She described how educational technologies can keep students excited about learning by stating, "I like how they get excited about being in the classroom instead of just sitting there and nodding offer, or playing on their laptop. It actually keeps them engaged and I feel like they like to learn." P3 explained how useful educational technologies are in helping students stay engaged with content and also useful in facilitating the instructor. She shared that she believed educational technology is useful because technologies are helpful in "engaging the students as they are interested in technology, and they are useful in that they facilitate the instructor… allowing the classroom to be more involved in the process than just seeing the sage on the stage." When asked what types of influence have educational technology tools had on your teaching, P 4 mentioned her teaching practices. She detailed how she uses a combination of tools in her classroom to facilitate learning and to keep students engaged. She shared how "I have a good combination of [educational tools] …you know it's not all online … I do try to do learning activities in class and usually we do stop and do learning activities in class but they're web-based." In conclusion, dental hygiene faculty describe particular instances where they felt educational technologies were helpful in engaging students. They felt that educational technology use can keep students engaged and attentive during instruction, and perhaps can influence their teaching practices by offering a variety of learning strategies to students to aid in the learning process.

Enhances faculty effectiveness in job. For Theme 4, enhances faculty effectiveness in job, data were organized into three categories: assessment and evaluation easier, improves productivity and performance, and instruction and communication are easier. Faculty felt they can easily create and grade assessments such as assignments and tests by using technology, which ultimately saves them time and therefore improves their productivity. I organized this section by these three categories.

Assessment and evaluation easier. The first category for Theme 4 was assessment and evaluation are easier. This category was mentioned by five participants in the context of effectiveness in performing their job better. The differences were the ways in which educational technologies makes assessment and evaluation easier for them. P2 mentioned "I like to use [technology] because I can manage [grading] all in one spot and give [students] quick feedback." P1 shared how useful educational technologies are for grading exams and quizzes. She shared, "once you get your quizzes and tests in the computer then you just you know it's easier to make adjustments and grading is a lot quicker." Two of the five participants explained how test development was especially useful to them. They described how publishing companies that produce textbooks now have test banks for each book that can easily be integrated into the LMS. They particularly like test banks because they no longer have to derive test questions or print long exams. Dental hygiene faculty mentioned Safe Assign and Blackboard and described how the use of such technologies makes the grading process more streamlined. P3 explained how Safe Assign is useful in detecting plagiarism when grading. Furthermore, P4 shared how educational technology such as Blackboard helps with

organization, “I don’t lose assignments and there’s documentation when they [students] turned it in.” She further notes how Blackboard “keep students accountable for turning things [referring to assignments] in on time. In conclusion, dental hygiene faculty discuss several ways that technology helps them evaluate students more efficiently and they generally felt they are better able to provide feedback to students by using technology. Faculty explain how technology has a positive effect on students because technology allows for more efficient grading.

Improves faculty productivity and performance. The next category for Theme 3 was improves faculty productivity and performance. This category was mentioned by all participants and all agreed. When asked to discuss a few ways that educational technologies have made their job easier, faculty detailed how educational technology helps them be more productive and saves them time. The only differences were the ways in which they felt their performance was improved. For example, P1 explained how the use of technology improved her productivity by “using Zoom to cut down on emails with students.” She explained how using Zoom meeting to answer questions is more productive and saves her time because she can answer all questions at one time, rather than answering individual emails. She states that “I’m more productive doing a 15-minute Zoom call rather than 20 emails back and forth trying to explain something.” Dental hygiene faculty also expressed how using technology helped them be more organized which they felt increased their job performance. P4 mentioned how, technology “made me more organized for sure… I don’t lose assignments!” P5 noted how easy it is to correct her mistakes if she accidently loaded the wrong objective, she’s

able to quickly correct it. She noted how her performance has improved because she can easily correct mistakes and communicate that to students, “I just post an announcement saying sorry guys [referring to students], I made a mistake on page two, here’s a new version.” In conclusion, dental hygiene faculty expressed how technology has allowed them to be more efficient in their job as they are able to accomplish tasks faster. Faculty noted how their performance has been improved because they can easily correct mistakes and update learning content in an efficient manner.

Instruction and communication are easier. The last category for Theme 4 was instruction and communication are easier. Dental hygiene faculty felt that technology provides many benefits including making instruction easier and that it can help them communicate with students easier. Five participants commented on it and all essentially agreed. Dental hygiene faculty felt that instruction was easier and that technology helped them be more efficient teachers. P1 indicated “I would say it’s a little bit easier to teach now with the educational tools.” P2 shared a specific example as to how technology made it easier to teach. She expressed how she would like to utilize Excel spreadsheet as this particular software offers the ability to generate graphs to make presentations. She felt the process of developing a course was easy and the use of spreadsheets for students would help them stay organized with tasks such as completed competencies and other clinical requirements. The ease of use of spreadsheets she felt is relatively easy. Dental hygiene faculty felt that educational technology makes it easier to communicate and share information with students. The differences between participants were the types of technology used to manage the information. P5 discussed Blackboard as an easy

technology to manage and store content for learning. She shared how Blackboard makes it easier to communicate with students as the content is stored and organized so students have instant access. She noted how encouraging students to see materials before class is much easier because they are prepared. P4 explained how the ease of communicating feedback to students using educational technology is quick, "the feedback instant." She further noted how educational technology allows her to "manage" student work "all in one spot and then give them quick feedback." Another participant explained how she would never know if information is incorrect unless a student tells her, for these reasons she enjoys the "ability to communicate in real time, no matter the time of day." She further described how email is particularly important in the ease of technology use for her as it allows her to provide quick information "if I remember something at 11 at night or if a student contacts me, I can send a quick email or post for you guys" as an announcement online in the LMS. In conclusion, dental hygiene faculty felt that educational technology for instruction makes it easier to communicate with and share information with students. In conclusion, dental hygiene faculty felt that technology makes it easier for them to teach. Dental hygiene faculty found that educational technology makes it easier to communicate with students, is quick, and has improved the type of communication shared with students.

In conclusion, dental hygiene faculty perceived educational technology as useful for instruction because technology keeps students engaged, helps students learn the material, and made assessment and evaluation easier. Faculty perceived that educational technology could support students' hands-on learning experiences, which is essential for

preparing students for clinical practice in a real-world context. The key findings related to RQ2 are that dental hygiene faculty perceptions about the usefulness of educational technologies for instruction are positive and that educational technology has had an influence on their teaching abilities including their ability.

Research Question Three

RQ3 was what are dental hygiene faculty perceptions about the ease of educational technologies use for instruction? To answer this research question, I asked dental hygiene faculty to talk about their experiences with the ease of use of the educational technologies they have integrated into instructional practices, of the educational technologies used in the classroom which do they find easy to use, what did it take for them to see these tools as easy to use, how learning to use technology tools has made it easier to learn to use other tools, to choose the most advanced educational tool they would use if possible, reasons for liking these advanced tools, which part of these advanced tools is easy to use, what part is hard to use, and what they have done to learn how to use these advanced tools. Two primary themes and four major categories emerged that aligned to RQ3. This section includes a table summarizing the themes, definition of categories, and the number of participants mentioning the category (See Table 6).

Table 6

Themes and Categories For Research Question 3

Theme	Categories	# of participants mentioning the categories
5. How to improve ease of use	Repetition and practice	5
	Formal training	2
6. Ease of use varies	Not always easy to use	4
	Easy to use	4

How to improve ease of use. For Theme 5, how to improve ease of use, data were organized into two categories: repetition and practice, and formal training. Faculty felt more comfortable implementing and using technology after receiving formal training from a technology specialist that could guide them through learning to use technologies. Participants discussed how formal training would be beneficial to expand upon the educational technologies they use in the classroom, as most faculty are teaching themselves how to use technology by trial and error. I organized this section by these two categories.

Repetition and practice. The most occurring category for Theme 5 was repetition and practice. This category was mentioned by all five participants and all essentially agreed. When participants were asked to talk about their experience with the ease of use of the educational technologies they have integrated into their instructional practices P1 explained:

> I would say easier because the more you keep up on the technology that's available and is out there then you can usually figure out how to use the other ones, as long as you're staying up on the technology, then I would say it's easier to go to a different technology.

When asked, at what point were educational technology tools easy to use, P2 amusingly replied, "A lot of trial and error and lessons learned." She further expressed getting to the point of seeing technology as easy to use took "many lessons and the ability to just keep trying and just trial and error for me." When asked the same question, P3 shared that, "Practice out of necessity… familiarity." In conclusion, dental hygiene faculty have learned to use technology with trial and error techniques and at times just practicing the skill repeatedly. Faculty felt that they have worked with technology for some time and feel comfortable figuring out how to use it on their own. Dental hygiene faculty felt that repetition and practice had the potential to improve ease of use of educational technology and their knowledge of how to use technology.

Formal training. The next category for Theme 5 was formal training. Two of the five dental hygiene faculty specifically discussed how better training was a necessity for faculty to learn to use or be better trained in educational technology. Training was largely discussed by the majority of participants; however, their perceptions differed. The differences were where faculty preferred to have training and the types of training. P1 discussed receiving training at the ADHA annual session. The ADHA annual session is a national convention distinctly organized for dental hygienists. There are several professional development activities and training seminars offered on a broad range of

topics. This participant enjoyed attending the ADHA annual sessions as she is able to get one-on-one training from experts from various companies that represent a broad range of products. On the contrary, P4 discussed using tutorials as a training mechanism to learn to use educational technologies. She described using “lots of tutorials” to learn how to use technology, by watching YouTube videos. Both participants note how having a technology specialist to guide them through learning to use technology would be beneficial. P4 noted how training would be a more effective means of learning how to use technology and perhaps save her time as she could stop trying “to look up answers to technology questions myself.” Both participants mentioned how they wished for more time to have faculty development with dental software specifically. P4 felt that the intricacies of dental software [Referring to Eaglesoft software] were restricted or that faculty members including clinical faculty were not allowed to explore Eaglesoft in fear of “messing something up or doing something wrong.” One point of contingency among these two participants was on the importance of receiving training to use or be better trained in educational technology as they age. Both participants mentioned how their age may hinder their ability to learn about technology and how to use it in the coming years. P4 noted how she can foresee learning to use technology as getting harder as she ages. In conclusion, faculty discussed how more training would be beneficial to expand upon the educational technologies they use in the classroom, as most faculty teach themselves how to use technology. They felt having more of an opportunity for training to use technology would be beneficial, and they would love the opportunity to have more time to do so.

Ease of use varies. For Theme 6, ease of use varies, data were organized into two categories: not always easy to use, and easy to use. Dental hygiene faculty perceived that ease of use of educational technology for instruction varies because on one hand technology use can be beneficial if faculty are comfortable using it properly. However, technology can also be difficult depending on the type of technology used and what the technology is being used for. I organized this section by these two categories.

Not always easy to use. The first category for Theme 6 was not always easy to use. This category was mentioned by four participants and all generally agreed that at times technology can be problematic or difficult to use when not fully understood. The differences were the circumstances as to why faculty felt this way and what particular task they were trying to accomplish with the technology. For example P1 mentioned having difficulty integrating test banks into Blackboard. She was forced to seek consultation with an instructional technology representative as it was too difficult for her because she did not fully understand how to integrate the technology into the LMS. She further described how some advanced technologies may be problematic if she were to use them for instruction such as GoPros. She shared how "the GoPro might be a little more difficult just depending on if you plug it into a computer to watch [referring to a video on GoPro], or just download the video, as that can be easier." Whereas P2 shared how Internet connectivity is often complicated and can cause quite a bit of frustration when students depend on it in the clinical setting when treating patients. She discussed how the Internet constantly goes down and thus leaves students unable to use the dental software required to chart dentition, probe, or even take radiographs on patients. Two of the four

participants described how calibration may be done to help faculty with the ease of use of technology and specifically with how to integrate technology so they understand better. P2 detailed how calibration, if prepared correctly may still be a challenge because "there are so many different ways of utilizing so many different methods of teaching." In a final example of this category, P5 expressed how the use of educational technology is not always easy because she does not necessarily understand how to use certain computer operating systems. She described how she does not like using Mac products because "I don't know how they work!" She further explained that her personal computer is a touch screen and she constantly finds herself trying to touch the screens of clinical computers thinking they are also touch screen, when they are not. She expressed how "things like that frustrate me the most! Just when I learn how to apply it [referring to integration of technology] it doesn't work!" She further notes how "if I just understood more about the possibilities of what it [referring to technology] could do for me, than I'd be happy." In conclusion, dental hygiene faculty felt that the use of educational technology and integration can be difficulty for faculty when not understood fully. They felt that, at times, depending on the type of technology and what it is used for, ease of use is complicated and can cause several problems in regards to the process of care for patients and the student's ability to properly care for patients.

Easy to use. The final category for Theme 6 was easy to use. Dental hygiene faculty felt that educational technology can be easy to use and user-friendly. This category was mentioned by four participants and was generally agreed upon. The differences were the specific circumstances associated with specific technologies. P3

mentioned that she found all the technology she uses as easy to use and to be user friendly because she will not integrate it if she is not comfortable explaining how to use it to students. She explained:

> I think a lot of it would be user-friendliness. That's going to be a big thing, if it's user-friendly and I can incorporate it fairly easy and understand it. Then that will hold a key, it's that user friendliness, if I can get that implemented into Blackboard or whatever program they decide to use. I think the user-friendliness is going to play a role, and I think that's with any kind of computer or program technology nowadays.

In a final example of this category, P5 discussed how she is comfortable using educational technologies and felt technology is fairly easy to use once they are programmed appropriately. She uses the example of Blackboard:

> I mean I think inherently the basic parts of Blackboard are easy to use. I mean I truly believe that and maybe it's just because I do know how they're used, so of course it's easy for me. I think Blackboard is pretty easy to use I think they [referring to technology specialists] make it pretty clear what you're supposed to do [referring to use].

The key findings related to RQ3 was that dental hygiene faculty perceived that educational technology was easier to use after repetition and practice, but they would appreciate more formal training as some technology is easier to use than others.

Summary

RQ1 was what are the perceived attitudes of dental hygiene faculty toward their use of educational technologies for instruction? Two themes were detailed along with four categories related to the research question. The key findings for RQ1 were that dental hygiene faculty's attitudes toward use is that they choose to use educational technology for instruction and enjoy a variety of technology when they perceive its use as valuable in the teaching and learning process. RQ2 was what are dental hygiene faculty perceptions about the usefulness of educational technologies for instruction? Two themes were discussed and six categories related to usefulness. Key findings for RQ2 were that dental hygiene faculty perceptions about the usefulness of educational technologies for instruction were positive and that educational technology has had an influence on their teaching abilities. RQ3 was what are dental hygiene faculty perceptions about the ease of educational technologies use for instruction? Two themes were detailed along with four categories related to the research question. Key findings for RQ3 were that dental hygiene faculty perceived that educational technology was easier to use after repetition and practice, but they would appreciate more formal training as some technology is easier to use than others.

Chapter 4 included the study results, the data analytic approach, and tables summarizing the identified themes and categories. Results were reported organized by RQ. In Chapter 5, I describe my interpretation of these findings.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this basic qualitative study was to explore the perceptions of dental hygiene faculty regarding faculty attitudes toward use, usefulness, and ease of use of educational technologies for instruction. I explored research questions framed through the conceptual lens of the TAM by Davis (1989). This study was conducted to explore the perceptions of dental hygiene faculty regarding use, usefulness, and ease of use of educational technology for instruction. There is limited literature and evidence in the dental hygiene field in general but specifically on perceptions of educational technology use for instruction among faculty members. Consequently, I designed and conducted this study at a university setting in the Midwest to strengthen social change among dental hygiene educators seeking to use technology to improve student-learning experiences.

Interpretation of the Findings

Currently, there is a gap in the scholarly literature on how dental hygiene faculty use educational technologies for instruction because no research has been done. Because there is no other dental hygiene research to compare to this study, findings neither confirmed nor disconfirmed prior research in the dental hygiene field. Instead, the findings extend the literature base in the dental hygiene field and support findings from research in both healthcare and in higher education. In this section, I present an interpretation of findings, connecting related categories with each research question. In addition, I interpret the findings through the lens of the TAM by Davis (1989).

Attitude Toward Technology Use

The key findings for RQ1 were that dental hygiene faculty's attitudes toward use is that they choose to use educational technology for instruction and enjoy a variety of technology when they perceive its use as valuable in the teaching and learning process. Participants also showed an interest in learning to use advanced technology to improve student learning experiences. Current literature related to higher education and the healthcare field has shown positive faculty attitudes toward new educational technologies and trends to enhance student learning experiences (Aragon et al., 2018; Loague et al., 2018; Pomerantz & Brooks, 2017). Therefore, the findings from my study confirm previous research that faculty choose to use new or advanced technology when they perceive its use as valuable in student learning experiences. Participants also believed that student comfort with technology influences faculty use. Results from the literature showed that when faculty do integrate technology into instruction, they often investigate the technology including digital tools to ensure students are accepting of its use (Lederman & McKenzie, 2017; Tiffany & Forneris, 2020). My study confirms the findings of previous research by indicating that student comfort with technology has a direct influence on faculty attitudes toward use.

Dental hygiene faculty also expressed how they enjoy using a variety of educational technologies for instruction. Participants described specific types of technologies they used in their teaching pedagogy such as Blackboard. Similarly, other researchers, like Abdullah, Ahlan, and Abdullah (2019), have found that the acceptance and adoption of an LMS are strongly influenced by perception of use. Therefore, the

findings from my study confirm LMS usage among faculty has an influence on their attitudes toward use of a technology. Because dental hygiene faculty enjoy using educational technologies such as Blackboard, they may in turn be more influenced to accept the technology and use it regularly for instruction. Although, researchers like Schoonenboom (2014) have explored the cause of low LMS use among faculty and found low use is due to low task importance or low task performance. Results from my study disfirm this account because dental hygiene faculty perceive a LMS to be valuable in the teaching and learning process. If dental hygiene faculty did not frequently perform specific tasks in Blackboard, their perceptions of the technology may have been negative as well. Because dental hygiene faculty perceive the use of Blackboard to be valuable, they therefore have accepted the technology and see it as an important part of the teaching and learning process.

Perception of Technology Usefulness

The key findings related to RQ2 were that dental hygiene faculty perceptions about the usefulness of educational technologies for instruction are positive and that educational technology has had an influence on their teaching abilities. Dental hygiene faculty indicated that educational technology improved learning performance for students and enhanced instructor effectiveness. Similarly, other researchers like Njoku (2015) found integrating technology useful to increase the quality of teaching and learning. This was corroborated by Salloum et al. (2019), who found that quality of information, enjoyment of technology, and accessibility have positive influences on PU of a technology and the ability to enhance faculty effectiveness. Therefore, the findings from

my study confirm previous research that technology could make it easier to communicate with and share information with students, which therefore makes it easier to teach. In looking at the association between PU and PEU, technologies that allow faculty-to-student communication are easy to use and, therefore, contribute to increased performance. The results of my study confirm that educational technologies that are easy to use have the potential to help dental hygiene faculty accomplish more while exerting the same amount of effort.

Participants' indicated that PU of technology was a value not only in their own performance but also in supporting student learning experiences. For example, Davis (1989) explained PU as the belief of a user that a particular technology will help improve job performance and therefore provide benefit or value. This was corroborated by Lawrence and Tar (2018), who identified factors that may increase faculty decisions to adopt and integrate technology into instruction to support student learning outcomes. Similarly, several prior studies have confirmed that technology can play a role in student skills, motivation, and knowledge (Blau, Shamir-Inbal, & Avdiel, 2020; Gu, Zhang, & Gu, 2020; Lawrence & Tar, 2018; Sofkova Hashemi & Cederlund, 2017). Participants in my study confirmed previous research in that faculty perceive technology as useful because they feel it helps students learn material and were helpful in engaging students with course content. For example, Drossel, Eickelmann, and Gerick (2017) found that teachers' perceptions of whether the use of technology in class improves student learning outcomes and motivation were predicted by the teacher's use of the technology. The results from my study confirm previous research; participants described how they

perceive the use of technology as useful for students to learn material and helpful in engaging the students as they are interested in technology. Participants also felt assessment and evaluation were easier and technology improved their productivity and performance. Faculty felt that technology helps them to be more efficient with daily tasks. In this study, dental hygiene faculty explained how useful it is to demonstrate the use of clinical technologies to students in the classroom. This is further supported in the literature by Tripathi, Chaturvedi, and Tripathi (2017) who tested the effect of intrinsic motivation on academic performance of educators. Results suggest that intrinsic motivations, such as personal value (commitment), achievement motivation, personal vision, optimism, self-efficacy, and creativity, impact educators' perceptions of performance. The results from my study confirm previous research in that dental hygiene faculty relate students' meeting their educational goals as a benefit or value, which in turn improves their perception of job performance.

Perception of Ease of Use

The key findings for RQ3 were that dental hygiene faculty perceived that educational technology was easier to use after repetition and practice, but they would appreciate more formal training as some technology is easier to use than others. Dental hygiene faculty felt it was easier to use educational technologies after practicing in the classroom with students many times. For example, Foulger, Wetzel, and Buss (2019) found that educators' attitudes, efficacy, and intention to teach with technology increased after they practiced doing so in the classroom with actual students. The results from my study confirm previous research because educators feel more comfortable implementing

and using technology after they have had practice using the technology in the classroom. Participants in my study also want to integrate technology into their teaching practices but would like adequate training. In current literature, professional development to promote positive teacher attitudes toward integration of technology was found to be a critical component to effective teaching (Czerniawski, Guberman, & MacPhail, 2017; MacPhail et al., 2019; Owens, 2017; Roberts, 2018). The results from my study confirm previous research that training is essential. Participants in my study felt that to improve ease of use and knowledge of how to use educational technologies would require formal training where faculty are able to practice their technology skills to help build confidence.

The role of training is an important element that stands out in the TAM literature as well (Rienties et al., 2016). For example, Alzubi et al. (2018) suggested that the actual usage of a technology by an individual is affected by their behavioral intentions, including ATU, PU, and PEU. The easier a technology is to use, the stronger an individual can feel in their skill using the technology (Alzubi et al., 2018). If the technology is not easy to use or is considered complex, the individual will not use the technology and will require training to effectively use the technology. For example, Iyer, Aziz, and Ojcius (2020) suggest that dental hygiene faculty who teach traditional entry-level courses may be asked to use technology, such as LMS, MOOCs, or other educational technologies to allow students to restart dental hygiene programs after extended closures that may have occurred due to the COVID-19 pandemic. If faculty perceive LMS, MOOCs, and other technologies as easy to use, they are more likely to feel comfortable using the technology. If faculty perceive these technologies as difficult

to use, they are likely to need training to be skillful at using the technology. Similarly, other researchers like Brame et al. (2017) suggested that some faculty are even asked to move or develop their course materials into an online format without previous training on the differences between the two teaching models (Brame et al., 2017). Thus, the problem that often arises is that dental hygiene faculty members lack adequate professional development, training, and awareness of best practices. The results from my study confirm previous research as professional development is a vital component to understanding the use of technology and having the ability to effectively integrate technology into the teaching and learning process.

Limitations of the Study

The limitations of this research study are influences that I cannot control, including the limited number of dental hygiene faculty available for interviews, the time constraint of collecting data, and the interview questions that I created as the researcher. Due to the nature of the data (interviews with only dental hygiene faculty members), a limitation of the study consists of only including participants from one academic institution rather than multiple, and not having participants from differing departments in the college of health professions (i.e., nursing, public health sciences, physician assistants, etc.). Including participants from additional academic institutions or from differing departments in the college of health professions might have provided additional information about their perceptions or experiences with attitude toward use, usefulness, and ease of use of educational technologies for instruction. Without access to such

perceptions, it is unclear how other healthcare providers' data could have provided additional insight to making the study results more transferable to a wider audience.

Researcher bias is another possible limitation of this study. I have 8 years of teaching experience as a dental hygiene educator in higher education. My current teaching appointment is 100% online; I am the assistant director of an online dental hygiene degree-completion program. All dental hygiene faculty recruited for this study had academic appointments in an entry-level program, not a degree-completion program (licensed hygienists seeking a bachelor's degree) located in the Midwest. To address challenges and bias in the study, I used a reflective journal to manage any personal biases and remain transparent. I also used member checking as a form of triangulation (Devault, 2018). Triangulation was achieved by asking the same research questions to each participant and by asking participants to review transcripts of their interview to ensure accuracy. I guarded against bias and judgment by remaining intentional and focused on the purpose of the study and the research questions during the stages of data collection, transcription, and analysis. I also used the conceptual framework to guide the design of the interview protocol and coding during data analysis.

While the research questions might have limited the study, to improve clarity and quality of the research questions, I reviewed the research questions with my methodologist several times. However, I may have failed to ask relevant questions, which could have limited the findings of my study. I attempted to ensure that the study participants understood the research and interview questions by asking clarifying questions at times; however, some questions might have been misunderstood or

misinterpreted. Furthermore, the study participants might not have disclosed information because they could not recall experiences or were reluctant to disclose because they felt uncomfortable. However, study participants responded to all the research questions and demonstrated little to no hesitation in answering any of the questions.

Recommendations

The following recommendations for further research emerged from analysis from technology use in healthcare professions, accounts from literature in the dental hygiene field, and the findings from the current study that extended the research knowledge:

Future research could consider using both quantitative and mixed-method approaches to investigate the experiences of dental hygiene faculty and their uses of educational technology for instruction. Combining quantitative and qualitative data could reveal an alternative view of the current findings, resulting in an alternative view point to the current findings.

Because this study was limited by the setting to just one academic institution, it is recommended to locate future studies through a wider context of similar settings such as including dental hygiene educators from additional academic institutions. This could allow for replication while providing deeper insights and understanding to add to the body of knowledge by identifying additional categories which were not identified from this study.

It could be beneficial for future research to include participants from differing departments in the college of health professions at Midwestern Universities (i.e., nursing, public health sciences, physician assistants, etc.) with a broader range of experiences.

This could provide more educators that teach in the healthcare field to offer their experiences and perceptions of technology use for instruction. Conducting future research through a wider range of participants could improve this study's quality and value, contributing to a deeper understanding of educational technology and the influence technology has on the teaching and learning process.

Future research could also examine current and emerging technologies beyond just perceptions of use to determine specific technologies that could enhance the health of the community and influence the current teaching and learning process. Participants of this study were open to using advanced technologies, so expanding future research through technology could provide further insight, making findings even more useful and potentially enriching. In the world of COVID-19, teledentistry could be extremely helpful to the field of dentistry and dental hygiene. Expanding research to include this type of advanced technology could greatly benefit the dental field and improve the health of the community.

Implications

This study may contribute to positive social change in several ways. First, my study uncovered six themes and fourteen categories through the perspective of dental hygiene educators that ultimately identified factors influencing their attitudes toward use, usefulness, and ease of use of educational technologies for instruction. The inclusion of a select group of experienced dental hygiene educators was significant in that it offered an enriched description for deeper understanding about the topic, and also provided insight to better prepare dental hygiene educators on preparedness for educational technology

implementation. While this study expanded on the literature base in the dental hygiene field, it also confirmed previous research related to higher education and the healthcare field. Because dental hygiene educators are viewed as significant predictors of student achievement (Leiken, 2017), my study may support and provide support for dental hygiene educators in how to better prepare for using educational technologies for instructional purposes.

The second contribution my study may make is in relation to improved professional practice because by better understanding the perceptions of dental hygiene educators and their use or lack of use of educational technologies for instruction, institutions might better be able to develop technology support that meets the needs of these faculty. Furthermore, knowing faculty attitudes toward technology use, provides understanding of how to further improve dental hygiene educators' self-efficacy related to the use of educational technologies. My study was also significant and had implications for practice because it confirmed the importance how faculty view professional development or training sessions to further train dental hygiene faculty on the use of educational technologies so they are prepared to use technology to transform practice and improve student learning.

The last contribution and implications of this study is that it may provide directors of dental hygiene programs, faculty, and other key stakeholders with a deeper understanding of the perception of dental hygiene faculty regarding the implementation of technology. While this can help better prepare faculty to use technology for teaching and learning, it can also promote and enhance student-learning experiences. Results of

my study may be used as a guide in helping stakeholders understand the perceptions of dental hygiene faculty and to accept and integrate technology into the teaching and learning process.

Conclusion

The problem addressed in this study was the lack of research on the use of educational technologies for instructional practices among dental hygiene faculty and their perceptions regarding attitude toward use, usefulness, and ease of use of those technologies. Faculty lack of use and possibly hesitancy to implement technologies is a relevant concern because students expect higher education to reflect the information accessibilities and immediacy of their connected lives (Johnson et al., 2016; Rienties et al., 2016; Teo & Mingming, 2017). Technology has become integral to students' educational experiences, so it is imperative that students and educators engage and utilize technologies as part of teaching and learning (Goodchild, 2018). Dental hygiene education programs that offer bachelor's degrees are often located at universities and offered through a group of schools referred to as a college of health professions, which can offer a variety of healthcare-related programs, such as nursing, physician assistant, physical therapy, speech pathology, medical laboratory sciences, public health sciences, communication sciences disorders, and dental hygiene. Many educators teaching in these programs began their careers as clinicians and have emerged as experts clinically; however, they often have not been formally trained to be educators and have received little guidance or formal preparation for teaching in higher education (Brownstein et al., 2015; Chen et al., 2017; Walling, 2018). As a result, educators in health professions

require training from academic institutions to excel in the classroom (Uğur & Turan, 2018). Because of this lack in teacher training, faculty are hesitant to implement new technologies and often attribute information technology incompetence, organizational climate, resistance to change, lack of institutional support, lack of financial support, and lack of time as reasons for not using educational technologies (Rizvi et al., 2017). As technology constantly emerges and technology use among dental hygiene students increases, so does the need to develop new teaching approaches and methods. It was important to explore the use of educational technologies for instructional practices among dental hygiene faculty and their perceptions regarding their attitudes toward use, usefulness, and ease of use of those technologies.

The purpose of this study was to explore the perceptions of dental hygiene faculty members regarding their attitudes toward use, usefulness, and ease of use of educational technologies for instruction. Understanding faculty perceptions can aid in the appropriate use of technology among dental hygiene faculty members and can support faculty as they enhance student-learning experiences with educational technologies. To fulfill this purpose, I used the TAM as the foundation to explore dental hygiene faculty perceptions about technology use, usefulness, and ease of use. Key findings for the study were that faculty (a) had positive attitudes toward the use of technology, (b) perceived technology as useful for instruction to improve student learning and their own effectiveness, and (c) perceived technology easy to use after practice or training. Results show an inference that these study participants are willing to explore new ways of working and ways of enhancing their instructional practices. The overall positive responses suggest that

innovation as an aspect of technology use in an academic context is the motivating factor for faculty members to experiment with and use technology. In addition, professional development and training sessions that allow faculty to learn to use technologies are paramount for technology to be implemented. If faculty find that educational technologies are affective to their instructional efforts, valuable in creating enhanced learning experiences for students, and convenient, they will in turn find it more useful, easy to use, and their intent to use will be positively affected. By understanding dental hygiene faculty's attitudes toward use, PU, and PEU of educational technologies, directors of dental hygiene programs will be better able to support faculty in using technologies by providing the assistance and training needed to ensure strong implementation. The results of this study help to understand why dental hygiene faculty are hesitant to implement educational technologies despite the rise in the ubiquitousness of technology in everyday life. It may also address the gap in the literature by establishing a starting point in the scientific literature.

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Appendix: Interview Guide

In-Depth Interview Introduction

Hi _____, thank you so much for participating in my study. I am looking forward to learning about how you use educational technologies in the classroom. As we get started, I would like to review the parameters for your participation. You provided consent to participate in this study by clicking on the email invitation and selecting, "Yes, I consent" in Qualtrics. By agreeing to participate, you are agreeing to partake in a one-time individual interview; and, if needed, a follow-up email conversation. This study is voluntary. There are no significant risks or direct benefits to being in the study. However, your participation will contribute to the body of knowledge regarding why dental hygiene faculty are hesitant to implement educational technologies despite the rise in the ubiquitousness of technology in everyday life.

As I mentioned in the consent, I will be recording our conversation just so I don't miss anything. I may also take a few notes. In a few days, I will email you a transcription so you can make sure I got everything right.

Do you have any questions for me before we begin?

Individual Interview Questions

Warm-Up/Beginning

- So how long have you been teaching?
- How much of this has been in dental hygiene education?
- Are you teaching or an instructor of any courses this summer session?

- Do you teach any other courses in the entry-level program during the fall or spring semesters?

  4a. What courses do you teach?

- Would you consider yourself to be technology savvy?

  5a. That's interesting… why do you think that?

- Do you use technology in your personal life?

  6a. What technologies do you use?

Middle

Interesting… okay. Now we are going to discuss a specific kind of technology, educational technologies, and the types that you use when teaching. Just so we are starting at the same point, educational technology can include anything from computers, laptops, word processing programs, presentation software, searching on the Web, tablets, student response systems (like clickers), white boards, or even dental specific technologies (digital radiographs, intra-oral cameras, dentrix), or any other type of technology that you use for teaching.

Attitude Toward Use (*Don't say this)*

Okay… let's go ahead and discuss the types of educational technologies that you use while at work in the classroom…

- Question #1: Can you share with me the educational technology tools that you use in the classroom for instruction?
  - Follow up #1a: Why did you begin using those technologies?

- Questions #2: Can you describe what the integration process has been like for you?
    - Follow up #2a: How do you feel about the use of those technologies now that you've incorporated them?
    - Follow up #2b: Are there any technologies you wish you could use that you don't?

Perceived Usefulness

Question #3: Can you talk a little bit about the usefulness of the ed. tech. tools that you use for instruction?

-Follow up #3a: In the years that you've been teaching, how do you think your use of available technologies has changed as you've taught and worked with students?

-Follow up #3b: What types of influence have ed. tech. tools had on your teaching?

-Follow up #3c: Can you describe an example?

- Question #4: Tell me a few ways that educational technologies have made your job easier?
    - Follow up #4a: What went well?
- Question #5: Have they influenced your job performance or productivity? In a positive way? Negative way? Can you explain this more?

Perceived Ease of Use

- Question #6: Can you talk about your experience with the ease of use of the educational technologies you have integrated into your instructional practices?

- Question #7: When we first started talking, you detailed quite a few ed. tech. tools that you use in the classroom. Of those, which do you find to be easy to use?

  -Follow up question #7a: What did it take to get you to the point of seeing these tools as easy to use?

  -Follow up question #7b: Can you describe how learning to use these tools has made it easier to learn to use other tools?

Question #8: If the most advanced ed tech tools were available for you to teach with, what tools would you choose?

- Follow up question #8a: What are some of your reasons for liking these tools?
- Follow up question #8b: Which parts of these tools are easy to use?
- Follow up question #8c: What parts are hard to use?
- Follow up question #8d: What have you done to learn how to use these tools? Can you discuss a specific situation or an example?

End

- [Ask any follow-up questions that may be needed for clarification or].
- Is there anything else you'd like to add about using ed. tech. in your teaching that I did not ask?

Closing

Thank you so much for taking the time to chat with me, I know you're super busy. Within the next 2 weeks, I will be emailing you to ask that you review the transcript of this interview for accuracy purposes. The follow-up email may also include a few clarification questions.

I appreciate you and want to again thank you for participating in my study and sharing your experiences with me.