FACULTY CONCERNS DURING A CURRICULUM CHANGE IN A SCHOOL OF MEDICINE

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Use of the Concerns Based Adoption Model (CBAM) in Health Professions Education

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Use of the Concerns Based Adoption Model (CBAM) in Health Professions Education

The only thing constant in design, implementation, and evaluation medical curricula is change. The rate at which medical curricula changes has been accelerating over the last several decades and recent calls for reform mean that further changes are on the horizon.

Medical education is not the only aspect of society that is prone to constant change. There is a rich body of literature on how change occurs within organizations generally, and educational institutions specifically. This paper briefly reviews the change literature, focusing in on a particular model of change, the concerns-based adoptions model. The use of this model in K-12 education, higher education, and the health professions specifically is reviewed.

In tandem with this review, a brief overview of the history of medical education curricular reform will be given. From this perspective, it will become clear why the concerns-based adoptions model has a role in the future of medical education reform.

History of Medical Education

"Medical education seems to be in a perpetual state of unrest" (Cooke, Irby, Sullivan, & Ludmerer, 2006). Although this quote is relatively recent, it echoes the sentiment that has been repeated over the last century. Prior to the beginning of the twentieth century, undergraduate medical education was largely an unregulated apprenticeship model. The Flexner report, published in 1910, changed all of that and medical education has been in a state of near-constant change since (Flexner, 1910).

Early 1900s

In 1910, Abraham Flexner, at the request of the Carnegie Foundation for the Advancement of Teaching published his assessments of all medical schools in operation in the United States and Canada (Flexner, 1910). Prior to this report, the public had little insight into

the workings of American medical education. Further, the publication of Flexner's report led to standardization of medical curriculum, new licensure and accreditation standards, and a paradigm shift in the way doctors were educated (Cooke et al., 2006).

Although the Flexner report is largely credited with these changes in medical education, Flexner's work came at the end rather than the beginning of the revolution in medical education (Barzansky, 2010; Ludmerer, 2010). Indeed, in the decade between the turn-of-the-century and the publication of Flexner's report, 70 medical schools either closed or merged and 50 new schools were founded (JAMA 1910). Additionally, there was a flurry of regulatory activity surrounding the turn of the century. The American Association of Medical Colleges (AAMC) was founded in 1890 by 66 member medical schools in an effort to raise standards of medical education (Darley, 1965). The American Medical Association (AMA), founded in 1847, developed its Council on Medical Education in 1904. One year later, the Council had already articulated its "ideal standard" for medical education - a model that came to be known as the "2+2" curriculum (American Medical Association, 1905).

Outcomes of reform. The vast majority of medical schools adopted a "2+2" curricular model. In this model, the curriculum is composed of two separate segments: the basic sciences and the clinical fields. Basic science training typically took place in the first two years of the Undergraduate Medical Education Curriculum (UME) followed by two years of clinical training. Unlike other professions, medicine was taught almost exclusively in the first two years (a.k.a. the pre-clinical phase) by instructors who were not members of the profession but rather held terminal degrees in one of the basic sciences. This curriculum meets Flexner's recommendation for a more scientific basis to medical education, however it creates a divide between the basic

sciences and clinical medicine. Indeed by 1925 Flexner himself said that: “scientific medicine in America… sadly deficient in cultural and philosophic background” (Flexner, 1925).

The rallying cry of the reform efforts of the early twentieth century was for greater educational rigor in medical education. According to Flexner, this could be achieved by increasing admissions standards to medical schools, assuring the best medical schools were affiliated with universities to promote an academic orientation rather than an apprenticeship orientation. Flexner also called for greater emphasis in the basic sciences including required laboratory work by all students and a full time teaching faculty (Flexner, 1910). In the decades following Flexner’s report, the vast majority of medical schools adopted more stringent admissions criteria and strengthened their associations with universities (Barzansky & Gevitz, 1992; Rothstein, 1987). By 1920 the basic structures for standardization and oversight of medical education were firmly in place (Irby, Cooke, & O'Brien, 2010). Even today, with the increase in community-based medical education programs, such programs generally follow Flexner’s recommendation and seek strong University alliances (Curry & Montgomery, 2010).

Flexner. While Flexner was not single-handedly responsible for these reforms, his report is not without significance. Unlike other medical educators of his day, Flexner related his discussion of medical education to the broader subject of public education and he frequently cited Dewey as his “ultimate authority” (Ludmerer, 1996). He viewed medical schools as institutions that needed to serve the public interest and therefore needed to be well funded. What Flexner argued against was the educational system without accountability or regulation (Miller, Moore, Stead, & Balser, 2010).

Finally, the 1910 Flexner report was not his final word on the subject of medical education, nor was it intended to be. On page 143 of his report, Flexner states that his report: “Deals only

with the present and near future, a generation, at most. In the course of the next 30 years needs will develop of which we here take. As we cannot foretell them, we shall not endeavor to meet them." (Flexner, 1910). Flexner went on to be a champion for medical education in the United States, later writing an international comparison of medical education systems published in 1925 (Flexner, 1925).

Mid 1900's.

Medical education reached equilibrium in the early parts of the twentieth century. Medical schools were uniformly affiliated with universities, admissions criteria were consistent between programs and licensure regulations were in place (Rothstein, 1987). With the coming of the Second World War, medical education began to change in response to the social, economic and scientific pressures of the time.

Social changes. In the years following World War II, there was a rapid increase in the amount of medical knowledge, which resulted in specialization of clinicians (Baughman, 1958; Kendell & Reader, 1988; Rothstein, 1987). As a result, medical educators and a number of schools became concerned about the overly technical nature of medical education. It was during this era that both the public and medical schools began to experiment with what was called "comprehensive medicine." Specifically, medical educators wanted to create programs to teach "comprehensive medicine" - an innovation that found support with the Commonwealth fund (Barr, 1946; Harvey & Abrams, 1986). Beginning in 1951 the Comprehensive Care and Teaching Program (Kendall & Reader, 1988) provided students with the opportunity to provide continuity of care across a variety of settings during their fourth year of training. The Commonwealth Fund provided financial support to this unique program until 1960.

Concurrent with this experiment in comprehensive medicine, a new curriculum at Western Reserve University was launched. The "2+2" curricular model had been almost uniformly applied until the Western's integrated curriculum (Bloom, 1988). Underwritten by the Commonwealth Fund, this new curriculum of eliminated grades and class ranking in an effort to lessen student anxiety and shift the focus to clinical care. Provisions were made for ample free time during which independent laboratory study could be completed. Unlike the other programs supported by the Commonwealth Fund, the curriculum at Western Reserve University was not an addition to a pre-existing curriculum, but rather and entirely novel curricular structure (Harvey & Abrams, 1986; Lee, 1961; Rothstein, 1987).

With the changes in medical curriculum taking place during this time, and the availability of funding, it should not be surprising then that it was during the period of 1955-1959 that the field of medical education research first appeared (Kuper, Albert, & Hodges, 2010).

Economic changes. One of Flexner's primary recommendations was the creation of a dedicated teaching faculty (Flexner, 1910). In the early part of the twentieth century, the teaching faculty at medical schools cared largely for the elderly and underserved. Their primary duties were to the education of their students and the patients that were seen in teaching hospitals simply couldn't afford other care. In the 1960s, the creation of Medicare and Medicaid programs changed the face of clinical practice at academic medical centers (Ludmerer, 1996; Prislin, Saultz, & Geyman, 2010). These two programs provided clinical revenue to academic health centers providing care for the underserved. Additionally, Medicare and Medicaid provided direct funding for graduate medical education (Ludmerer, 1996). These changes resulted in significant growth of the clinical enterprise at academic health centers (Prislin et al., 2010). This growth of

the clinical enterprise, and the resultant pressure for clinicians to increase revenue, had both positive and negative effects on medical education as will be shown later (Ludmerer, 1996).

Educational changes. Medicine was not the only discipline that was growing during the middle of the twentieth century. Cognitive science, education and learning theory were also making strides forward. Based on this new body of knowledge, McMaster University in Ontario developed its new approach to medical education in the 1960's (Neufeld & Barrows, 1974). This approach held that medical education should focus on the individual student - specifically the student's ability to recognize and find problems and data and to manipulate knowledge rather than the student's ability to accumulate a broad fund of knowledge. Among the goals explicit in this curriculum were the following:

1. To identify and define health problems and to search for information to resolve and manage these problems.
2. Given a health problem, to examine the underlying physical or behavioral mechanisms.
3. To recognize, maintain, and develop personal characteristics and attitudes required for professional life.
4. To develop the clinical skills and learn the methods required to find and manage the health problems of patients.
5. To become self-directed learners, recognizing personal educational needs, selecting appropriate learning resources, and evaluating their own progress.
6. To be able to critically assess professional activity related to patient care, healthcare delivery, and medical research.
7. To be able to function as a productive member of a small group.

8. To be aware of, and be able to work in, a variety of healthcare settings. (Neville & Norman, 2007)

The McMaster curriculum was typical of the shifting focus to individuals and values over science. This change in values was occurring not only in medical education but also in other areas of society. Temporally, it correlates in time to the development of Fuller's model of concerns of teachers in training that will be outlined in later sections.

The Last 30 Years

"Making educational changes in a shifting environment became the rule rather than the exception throughout the 1990s" (Mennin & Krackov, 1998). This sentiment has been expressed for every decade of the last 30 years. Looking back, this most recent round of reform can be thought of as beginning in 1981, when the AAMC formed the panel on general professional education. This panel published its first report in 1984 where they called for:

"Medical faculties should emphasize the acquisition and development of skills, values, and attitudes by students at least to the same extent that they do their acquisition of knowledge." (Association of American Medical Colleges, 1984).

This represents the first time a major regulatory body formally expressed concerns with anything other than the body of knowledge to be taught (Kendall & Reader, 1988). This trend has continued. Marking the 100th anniversary of the Flexner Report, the Carnegie Foundation for the Advancement of Teaching once again turned its focus to medical education (Irby et al., 2010). The authors of this new report found medical education at the turn-of-the-century to be lacking. Their recommendations include standardization of learning outcome in order to individualize the learning process (Cooke, Irby, O'Brien, & Shulman, 2010). Additionally, they

recommend a greater focus on the progressive formation of professional identity as well as the development of habits of inquiry (Cooke et al., 2010; Irby et al., 2010).

Recently, the scope of innovation has been accelerated in medical education in North America. Irby and Wilkerson (2003) identified several trends that are currently changing the face of medical education. These are described in the following sections.

Integration. Irby and Wilkerson (2003) noted that there is a growing need for greater integration in medical education. Both basic science research and health care practice have become increasingly multidisciplinary (Irby & Wilkerson, 2003). The dominance of the 2+2 curricular model has led one author to write " the unintended consequence of medical education in the university setting has been a potentially harmful imbalance, bordering on schism, between the formal–analytical parts of the curriculum, especially the basic sciences and research, and the learning of clinical practice" (Sullivan, 2010). The close association of medical schools with Universities, a recommendation of Flexner, could be seen as causing this divide. Historically, universities have divided education into departments. Such departmentalization leads to not only political division but also a lack of integration of academic content (Baughman, 1958).

The American Association of Medical Colleges (AAMC) in their report on General Professional Education (GPE) wrote that the classical curriculum had the "undesirable effect of artificially separating the basic and clinical sciences" (AAMC, 1984). In 1991, the Robert Wood Johnson Foundation (RJWF) set out to encourage change in the ways that medical schools taught under a program titled "Preparing Physicians for the Future." Eight schools were funded under this program whose stated goals included "to encourage early clinical exposure and vertical integration" (RWJF, 2002; Mennin & Krackov, 1998).

More recently the Liaison Committee on Medical Education (LCME) has joined in the call for more integration. The LCME is the organizational body that reviews and accredits all medical schools in the United States and Canada. Annually, the LCME publishes their *Standards for Accreditation of Medical Education Programs Leading to the M.D. Degree*, the introduction of which reads: "To achieve and maintain accreditation, medical education programs leading to the M.D. degree in the U.S. must meet the standards and elements contained in this document" (Liaison Committee on Medical Education, 2016). The standards contained within this document carry significant weight with medical school administrators as failure to comply with these standards can lead to a program being placed on probation.

In the most recent edition of the LCME standards, Standard 8.1 reads: "A medical school has in place an institutional body that oversees the medical education program as a whole and has responsibility for the overall design, management, integration, evaluation, and enhancement of a coherent and coordinated medical curriculum." (Liaison Committee on Medical Education, 2016). This standard maps to an earlier standard which stated: "Evidence of coherence and coordination includes: content that is coordinated and integrated within and across the academic periods of study (horizontal and vertical integration)." (Liaison Committee on Medical Education, 2007). Thus the accrediting body for schools of medicine has mandated that the curriculum be integrated in specific ways.

Finally, changes in licensure requirements graduates must meet have led to reexamination of the role of basic and clinical science integration in the curriculum. The three-step United States Medical Licensure Examination (USMLE) was initially implemented in 1992. In 2004 the Composite Committee that governs the USMLE began a review of the design, structure and format of the exam in light of changes in the academic, regulatory and practice environments that

had taken place since 1992 (Scoles, 2008). The recommendations from this review are still being discussed and changes to the exam itself are not yet final but key concepts have emerged from the initial report. Generally it has been recommended that: "assessment of fundamental science principles should be undertake in a clinically relevant context" (Scoles, 2008).

Active learning. The second trend influencing medical education is research into education itself (Irby & Wilkerson, 2003). New research into learning suggests that there is a need for learning environments that are active, learner-centered and knowledge-rich. These trends have led to recommendations by the LCME as well as a rise in such teaching active methods as TBL and PBL.

But what is active learning? A brief review of the literature reveals that while numerous active learning taxonomies exist, each includes the interrelated components of intentional engagement, purposeful observing, and critical reflection (Graffam, 2007). Active learning is grounded in constructivist and social constructivism theories. That is, learners interact more with the subject matter to construct and "own" knowledge. They are not empty vessels into whom faculty pour knowledge (Dori & Belcher, 2004). Active learning activities promote thoughtful engagement, encourage analytical thinking and reasoning, foster the integration and application of knowledge, and are designed around well-defined learning objectives (Fink, 2003; Vernon & Blake, 1993). Students engage in solving problems, sharing ideas, giving feedback, and teaching one another. Active learning requires faculty who facilitate and emphasize the development of students' skills (Fink, 2003). Active learning requires collaboration in both teaching (e.g., working teams of instructors, instructional designers, educational technology professionals, etc.) and learning (e.g., small groups). Active learning incorporates assessment as part of curriculum and instruction to ensure coherence and consistency.

There are many benefits attributable to the use of active learning techniques. Research has found that active learning can enhance academic achievement, promote retention and application of knowledge, enhance understanding and mastery of course content, improve critical thinking and problem solving, improve clinical competencies, enhance interpersonal skills, promote teamwork, increase student engagement, promote positive student attitudes, increase course satisfaction, and encourage self-directed lifelong learning (Cortright, Collins & DiCarlo, 2005; Dori & Belcher, 2004; Ernst & Colthorpe, 2007; Fink, 2003; Michael, 2006; Prince, 2004).

The LCME requirement for increases active learning methodologies has been directly linked to the need for physicians to be lifelong learners (Mayhew, Wolniak, & Pascarella, 2008). Medical Education is not alone in the need to address issues of life-long learning. The Association of American Colleges and Universities (2002) charged all institutions with providing educational environments that: "foster a well-grounded intellectual resilience, a disposition toward life-long learning, and an acceptance of responsibility for the ethical consequences of our ideas and actions." Even with such a sweeping charge, life-long learning defies easy definition and lends itself to a plethora of conceptualizations (Abukari, 2005). This has not stopped authors from drawing conclusions about its necessity, including Alexander et. al. (2004) who concluded: "Clearly self-directed and life-long learning are vital elements in the process of building a global healthcare service for all citizens" (Alexander, Kernohan, & McCullagh, 2004).

Despite these definitional difficulties, many researchers have conducted work on life-long learning using a variety of scales and constructs. Perhaps the best studied of these is the Need for Cognition (NCS) Scale (Cacioppo & Petty, 1982; Cacioppo, Petty & Kao, 1984). This group defines the need for cognition as "an individual's tendency to engage in and enjoy effortful cognitive endeavors." The NCS has been validated in both short and long forms and a

recent literature review (Cacioppo, Petty, Feinstein, & Jarvis, 1996) found over 100 studies that have used the instrument. Like the NCS, the Individual Development and Educational Assessment (IDEA) is a self-assessment completed by students (Cashin, 1995). Unlike the NCS, IDEA does not focus on the student as an individual without context but rather, is incorporated as part of a student evaluation to determine student learning and development as a learner. This bias toward student self-assessment is prevalent in the life-long learning literature (Crick, Broadfoot & Claxton, 2004; Huynh et.al, 2009; Wielkiewicz, Prom & Loos, 2005) with a brief review of the literature turning up only one study that attempted to triangulate student self-assessment with faculty assessment (Jiusto & DiBiaso, 2006).

Despite these limitations, a few basic themes recur in the literature on life-long learning. Life-long learners are described as being self-directed learners (Alexander, 2004; Jiusto, 2006) who are "goal oriented"(Alexander, 2004), enjoy learning (Mayhew, 2008), making meaning and demonstrate both creativity (Crick, 2004) and motivation (Mccombs, 1991).

Competency focus. The third trend is the public call for increased accountability from both higher education and health care. Recent shifts have resulted in changes in recertification examinations in medicine. Competency-based education is one outcome of this trend (Irby, 2003). CanMEDS was one of the first competency-based frameworks to be introduced in the mid-1990's (Bandiera, Sherbino, & Frank, 2006; (Holmboe et al., 2011). Work since that time has focused largely on the movement to more competency based medical training at all levels. (American Association of Medical Colleges, 2009).

While the concept of a competency based curriculum first arose during the 1970's (Carraccio, Wolfsthal, Englander, Ferentz, & Martin, 2002), finding valid and reliable ways to assess competence remains elusive (Cunnington, Hanna, Turnhbull, Kaigas, & Norman, 1997;

Davis & Harden, 2003). Calls for competency-based curricula have challenged medical educators to develop new forms of assessment (Sousa, Wagner, Henry, & Mavis, 2011). There is increased emphasis on formative evaluation, OSCEs, uniform clerkship evaluations, portfolios and the use of simulation in order to demonstrate competency across a variety of domains (Albanese, Mejicano, & Gruppen, 2008; Bramson, Sadoski, Sanders, van Walsum, & Wiprud, 2007; Dannefer & Henson, 2007). Assessment data collected from these methods can be used as an evaluation tool to direct curricular improvement (Sousa et al., 2011).

Faculty development. The final trend is the rise of managed care and the need to recapture the educational mission (Irby & Wilkerson, 2003). As mentioned before, Medicare and Medicaid brought the prospect of clinical revenue to Academic Health Centers (AHC). Since that time, clinical faculty have been under increasing pressure to boost their own clinical productivity leading some to speculate that there is an erosion of the learning environment in academic health centers (Ludmerer, 1999).

Historically, federal funding has heavily supported medical education. Over the last 30 years, the reliance on clinical revenue, compared to federal underwriting, has increased dramatically. Prior to Medicare, federal monies comprised 54% of the operating budgets of AHCs. By the turn of the century, federal money accounted for only 20%, with 58% of the support derived from clinical practice (Eisenburg, 1999). This increasing reliance on clinical revenue has contributed to the current state of medical education.

Academic Health Centers are not in a good position to compete in today's health-care market. The cost of care is higher in an AHC than in a hospital where no teaching occurs, because faculty time is consumed not only with patient care but also with teaching and research. Additionally, more than twice as much uncompensated care is provided at AHCs than at other

hospitals. These facts, taken in light of health-care finance changes of the last decades, have led many AHCs to the point of financial hardship.

Recently, there have been significant changes in the economics of medicine. Medicare reforms—including a reduction in the fees Medicare pays to AHCs, the increase in managed-care contracts, and decreased funding for research—have had a significant impact on medical education. A Medicare ruling put into effect in 1996 negatively impacted the time that teaching physicians have to teach, and their availability to students. This ruling provides that Medicare cannot reimburse resident services when it is provided as part of training. Further, Medicare reimbursement will be allowed only if the teaching physician is present for any service or procedure (AAMC, 2000). As most third-party payers follow Medicare's rulings on reimbursement, these apply to all patients seen, not just Medicare patients. Thus, not only are Medicare payments and reimbursement decreased for the support of residents, but also service provided by residents generates no revenue for the AHC. Teaching physicians must now have a greater physical presence in direct patient care than previously, leaving them with less time than ever to engage in educational activities other than bedside teaching.

Managed care has also had an adverse impact on medical education, both in terms of financing and the quality of teaching that can occur. Because managed care does not reimburse on a fee-for-service schedule, but rather a negotiated per-patient amount, hospitals attempt to discharge patients as quickly as possible. Any activity that detracts from clinical work (e.g., teaching or research) costs considerably more than it did under the fee-for-service plans. With patients spending less time in a hospital or clinic, the student has less time to observe, interview, or examine the patient, and the teaching physician has less time to conduct bedside teaching.

Another factor that has had an impact on the economics of medical education is the decrease in research funding. On a national level, funding for medical research by the National Institutes of Health has decreased considerably since 1970 such that, by 1990, nearly two-thirds of all applications from medical schools remained unfunded (Andreoli, 1999). While medical school faculty numbers also have increased over that time, this alone does not account for the shortage of research funds, as the growth has been predominantly in clinical areas. For example, in 1960, the ratio of clinical-to-basic-science faculty was 1.8:1, whereas more recently the ratio has grown to 5.5:1 (Andreoli, 1999). This further supports the reliance of the AHC on clinical revenues and decreases the teaching support available for the preclinical curriculum.

Faculty development has been proposed as one way to mitigate the pressures to generate clinical revenue and re-invigorate the educational mission of the academic health center (Irby & Wilkerson, 2003). Despite the proven efficacy of faculty development programs to improve the quality of teaching, a recent review found that less than 40% of teaching hospitals had ongoing faculty development programs. Of those that did, less than half of the faculty participated (Cole et al., 2004). Faculty development will be discussed in greater detail in a later section.

Change

"Change" is not a single unified theory but rather a broad collection of theories (Ensminger, Surry, Porter, & Wright, 2004). These theories have several unifying themes.

Models of Change

A recent review identified eight models of change (The Evidence-Based Intervention Work Group, 2005). These are:

1. Social Influence Theory
2. Concerns-Based Adoptions Model

3. Theory of Reasoned Action
4. Rogers' Innovation-Diffusion Theory
5. Generalization Theory
6. Transtheoretical Model of Change
7. Functional Assessment
8. Organizational Analytic Model

Generally speaking, all of these models fall into one of three categories of investigation about change (Holloway, 1978). These three broad categories are:

1. Characteristics of the adopters
2. Characteristics of the innovation
3. Characteristics of the change process itself

In the sections following, two of the models of change will be discussed in further detail including a discussion of how they fit into these categories of investigation.

Diffusion of Innovation

Perhaps the most frequently cited expert in the field of change is Everett Rogers (1995). His seminal work on the field change describes the process as it relates to change agents, adopters, and the innovation itself. The three most commonly referenced ideas from Roger's work are the innovation–decision process, the attributes of the innovation, and the type of adopters. A brief overview of Roger's work is presented.

Rogers defined "diffusion" as the process by which an innovation is communicated through channels over time among the members of a social system. He went on to define an "innovation" as an idea, practice or objective that is perceived as new by an individual or other unit of adoption. Thus, the innovation itself, the communication channels, the social system, and

time impact the rate of diffusion of innovation. This model, then, accounts for all three areas of investigation of change - the adopters, the innovation itself and the change process. Each of these is described in greater detail below.

Change is a "delicate process that can be effective and sustainable only if properly facilitated" (The Evidence-Based Intervention Work Group, 2005)

Adoption factors. The traits of the individual or group of doctors also influence the rate of adoption of an innovation. Rogers approaches this problem by defining categories of adopters that have different social and psychological characteristics. These categories of adopters fall into a rough bell curve and are as follows:

1. Innovators (2-3%): the risk takers
2. Early adopters (13 to 14%): opinion leaders
3. Early majority (34%): careful and deliberate
4. Late majority (34%): skeptical
5. Laggards (16%): adopt only out of pressure or necessity

Innovation Factors. All innovations have certain characteristics that will impact their rate of adoption. Rogers identified five attributes of an innovation as follows:

1. Relative advantage: How much better is the innovation?
2. Compatibility: How compatible is the innovation with our current needs?
3. Complexity: How difficult/easy is the innovation to use?
4. Trailability: Can we try the innovation before committing to adoption?
5. Observability: Can we see others using the innovation before adopting it?

These factors together account for between 49 and 87% of the variance in the rate of adoption (Rogers, 1995). The importance of these factors of an innovation in determining the

rate of adoption has been validated in the healthcare provider setting (Fox, Rankin, Costie, Parboosingh, & Smith, 1997).

The attributes of an innovation do not exist in isolation, it is the perception of the individuals involved in the adoption of the innovation that determines the relative weight of these attributes (Moore & Benbasat, 1991; Persichitte, 1999). This examination of potential users' perceptions of the innovation has been called a potential key to the integration of diffusion research (Moore & Benbasat, 1991). Finally, the users' perceptions of and concerns about the innovation are central to the CBAM, which will be discussed later.

Innovation-decision process. The innovation–decision process is a five step sequential process that defines the adoption of an innovation. The five steps, as defined by Rogers, are:

1. Awareness of the innovation
2. Forming either a positive or negative opinion about the innovation
3. Choosing to adopt or reject the innovation
4. Using the innovation
5. Seeking evidence that supports the decision to adopt or reject the innovation

These five steps can be viewed as the stages that an individual passes through while making the decision to adopt an innovation. In the first step, they must acquire *knowledge* of the innovation. Following this, they are *persuaded* (or not) and then make a *decision* about and adoption. This decision leads to *implementation* followed by *evaluation*, which confirms (or not) the decision made in step three.

Concerns Based Adoption Model (CBAM)

In Rogers' model, the focus is largely on the adoption of an innovation. In other words the initial decision to use or not use an innovation. This is, however, only the first step in the

process. Following adoption, an innovation must be implemented. Research by Ely and others has focused on this step of the change process (Ely, 1990; Ensminger et al., 2004).

The concerns-based adoptions model (CBAM) is a model for educational change that describes the process educational institutions must pass through in order to successfully implement an educational innovation (Ensminger & Surry, 2008; Hall & Hord, 1987). The CBAM was first defined in 1974 by a group of researchers at the Southern Educational Development Laboratory (Hall & Hord, 2014). It evolved from the earlier work of Frances Fuller (1969) demonstrating that the perceptions of those involved in innovations are important for the success of the innovation process. The model is unique in that it considers change from the perspective of those directly involved in the implementation of an innovation. Looked at from that perspective, it can be a valuable tool in targeting faculty development efforts.

History of CBAM

In the 1960s, Fuller first proposed a three phase model of concerns expressed by preservice teachers as they move through teacher education programs (Fuller & Case, 1969). In this model, preservice teachers in the early phases of training expressed primarily *self* concerns. That is to say concerns about their own performance and lives. As these concerns resolved, preservice teachers begin to experience *task related* concerns. These concerns relate to the methodology and logistics of their teaching. In the final phase, teachers develop *impact* concerns. This model lead Fuller to later propose that this progression of concerns could service key to developing and sequencing relevant teacher education programs (Fuller, 1969).

Fuller's work led to the development of a reliable and valid 45 item "Stages of Concern Checklist" (Fuller & Case, 1969; Rogan, Borich, & Taylor, 1992). The developmental nature of Fuller's three stage model has been validated in of multiple studies (Buhendwa, 1996; Fuller &

Others, 1974; Rogan et al., 1992) and the model has even been supported by a seven year longitudinal study (Pigge & Marso, 1997).

Two strands of research have grown out of Fuller's work (Conway & Clark, 2003). The first relates to the understanding of the development of pre-service teachers (Pigge & Marso, 1997) while the second concerns the context of innovation adoption (Anderson, 1997). The Concerns Based Adoption Model (CBAM) has grown out of this second line. In the following decade, Hall and his associates applied Fuller's model of pre-service teachers experience concern stages to create the Concerns-Based Adoptions Model or CBAM (Hall & Loucks, 1978; Hall, 1975; Hall, 1976; Hall, Wallace, & Dossett, 1973).

Assumptions

CBAM makes several assumptions about educational change as shown in Table 1 (Hall & Hord, 2014). To begin with, the authors of the model assert that change is a process rather than a single event. This process takes time and can only be achieved in stages. The second assumption is that individuals rather than organizations accomplish change. This means that the individual must be the primary target of any intervention designed to facilitate change. Other change models view the institution as the primary unit of change but the CBAM model posits that the institution cannot change until the individuals within them change. The third assumption of the CBAM model is that change is a highly personal experience. This means that personal concerns and actions may be of more critical importance than the characteristics of the innovation itself. The fourth assumption is that change involves developmental growth of feelings and skills, an assumption that was pivotal in the development of the three tools that comprise the model. This means that the change process is not simply an undifferentiated continuum that relies simply on the passing of time but that the process is developmental in

nature. The fifth and final assumption is that change can be facilitated by interventions directed toward individuals (Hall & Loucks, 1978; Hall & Hord, 2014).

Definitions

For the purpose of the CBAM model, the term "concern" describes anything which causes heightened feeling and thought (Hord, Hall, Stiegelbauer, & Dirksen, 2006) . More specifically, it is "the composite representation of the feelings, preoccupation, thought and consideration given to a particular issue or task" (Hall & George, 1979). Concern and anxiety about a large curriculum change are common among individuals who experience the change. As innovations are adopted and used by the stakeholders, it is expected that an individual's level of concern would diminish and that the nature of those concerns would change. We will track long term our faculty's stage of concern, for both faculty development planning and curriculum evaluation purposes. Although the word "innovation" has a variety of connotations, Hall and Hord (1984) define it simply as a program or process that is new to an individual.

Components of CBAM

There are three validated tools used in CBAM. Together they help guide stakeholders, change agents and participants through the change process, by a process of crating buy-in, self-reflection, and professional development activities. The three diagnostic tools that make up the CBAM are the Stages of Concern (SoC), the Innovation Configuration (IC) and the Levels of Use (LoU) Interview protocol (Hall & Hord, 2014). These are diagnostic tools designed to describe the change process and guide faculty development. Although they were designed to be used together, they may be used either individually or in various combinations (Anderson, 1997). Together they help guide stakeholders, change agents and faculty developers.

Stages of concern. The first tool in the CBAM model is the Stages of Concern (SoC). This was the original focus of the model and has remained a central component of its use (The Evidence-Based Intervention Work Group, 2005). Hall described seven Stages of Concern, numbered 0-6 that span a developmental range (Hall & Hord, 2014). These levels of concern are: awareness, informational, personal, management, consequence, collaboration, refocusing. According to Hall (1976), concerns directly impact an individual's performance. Thus, lower level concerns must be addressed before higher-level concerns can emerge and subsequently be addressed. Huberman and Miles (1984) conducted an analysis of 12 sites with regard to the concerns of teachers during implementation of an innovation and found that the successful innovation usually entails anticipation of concerns and the adoption of measures to reduce concerns.

The SoC relate to the steps of the Innovation-Decision process described by Rogers. In that model, "Awareness" was followed by opinion formation, a process that relies on information. The decision to adopt or reject an innovation reflects the personal concerns of the users, as does the actual use of the innovation. Management concerns also relate to use of the innovation. The final step in Roger's model was seeking evidence to support or reject the decision. This is reflected in consequence and refocusing concerns. These correspondences are shown in Table 2.

Martin and Heller (1985) divided Hall's seven SoC into three levels, providing a framework to guide understanding of these developmental stages. The first level is called "self-directed" and indicates that the individual in this level has concerns focused on the effect of the innovation upon themselves. The second level is called "task-directed" indicating that concerns at this level tend to be focused on the environment and activities. The third and final level Martin

and Heller called “impact-directed” due to the concerns at this level being directed at the outcomes. These levels are consistent with the four levels of concerns identified by Fuller (1969): unrelated, self, task and impact.

Stages of concerns can be assessed in one of three ways: the one-legged interview, open ended concerns statements, and the Stages of Concern Questionnaire (SoCQ) (Newlove & Hall, 1976). Of these, the most efficient and reliable is the Stages of Concern Questionnaire.

The SoCQ is a validated instrument that measures the level of concern that one/a group has regarding a change or innovation. Recognizing that an individual will not have only one concern at a time, user concerns are generally presented as a profile where one or more concerns dominate (Hall, George, & Rutherford, 1977). This instrument can be used at any point during the adoption of an innovation - from novice to expert user - and is independent of the type of innovation being studied.

There are five items for each of seven factors for a total of 35-items. Individual items are rated on a Likert scale with values ranging from 0-7 where 0 represents “not true of me now” and a score of 7 represents “very true of me now”. An additional item allows for qualitative comments to be collected. Percentile tables are provided for converting raw scores into scaled scores and interpretation manuals are available for both the quantitative (Hall et al., 1977) and qualitative (Newlove & Hall, 1976) analysis of the results. A complete copy of the instrument as used can be found in Appendix A.

The instrument is constructed in such a way as to be applied to any innovation. Each of the items remains the same with only the name of the innovation added to the instrument. In this way, the factor structure and reliability can be preserved. This instrument is available online with

blinding so participants can be coded by demographics without needing to identify them to the researchers. Subsequent data can then be analyzed by any number of subgroups.

The SoCQ has been extensively validated (Hall & George, 1979). Estimates on internal consistency (alpha coefficients) range from .64 to .83 with six of the seven coefficients being above .70. Additionally, stage score correlations ranged from .65 to .86 with four of the seven being above .80 (Hall & George, 1979). Finally, test-retest reliability measures are reported to range from .65-.86 (Hall & Hord, 2014).

Levels of use. The second tool within CBAM is the Levels of Use (LoU), a construct that focuses on how an innovation is being used. Hall and Hord (2014) have identified eight LoU that are divided across a continuum of users and nonusers of the innovation. Ideally, these levels represent a sequence through which a new user would pass during the change process (Newhouse, 2001). LoU differs from the SoC in that not only do adopters concerns need to be met in order to utilize the innovation, they also need to acquire the skills and behaviors to utilize the innovation. Thus, the LoU is a behavioral measure making self-report unreliable. In order to measure the LoU, a focused interview technique was developed by Hall et. al. (1975a). The interview uses a branching technique based on defined decision points that separate each level. Rater reliability coefficients are generally reported in the .64 to .81 range (Hall, 1975). Attempts have been made to generate a survey form of the LoU (Mrazek & Orr, 2008), however the developers of the CBAM do not advocate that approach (Hall & Hord, 2014).

Operational definitions must first be developed and subsequently used to guide the collection of data by interview and observation. Progression from one level to the next can be identified by key decision points and specific behaviors along the following domains: acquiring information, assessing, sharing, planning, status reporting, performance (Hord, Dirksen, George,

Stiegelbauer, & Southwest Educational Development Laboratory, 2006). The LoU defined in the CBAM model are shown in Table 4 while the complete LoU Interview Protocol can be found in Appendix B.

Innovation Configuration. The final tool found within CBAM is the Innovation Configuration (IC). This process is used to clearly define the innovation being introduced during a change process. Innovations, no matter how well planned; tend to become adapted by the end users of the innovation, often in such ways as to become unrecognizable to the developers of the innovation. An Innovation Configuration map defines a practice profile that provides a precise description of how an innovation looks when it is in use.

The Innovation Configuration process is one way to map those adaptations and to allow evaluators to determine the level of acceptable use of the innovation in question (Hall & Loucks, 1981). Using an innovation configuration, developers can determine the variations of the innovations that are in use according to its various components. This description includes the resources and conditions necessary for implementation of the innovation. The critical components of the innovation are identified and descriptions or "word pictures" are arranged along a continuum of behaviors (Horsley & Loucks-Horsley, 1998; Southwest Educational Development Laboratory, 2006). To that end, developers can design a concept of *ideal, acceptable,* and *unacceptable* adaptations of the innovation (Hall & Hord, 2014). Steps in the innovation configuration are not intended to be developmental in nature; rather, they represent variations in use of the innovation. Because an innovation configuration is unique to any given innovation, no prototype can be shown. For an example, the reader is directed to Bellah and Dyer (2007).

Criticism of the Model

There is literature questioning the SoC seven-stage model. Reliability measures reported by Hall et.al. in the initial reports have not subsequently found support by other authors (Cheung, Hattie, & Ng, 2001). Several of these studies however, have had very small subject samples (Jibaja-Rusth, 1991). In a study by Bailey and Palsha (1992) an exploratory factor analysis was conducted on data collected from 142 subjects. Additionally, Chronbach's alphas values were calculated. The authors found the CBAM to be inadequate and proposed two modified versions: a 5-factor model with either 35 or 15 items. Confirmatory factor analysis suggested that this might be a more reliable model but also reveled persistent issues with the validity of this new model, in part because this work was carried out using only novice users of the innovation. These concerns led Shotsberger and Crawford (1996) to suggest a 27-item 5-stage model (Shotsberger & Crawford, 1996). As noted by Cheung, none of the data present a convincing simplex structure, calling into question the underlying assumption that the SoC are, in fact, developmental in nature (Cheung et al., 2001).

CBAM In Use

A review by Anderson (1997) described the state of research using the concerns-based adoptions model since the mid-1980s. His review covers literature across the English-speaking world including the United States, Canada, Australia, and Europe. Despite this seemingly wide international use, relatively few of the examples given came from higher education, and even fewer came from health professions education.

International Use

The CBAM has been used extensively in international settings. There are non-English adaptations of the SoCQ in use in both Asia and Europe. Specifically, it has found use in Taiwan

(Chen, 1999), Malaysia (Rebecca & Watkins, 2003), and Hong Kong (Cheung & Ng, 2000; Leung, 2008) as well as the Netherlands (van den Berg & Ros, 1999) and Turkey (Baltaci-Goktalay & Cangur, 2008). English-language versions are in use in Cyprus (Christou, Eliophotou-Menon, & Philippou, 2004), Australia (Main, 2009; Marsh, 1987; Marsh & Penn, 1988), Mexico (Gonzalez, Resta, & De Hoyos, 2011; Gonzalez, 2004), India (Anshu & Singh, 2009) and South Africa (Gwele, 1996a; Gwele, 1996b; Gwele, 1997). In Wales, the LoU interview protocol has also been used (Hopkins, 1990).

Higher Education

Although initially developed for K-12 education, the concerns-based adoptions model has found use in higher education. A great deal of its use has centered on the use of technology and technological innovations in higher education. Further, the vast majority of its use has centered on the Stages of Concern questionnaire rather than the other tools of the CBAM model. In 1999, Poplos used pre-and post-test Stages of Concern questionnaires to assess faculty concerns about the use of educational technology in a higher education setting (Poplos, 1999). Signer used the same model with the innovation of web-based teaching tools. In the latter case, a faculty development workshop was delivered between the initial and final SoC survey (Signer, Hall, & Upton, 2000).

Distance education, as a particular instance of technological innovation, has been studied with CBAM. In a series of studies, Ansah looked at the concerns of faculty regarding technology-based distance education in a higher education setting (Ansah & Johnson, 2003; Ansah, Neill, & Newton, 2011a). These studies compared faculty concerns across three different educational institutions. By contrast, Dobbs looked at a single institution's faculty who were randomized to one of three training programs relating to distance education (Dobbs, 2005).

Again, only the SoCQ was used. Finally, drawing on the literature from Taiwan, Chen used the 2 x 2 factorial design to look at the type of innovation decision and the type of intervention (concerns-based versus non-concerns-based) and the impact that these two factors have on faculty concerns regarding Internet use in a higher education setting (Chen, 1999).

Non-technological innovations have also been studied in the higher education setting. In a series of studies out of Mexico, Gonzalez uses the Stages of Concern questionnaire to examine faculty concerns regarding innovation of "new teaching methods." (Gonzalez et al., 2011; Gonzalez, 2004) The innovation is better defined by such authors as Bagby (2007) who used a correlational descriptive study of the stages concerns of liberal arts faculty when implementing a college wide writing program. Likewise, Dove's work on student learning assessment outcomes at community college has both a well-defined innovation and uses faculty interviews to triangulate the data given by the Stages of Concern Questionnaire (Dove, 2009). Still a better example of triangulation of data comes from Julius (2007) whose detailed study used all three tools of the CBAM model to extensively detail the experiences of five higher education faculty participating in a learning with technology faculty development initiative.

Health Professions

The tools of the CBAM have been used outside of education as well. Within the healthcare field, the SoCQ was used to look at the concerns of nursing home faculty regarding the use of telemedicine at the pre-implementation stage (Armer, Harris, & Dusold, 2004). The difficulty in interpreting this study comes from the fact that the authors altered items on the published, validated instrument based on "face validity" concerns.

Other authors have used the SoCQ without alteration in the healthcare setting. Lewis (1996) used the SoCQ to examine the use of computers by diabetes educators. Looking at

diabetic patients, Carpentier used a randomized pre-/post instruction model to determine the impact of a diabetes management program on patients (Carpentier, Piziak, Bratcher, & Hejl, 1990). This latter study used both the SoC and the LoU instruments and interestingly, found a difference in patients concerns but not their LoU between the two instructional programs. Finally, Snyder (1983) used the SoC as an assessment tool to evaluate clinical staff concerns to policy change.

Health Professions Education

Although not specifically using CBAM, McCulloch and Thompson (1981) applied Fuller's three stage model of concerns to both physical therapy students and practicing physical therapist in order to validate this model in health professions education. Using the Teachers Concerns Checklist developed by Fuller, these researchers surveyed both physical therapy students and practicing physical therapists. A factor analysis of the results demonstrated three factors with coefficients of .99 .98 and .99 that corresponded to the three factors proposed by Fuller. Additionally ANOVA analysis determined that the students and practicing therapists differed significantly in their concerns in ways that would have been predicted by the developmental nature of Fuller's model.

In 1992, Fuller's model was applied to nursing students in Australia (Owens, Powell, & Hatton, 1992). The authors modified Fuller's questionnaire by altering the wording of nine statements and added an additional ten items to contain a total 25 items related to concerns. Based on this modified instrument, a factor analysis showed that a five-factor model was in fact a better fit for Owen's study population. These results are difficult to analyze given that the population studied was older and more experienced and the instrument had been significantly

modified from the original. Still, it supports the developmental nature of student concerns in a nursing population.

The bulk of the literature utilizing the concerns-based adoptions model and health professions education can be found within the discipline of nursing. As in both K-12 and higher education, this literature is largely concerned with the use of technological innovations. Also, likely due to its ease of use, the bulk of the literature is based on the SoCQ. In the study previously mentioned by Ansah, concerns towards distance education were evaluated using the SoCQ across a random cross section of faculty at a single point in time (Ansah, Neill, & Newton, 2011b). Using faculty affiliation with a particular school as the independent variable and their respective SoC as the dependent variable differences in faculty concerns across the various schools were examined. This included the school of nursing as well as Education, Business and Arts and Sciences. Nursing faculty made up less than 10% of the total respondents and demonstrated a statistically significant difference from the concerns of faculty in other schools. Specifically, they were found to have lower Stage 0 concerns and higher Stages IV-VI concerns. This was attributed to recent calls for reform of nursing education to be more inclusive of technology based distance education.

Nursing faculty adoption of computer technology was studied using the SoCQ both prior to and following a faculty development program in a study by Lewis (1997). While the results for both pre- and post-workshop responses showed a typical non-user profile, there were differences between the two groups. While concerns in the post-workshop group were lower at all but Stages I and IV, the findings were not statistically significant. Further, the study reports that 25 of 57 faculty members responded to the pre-workshop SoCQ while 28 faculty members attended the workshop and completed the post-workshop questionnaire. It was not specified the

degree of overlap between these two groups. Given that the optional workshops were on the adaptation of computer technology, it is entirely possible that there was self-selection bias leading those faculty members with lower concerns to be willing to attend the workshops.

Years later, following significant advances in computer technology, Dell (2004) used the SoCQ to look at nursing faculty concerns regarding web-based instruction. The setting was an online course in a nursing school where two cohorts were given the SoCQ both pre- and post-participation in a course about Web-based teaching. No significant differences were found between the two administrations of the SoCQ for the 43 participants. Not only was the sample size small in this study, but also the participants varied greatly in years of teaching (0-30+) and experience in Web-based teaching (none - 4+ years). The amount of experience with Web-based teaching, highest degree obtained and prior Web experience were all correlated with lower levels of personal concerns.

Most recently, Abell use a quasiexperimental design to study video delivery of synchronous distance education in a BSN program (Abell, Wright, & Jones, 2010). In this study, the SoCQ was administered prior to and following an educational session on video delivery of education. The authors found that prior to the 2-hour session, 89.9 % of the participants rated their highest concern at Stage 0 (66.7%) or I (22.2%) while following the session over a third of the sample had moved to Stage II or higher concerns.

Technology is not the only innovation that has been studied using CBAM in health professions education. The movement to use nursing conceptual models began on the national level in the 1980s. Dalton used the LoU interview protocol to examine the use of nursing conceptual models by BSN nursing faculty (Dalton, 1990). A total of 40 faculty members from 13 BSN programs were interviewed via telephone using the LoU interview protocol. Of those,

only ten scored in the "user" category on the LoU (score of >II) and all of those scored at the IVA level, making sub-group comparisons impractical.

Gwele used this use of CBAM to measure faculty reactions to curricular innovations extensively while studying nursing education in South Africa. Over the various stages of the curricular change in the implementation of a comprehensive nursing curriculum, the SoC profiles of faculty at four schools were compared (Gwele, 1996a). Two of the schools studied were considered "early adopters" based on their decision to adopt curriculum changes prior to legal mandates to do so. The remaining two schools, who did not adopt curricular changes until legally mandated, were considered "late adopters." MANOVA analysis of the SoCQ responses revealed that the level of experience with the curricular innovation was a more significant predictor of concerns than was the timing of adoption by the school.

Levels of Use (LoU) was also examined across the same four nursing schools (Gwele, 1996b). The authors found that adoption by a school did not predict level of use by individual faculty. Of additional note is that during the process of interviewing 47 faculty members it became apparent that a variety of definitions of the innovations being studied were in existence.

Finally, Gwele (1997) used the SoCQ to track concerns during the implementation of a problem-based learning curriculum in a single nursing school over an 18 month implementation period. Data were collected at three time points – pre-implementation, at the end of the first semester and at the end of 18 months. Pre-implementation, concerns were highest at the lowest stage (awareness). At six months, the profiles were multi-peaked with "personal" concerns showing the most intense and "consequence" and "refocusing" second. As predicted, the 18-month data show a tailing up of concerns at Stage VI (refocusing), indicating that users have begun to think about ways in which to address their management concerns.

Nursing is not the only discipline within the health professions to utilize the concerns-based adoptions model. In 2008, Remus used the SoCQ as part of a larger mixed methods evaluation examining faculty concerns about service learning in a health professions college (Reams & Twale, 2008). The program studied trains nurses, physicians' assistants, premedical students and other allied health professionals. Within dental education, Littlefield use the SoCQ with dental faculty as an instrument to help improve a teaching skills course (Littlefield, 1979).

Turning our attention to medical education, Broyles et al. (2007) used the SoCQ to assess faculty concerns to the implementation of a competency-based curriculum in a college of osteopathic medicine. This study not only used follow-up interviews to triangulate the data, but also calculated internal consistency and reliability estimates for the SoC in a medical school setting. Finally, faculty concerns before and following a faculty development workshop on teaching skills was measured using the SoCQ and a medical college in India (Anshu & Singh, 2009).

Faculty Development

At the same time that the cost of higher education has come under fire from both the public and funding agencies, the quality of teaching has been called into question (Massy & Wilger, 1992). In light of recent criticism of higher education, there is increasing pressure for institutions to place greater emphasis on their teaching and learning functions (Boyer 1990; Evans 1993). Faculty development is one of the mechanisms institutions use to improve instructional competencies of their teachers. It has also been suggested as a vital component to recapture the educational mission of medical schools (Irby & Wilkerson, 2003). The Assessing Change in Medical Education–The Road to Implementation project (ACME-TRI) identified faculty development as one of its five main areas of focus (Swanson & Anderson, 1993). Of the

53 schools participating in this survey, 15 had hired professional educators in order to bolster faculty development activities.

In short, faculty development is required to develop competent teachers, educators and researchers for their roles in medical education. In the words of Wilkerson: " Academic vitality is dependent upon faculty members' interest and expertise; faculty development has a critical role to play in promoting academic excellence and innovation." (Wilkerson & David, 1998).

Change models can be used to inform faculty development efforts in medical education. As noted above, medical curricula are in a state of constant flux. New teaching methodologies, technologies, and medical knowledge all represent innovations that medical educators must adopt and implement.

Individualization

In 1975, Hall and colleagues wrote "the reason for so little meaningful change is that the focus of change has been almost completely on the large-system level, when the focus should first be on the individuals that must make the change. We think that change at this level will not be accomplished unless the individual members are attended to".

Other researchers have likewise called for greater individuation of faculty development. In a study of conditions that facilitate implementation of educational technology, Ely (1990) identified eight primary conditions. In a later study of the relative importance of Ely's eight conditions, researchers found that educational adopters valued the condition of resources most highly (Ensminger & Surry, 2008). These studies found that not only were there differences between the educational and business groups, there were differences between the K-12 and higher education groups. The researchers conclude that " tailoring implementation plans based

on the occupation group and type of innovation will be more successful" (Ensminger & Surry, 2008).

Thus, good faculty development is guided by not only best evidence but also a needs assessment (O'Sullivan & Irby, 2011). Much like taking a trip, you must know where you want to go in order for everyone to successfully arrive at the appropriate destination (McLean, Cilliers, & Van Wyk, 2008). Most models of instructional design and educational consultation include the identification and awareness of instructors concerns as an essential element of the process. In the past, schools were not rigorous in how they conducted needs assessments or used the results in planning faculty development efforts. Schools are beginning to collect evidence to direct their faculty development programming and becoming more focused. Institutions need to carefully identify areas on which to focus faculty development efforts (Bland, Seaquist, Pacala, Center, & Finstad, 2002). Also, as there are discipline-specific "ways of knowing" and faculty development takes place within a disciplinary framework. Faculty have trouble understanding the significance of research on learning from other disciplines (Angelo, 1993).

Change Models

A recent review of the faculty development literature for medical educators called for future work to make more deliberate use of theories of learning and educational principles in the design and development of faculty development programs (Steinert et al., 2006). Theories of change in general, and the CBAM specifically, would serve well as the basis for faculty development in medical education. Fuller suggested that learning occurs from the successive arousal of concerns and the subsequent resolution of those concerns (Fuller, 1970). Given that premise, we must understand faculty members' concerns in order for learning to result from faculty development efforts. As one author wrote:

"Without giving the learners a voice in the planning process and without knowledge of their perceptions that have proved so important…a program planning committee may make erroneous assumptions and misestimates of the readiness of the client systems to learn and change. Such misestimates contribute to failures in attendance, attention, and learning that, in turn, lead to failed programs." (Fox, 2000)

Fox went on to say that "In an applied field, like education or medicine, most research studies should begin with the problem rather than the theory or the set of observations" (Fox, 2000). Faculty concerns about the change process, the innovation or their role would be a valid starting point in planning faculty development for educational change. Rogers' framework for the diffusion of innovation has been used to describe faculty development actions targeted to particular types of adopters (Harris, 1997). Additionally, identification of instructors' SoC could be used to inform efforts to promote and facilitate the implementation of an innovation (Roach, Kratochwill, & Frank, 2009).

A final reason to attend to faculty concerns in the design of faculty development is the growing body of research that has shown that extraneous material, even when seemingly useful, has deleterious effects on learning (Chandler & Sweller, 1991; Chandler & Sweller, 1992). This means that addressing issues not of concern to teachers is not only ineffective but could actually detract from development efforts.

CBAM in Faculty Development

CBAM in general and the SoC in particular can be useful in directing faculty development efforts as faculty developers function in the capacity of change agents within the institution (Evans & Chauvin, 1993). When CBAM-based professional development is adopted, the results are reduced teacher resistance (Vaughan, 2002).

Although the CBAM tools were not developed as prescriptive tools, these diagnostic tools have an obvious relationship to assessing faculty development needs (Griffin, 1983). Reviews of the CBAM literature have revealed that the majority of research fails to use the entire CBAM model. The SoCQ is the most commonly used diagnostic instrument, frequently used in the pre-post design model, in studies of less than one-year duration. (Chamblee & Slough, 2004; Slough & Chamblee, 2005). A recent review identified just over 100 studies using the CBAM model to assess technology implementation in the decade between 1995 and 2006 (Slough & Chamblee, 2007). Of these, only 29 used more than one of the three diagnostic tools, contained follow-up data, or addressed higher-level concerns. Several of these studies dealt with the issue of faculty development.

In a study by Fox et. al (1997), different educational materials were used for training at differing points in the innovation change cycle with good results. Dobbs demonstrated the ability of targeted faculty development to successfully move learners to higher Stages of Concern. She used both treatment and control groups in a pre/post trial in order to demonstrate this progression (Dobbs, 2004; Dobbs, 2005).

Vaughan used the SoCQ before and after a two-week teacher-training program. The findings suggested that teacher concerns behaved in a manner consistent with the concerns-based adoptions model. They conclude by suggesting that the key to successful faculty development intervention is to take the concerns of those engaged in the change process into consideration when planning training (Vaughan, 2002).

Broyles and Tillman looked at the elements of a training session and correlated that with the impact of SoC (Broyles & Tillman, 1985). The majority of their participants were non-users and training reduced the intensity of awareness, informational and personal concerns. When

trainers spent more time on the introductory content, the intensity of personal concerns was higher after the workshop. More time spent on skills reduced the intensity of consequence concerns. More time spent on organizational material resulted in lower informational concerns. Giving examples reduced refocusing concerns. Finally, the more theoretical the nature of the content, the higher the personal concerns following training. This study is limited by the large number of novice users but would still suggest that concerns are related to the format of training and can be impacted by the format of training.

Conclusions

Medical education is in a state of rapid change for social, economic, and scientific reasons. These changes have led to a variety of innovations being adopted both in healthcare practice and within academic health centers. Models of change generally, and CBAM specifically, give us both the theory and the tools to navigate this rapid change. Additionally, see down concerns itself primarily with the role of the individual within the change process. While the CBAM tools have been used in medical education, the bulk of the work published concerns itself primarily with the SoC. All tools of the CBAM model should be further used in the design and delivery of faculty development within medical education.

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Table 1

Assumptions of the Concerns-Based Adoption Model

Change is a process, not an event, and it takes time to institute change;
Individuals must be the focus if change is to be facilitated and institutions will not change until their members change;
The change process is an extremely personal experience and how it is perceived by the individual will strongly influence the outcome;
Individuals progress through various stages regarding their emotions and capabilities relating to the innovation;
The availability of a client-centered diagnostic/prescriptive model can enhance the individual's facilitation during staff development; and
People responsible for the change process must work in an adaptive and systematic way where progress needs to be monitored constantly.

Table 2

Comparison of the Diffusion of Innovation Model to the Concerns-Based Adoption Model

Roger's Innovation-Decision Process	**CBAM Stages of Concern**
Awareness of the innovation	Awareness
Forming either a positive or negative opinion about the innovation	Informational
Choosing to adopt or reject the innovation	Personal
Using the innovation	Management
Seeking evidence that supports the decision to either adopt or reject the innovation	Consequence
	Collaboration
	Refocusing

Table 3

The Seven Levels of the Stages of Concern

Level	Stage	Items
Self-Directed	Awareness	3. I am more concerned about another innovation.
		12. I am not concerned about the innovation at this time.
		21. I am preoccupied with things other than the innovation.
		23. I spend little time thinking about the innovation.
		30. Currently, other priorities prevent me from focusing my attention on the innovation.
	Informational	6. I have a very limited knowledge of the innovation.
		14. I would like to discuss the possibility of using the innovation.
		15. I would like to know what resources are available if we decide to adopt the innovation.
		26. I would like to know what the use of the innovation will require in the immediate future.
		35. I would like to know how the innovation is better than what we have now.
	Personal	7. I would like to know the effect of the innovation on my professional status.
		13. I would like to know who will make decisions in the new system.
		17. I would like to know how my teaching or administration is supposed to change.
		28. I would like to have more information on time and energy commitments required by the innovation.
		33. I would like to know how my role will change when I am using the innovation.
Task-Directed	Management	4. I am concerned about not having enough time to organize myself each day.
		8. I am concerned about conflict between my interests and my responsibilities.
		16. I am concerned about my inability to manage all that the innovation requires.
		25. I am concerned about time spent working with non-academic problems related to the innovation.
		34. Coordination of tasks and people is taking too much of my time.
	Consequence	1. I am concerned about students' attitudes toward the innovation.
		11. I am concerned about how the innovation affects students.
		19. I am concerned about evaluating my impact on students.
		24. I would like to excite my students about their part in this approach.
		32. I would like to use feedback from students to change the program.
Impact-Directed	Collaboration	5. I would like to help other faculty in their use of the innovation.
		10. I would like to develop working relationships with both our faculty and outside faculty using this innovation.
		18. I would like to familiarize other departments or persons with the progress of this new approach.
		27. I would like to coordinate my efforts with others to maximize the

		innovation's effects.
		29. I would like to know what other faculty are doing in this area.
	Refocusing	2. I now know of some other approaches that might work better.
		9. I am concerned about revising my use of the innovation.
		20. I would like to revise the innovation's approach.
		22. I would like to modify our use of the innovation based on the experiences of our students.
		31. I would like to determine how to supplement, enhance, or replace the innovation.

Table 4

The Levels of Use of an Innovation (Hall 2010, pg. 94)

Users	VI	**Renewal**: the state in which the user really evaluates the quality of the use of the innovation, seeks major modifications of or alternatives to present innovation to achieve increased impact on clients, examines new developments in the field, and explores new goals for self and the system.
	V	**Integration**: state in which the user is combining own efforts to use the innovation with related activities of colleagues to achieve a collective impact on clients within their common sphere of influence.
	IVB	**Refinement**: state in which the user varies the use of the innovation to increase impact on clients within immediate sphere of influence. Variations are based on knowledge of both short and long-term consequences for clients.
	IVA	**Routine**: use of the innovation is stabilized. Few if any changes are being made in ongoing use. Little preparation or thought is being given to improving innovation use or its consequences.
	III	**Mechanical use**: state in which the user focuses most effort on the short term, day-to-day uses of the innovation with little time for reflection. Changes in use are made more to meet user needs than client needs. The user is primarily engaged in a stepwise attempt to master the tasks required to use the innovation, often resulting in disjointed and superficial use.
Non-Users	II	**Preparation**: state in which the user is preparing for first use of the innovation.
	I	**Orientation:** state in which the user has recently found or is seeking information about innovation and has recently explored or is exploring its value orientation and its demands upon user end-user systems.
	0	**Non-use**: state in which the user has little or no knowledge of the innovation, no involvement in innovation, and is doing nothing toward becoming involved.

Appendix A

CBAM - Stages of Concern Questionnaire

The purpose of this questionnaire is to determine what people who are using or thinking about using various programs are concerned about at various times during the adoption process. The items were developed from typical responses of school and college teachers who ranged from no knowledge at all about various programs to many years' experience using them. Therefore, **many of the items on this questionnaire may appear to be of little relevance or irrelevant to you at this time.** For the completely irrelevant items, please circle "0" on the scale. Other items will represent those concerns you do have, in varying degrees of intensity, and should be marked higher on the scale.

For example:

This statement is very true of me at this time. 0 1 2 3 4 5 6 7

This statement is somewhat true of me now. 0 1 2 3 4 5 6 7

This statement is not at all true of me at this time. 0 1 2 3 4 5 6 7

This statement seems irrelevant to me. 0 1 2 3 4 5 6 7

Please respond to the items in terms of *your present concerns***,** or how you feel about your involvement or potential involvement with **<innovation>**. We apply the following definition of the innovation so please think of it in these terms. Since this questionnaire is used for a variety of innovations, the name **<innovation>**never appears. However, phrases such as "this approach" and "the new system" all refer to **<innovation>**. Remember to respond to each item in terms of *your present concerns* about your involvement or potential involvement with **the innovation**.

0	1	2	3	4	5	6	7
Irrelevant	Not true of me now		Somewhat true of me now			Very true of me now	

1. I am concerned about students' attitudes towards this innovation.
2. I know of some other approaches that might work better.
3. I don't even know what the innovation is.
4. I am concerned about not having enough time to organize myself each day.
5. I would like to help other faculty in their use of the innovation.
6. I have very limited knowledge about the innovation.
7. I would like to know the effect of the reorganization on my professional status.
8. I am concerned about conflict between my interests and my responsibilities.
9. I am concerned about revising my use of the innovation.
10. I would like to develop working relationships with both our faculty and outside faculty using this innovation.
11. I am concerned about how the innovation affects students.
12. I am not concerned about this innovation.
13. I would like to know who will make decisions in the new system.
14. I would like to discuss the possibility of using the innovation.
15. I would like to know what resources are available if we decide to adopt this innovation.
16. I am concerned about my inability to manage all the innovation requires.
17. I would like to know how my teaching or administration is supposed to change.
18. I would like to familiarize other departments or persons with the progress of this new approach.
19. I am concerned about evaluating my impact on students.

20. I would like to revise the innovation's structural approach.

21. I am completely occupied with other things.

22. I would like to modify our use of the innovation based on the experiences of our students.

23. Although I don't know much about this innovation, I am concerned about things in the area.

24. I would like to excite my students about their part in this approach.

25. I am concerned about time spent working with nonacademic problems related to this innovation.

26. I would like to know what the use of the innovation will require in the immediate future.

27. I would like to coordinate my efforts with others to maximize the innovation's effects.

28. I would like to have more information on time and energy commitments required by this innovation.

29. I would like to know what other faculty are doing in this area.

30. At this time, I am not interested in learning about this innovation.

31. I would like to determine how to supplement, enhance, or replace the innovation.

32. I would like to use feedback from students to change the program.

33. I would like to know how my role will change when I'm using the innovation.

34. Coordination of tasks and people is taking too much of my time.

35. I would like to know how this innovation is better than what we have now.

36. What other concerns, if any, do you have at this time? (Please describe them using complete sentences.)

Appendix B

CBAM - Levels of Use Interview Protocol

Are you using the innovation?

IF YES

1. What do you see as the strengths and weaknesses of active learning in your situation? Have you made any attempt to do anything about the weaknesses?
2. Are you currently looking for information about active learning? What kind? For what purpose? (Acquiring information category)
3. Do you ever talk with others about active learning? What do you tell them? (Sharing category; check decision point E)
4. What you see as being the effects of active learning? In what ways have you determined this? Are you doing any evaluating, either formally or informally, of your use of active learning? Have you received any feedback from students? What have you done with the information you get? (Assessing category)
5. Have you made any changes recently and how you use active learning? What? Why? How recently? Are you considering making any changes? (User oriented versus impact oriented)
6. As you look ahead to later this year, what plans do you have in relation to your use of active learning? (Planning and status reporting categories)
7. Are you working with others (outside of anyone you may have worked with in the beginning) in your use of active learning? Have you made any changes in your use of active learning based on the scored nation? (If positive use probes below)
    a. How do you work together? How frequently? (Performing category)

   b. What are the strengths and weaknesses of this collaboration for you? (Knowledge category)
   c. Are you looking for any particular kind of information in relation to this collaboration? (Acquiring information category)
   d. When you talk to others about your collaboration, what do you share with them? (Sharing category)
   e. Have you done any formal or informal evaluation of how your collaboration is working? (Assessing category)
   f. What plans do you have for this collaborative effort in the future? (Planning category)

8. Are you considering making or planning to make major modifications or to replace the use of active learning at this time?
9. Can you summarize for me where you see yourself right now in relation to the use of active learning (optional)

IF NO

1. Have you made a decision to use active learning in the future? If so, when?
2. Can you describe the active learning for me as you see it? (Knowledge category)
3. Are you currently looking for any information about active learning? What kinds? For what purposes? (Acquiring information category)
4. What are the strengths and weaknesses of active learning for your situation? (Assessing category)
5. At this point in time what kinds of questions are you asking about active learning? Give examples of possible.

6. Do you ever talk with others and share information about active learning? What do you share? (Sharing category)
7. What are you planning with respect active learning? Can you tell me about any preparation or plans you have been making for the use of the active learning? (Planning category)
8. Can you summarize for me where you see yourself right now in relation to the use of active learning? (Optional)

PAST USERS

1. Why did you stop using active learning?
2. Can you describe for me how you organized you use of active learning, what problems you found, and what its effects appeared to be on students?
3. When you assess the active learning at this point in time, what are its strengths and weaknesses for you?

Comprehensive, Utilization-Focused Evaluation of Curriculum Reform in a School of Medicine

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Abstract

Like so many other schools, the University of Virginia (UVA) School of Medicine is conducting a curriculum renewal. The design and development of a curriculum calls for a parallel system of program evaluation. The purpose of this paper is to describe the role and use of evaluation theory in the development of a comprehensive curriculum evaluation in a School of Medicine. Specific instruments and results are not presented; the process by which the evaluation plan was developed and the rationale for the process decisions made are the focus of this paper. Additionally, the role that evaluation theory in general, and Utilization-Focused Evaluation (U-FE) in particular, had in the development of the evaluation plan is detailed. At a time when both time and money are scarce, focusing evaluation in ways that will be useful is more critical than ever. UF-E allows an institution to not only to focus evaluation on findings that are useful but also to build evaluation capacity.

Introduction

Widespread curriculum reform is the rule in medical education with estimates placing over half of American Medical Schools in the process of significant curricular reform (Hollander et al., 2002). Much of this curricular change has been driven by the growth of scientific knowledge and the innovations in medical education (Cooke et al., 2006). The process of curricular change has been defined as including evaluation as part of the process (Loeser et al., 2007). Indeed, evaluation has been identified as a critical component to the success of curricular change (Bland et al., 2000) and is required for accreditation (LCME, 2016). However, there is a dearth of discussion about the appropriate approaches to evaluate such reforms. Thus it is little surprise that there is a lack of discussion about the use of theory-driven evaluation within medical education (Musick, 2006).

While there are many possible evaluation approaches available to be employed in such reforms, we approached the process of planning the evaluation of our curriculum from the perspective of Utilization-Focused Evaluation (U-FE). This evaluation approach is highly contextual and values evaluation only to the extent that the results are useful. We felt that U-FE would allow evaluation to be guided by a structured approach while best serving the needs of the decision makers within the School of Medicine (SOM). In this way, resources would be most effectively and efficiently used.

The purpose of this paper is to describe the role that Utilization-Focused Evaluation theory played in the development of a comprehensive curriculum evaluation in a School of Medicine. Evaluation theory will be briefly reviewed in order to give readers a foundation in the topic and to provide the framework to explain why we selected U-FE as our approach. We will

discuss how U-FE was used to guide the planning of our curricular evaluation. Finally, we will show some of the ways in which this approach fit our educational and organizational mission.

Evaluation Theory

Evaluation theories describe what evaluators do when conducting an evaluation in terms of purpose, users, uses, methods and strategies (Coryn et al., 2011). Evaluation theory has a different meaning from program theory, although the two are often used interchangeably (Donaldson & Lipsey, 2006). Evaluation theory guides how evaluation is done by the evaluator while program theory details the assumptions that guide the way a particular program functions from the perspective of the program participants. While there is no shortage of literature on evaluation theory, the challenge evaluators face is on the translation of theory into practice (Shobokshi & Sukkar, 1988).

There are several heuristic approaches to understanding the role of evaluation theory in evaluation planning. These heuristics allow evaluators to make informed choices about the model of evaluation to follow during the initial design phase. One method of defining evaluation theories, the evaluation theory tree described by Alkin & Christie (2004), divides evaluation theories into three branches: Use, Methods and Valuing. The "valuing" branch focuses evaluation on making summative judgments about the value of a program. The "methods" branch focuses evaluation according to the methods used. The "use" branch focuses evaluation on the belief that the purpose of evaluation is ultimately to be used to guide decision-making (Alkin & Christie, 2004).

Shadish, Cook and Leviton (1991) constructed a theory of evaluation with the following components defining the different emphases of various evaluation approaches: knowledge construction, values, use, social programming and evaluation practice. Each of the many

evaluation theories available is strong on some of these six components and weak on others. The challenge for evaluators is to determine which strengths are most important and which weaknesses are best tolerated in the particular context in which they are working.

According to Shadish, Cook, and Leviton, knowledge construction defines the nature of reality (ontology), what counts for knowledge (epistemology), and how we construct that knowledge (methodology). Evaluation approaches differ in the way these issues are handled with some favoring realist ontology primarily utilizing quantitative methodology and others favoring a more interpretivist approach utilizing qualitative methods. U-FE is agnostic on this issue, leaving the construction of knowledge entirely up to the users of the evaluation (Patton, 2008).

Valuing as construct in evaluation theory defines what kinds of values will be used to judge the program being evaluated. Values can be prescriptive in nature, in which case a set criterion would be used to determine value. Descriptive values merely describe the program in terms of the definitions set out by the various stakeholders. Finally, meta-theory approaches work with the clients to construct the values that will be used to judge the program. U-FE is a meta-theory approach as the evaluator works closely with clients to clarify and define the values that will be used.

Use considerations assist the evaluators in determining how, when and where results of the evaluation will be used. Instrumental uses defines the situation where evaluation results are used to make concrete changes to specific programs while enlightenment uses help define more general principles that can be used across multiple contexts. U-FE is very much focused on instrumental uses. As the name of the theory implies, evaluation results are produces in order to be used (utilized) to make concrete changes in the program. All other considerations in the design of the evaluation are secondary to the pre-defined instrumental uses of the evaluation.

Social programming considerations identify the key issues for improving the program capacity to address social problems. Three components define these considerations. Internal components define how the program is structured internally and how it operates. External components define the context and outside influences of the program. Finally, change components define the theory of change of the program both internal (e.g. local curricular reform) and external (e.g. regulatory pressures). U-FE is relatively weaker on social programming issues. As with other considerations, U-FE defers to the users to determine what is valued. Typically, internal components will dominate however regulatory pressures can dictate that external issues take priority. U-FE offers the evaluator little guidance in how to balance these issues.

Evaluation practice is the last of the five components defined by Shadish et al. (1991) and is the most practical. This component speaks to the role of the evaluator, the type of evaluation questions that are asked, the evaluation design and the timing of evaluation. Again U-FE defers to the context-specific needs of the users when speaking to these issues. U-FE prescribes that evaluation is done when and how the users request it, that the questions asked are those that will give the intended users information necessary for their pre-defined uses, and that the role of the evaluator is whatever best suits those uses. The evaluator may find himself or herself in the role of policy maker, social scientist, designer or educator depending on the needs of the program and the defined uses. In other words, U-FE as a theory does not itself define the role of the evaluator.

U-FE defines all of these constructs in terms of the users and the use of the evaluation. The data (or form of knowledge/evidence) to be gathered is defined by the users according to what they find useful. Likewise, the value of a program is determined by users based on their needs and context such that “success” or “failure” are determined by the users given their particular

needs rather than by the evaluator using some external metric. Evaluation use in U-FE can be formative, summative or developmental depending on the intended use prescribed by the program users. Social programming refers to how evaluation is used to construct change. In the case of U-FE the users also define this at the outset. The last factor, evaluation practice, is the pragmatic issue of conducting an evaluation. In U-FE, this issue is determined by the use, which is designated by the users of the evaluation.

Utilization-Focused Evaluation

Utilization-Focused Evaluation (U-FE) falls on the "use" branch of the evaluation tree (Alkin & Christie, 2004). In terms of the theory set out by Shadish et al. (1991), U-FE is strong on use considerations and significantly weaker on social programming issues while deferring to the users on issues of knowledge construction and evaluation practice. For an in-depth description of the theory and its use, the reader is referred to Patton (2008, 2011). The central focus of U-FE is "intended use by intended users" (Patton, 2011) meaning that both the use of the evaluation and the intended users of the evaluation are determined in advance of collecting any evaluation data.

U-FE is, therefore, highly context specific, personal and methodologically agnostic (Vassar et al., 2010; Patton, 2011). Any methods (i.e. qualitative or quantitative) and any research design (i.e. randomized, case-control, case study) are appropriate so long as they serve the intended use of the evaluation as set forth by the intended users.

Context

In order to understand the rationale for employing U-FE as an evaluation approach for medical curricula, one must understand the context in which such evaluation takes place. Some of the considerations specific to this context are discussed below.

Evaluating Curricular Change in Medical Education

Sentiments such as: "Making educational changes in a shifting environment became the rule rather than the exception" (Mennin & Krackov, 1998) have been expressed for every decade of the last 30 years as the scope of innovation in medical education has been accelerating in North America (Irby & Wilkerson, 2003). Recently, marking the 100th anniversary of the Flexner Report, the Carnegie Foundation for the Advancement of Teaching once again turned attention to medical education (Irby et al., 2010). The authors of this report found medical education at the turn-of-the-century to again be lacking and have once again called for changes in medical education. Medical school faculty generally view program evaluation as an essential part of curriculum development (Horan et al., 1984) and regulatory bodies require evaluation in order for an educational program to maintain accreditation (LCME, 2016).

Economic Pressure

Since the time of Medicare and Medicaid, the clinical faculty has been under increasing pressure to boost clinical productivity (Ludmerer, 1999). Historically, federal funding has heavily supported medical education however over the last 30 years, reliance on clinical revenue has increased dramatically. Prior to Medicare, federal monies comprised 54% of the operating budgets of Academic Health Centers (AHC). By the turn of the century, federal money accounted for only 20%, with 58% of the support derived from clinical practice (Eisenburg, 1999).

Generally, teaching hospitals are not in a good position to compete in the health-care market. The cost of care is higher than in a hospital where learners are not present, because faculty time is consumed with teaching as well as patient care. Managed care has also had an adverse impact on medical education, because it does not reimburse by a negotiated per-patient

amount, leading hospitals often discharge patients as quickly as possible. Thus, any activity that detracts from clinical work (e.g., teaching) costs more (Michaelsen, 2001). With increased pressure to generate revenue and the cost of training of students rising, it would be in the interests of teaching hospitals to conduct and use cost-effective evaluations.

Regulatory Pressure

The Liaison Committee on Medical Education (LCME) Standards require evaluation of all medical education programs (LCME, 2016). These standards carry significant weight with Medical School Administrators as failure to comply with these standards can lead to a program being placed on probation. Since the early 1990's, the LCME has enacted increasingly tighter standards for the management and evaluation of medical curricula (Kassebaum et al., 1997).

The most recent edition of the LCME standards, Standard 8.5 reads: "In evaluating medical education program quality, a medical school has formal processes in place to collect and consider medical student evaluations of their courses, clerkships, and teachers, and other relevant information." (LCME, 2016, p. 20). Thus, the accrediting body for all medical education programs in the U.S. and Canada has mandated that the curriculum be evaluated in specific ways but also that there must be processes in place to use the evaluation data (LCME, 2016).

Evaluation in Medical Education

It has been said that curriculum evaluation is the force that leads the curriculum process (Torres, 1975). Although Torres was referring to nursing education, the same is generally held to be true in medical education. Despite this, research in program evaluation in medical education is less well developed than in other educational fields (Durning et al., 2007). Good reviews of evaluation in medical education (Goldie, 2006; Gibson et al., 2008) and nursing

education (Roxburgh et al., 2008) are available however few describe the evaluation theory that underlies planning for, collection of, and use of evaluation data.

Mackenzie (1981) stated that the validity of evaluation depends on purpose. Thus, most health professions education evaluation fails because it is designed to impress third parties rather than to produce change in the educational process (Mackenzie, 1981). Indeed, evaluation reports in the literature that do cite evaluation theory have tended to be heavily shaped by the adoption of the Kirkpatrick hierarchy (Haji et al., 2013). This focus on outcomes largely ignores the context and process of the curriculum. A recent review of the evaluation literature in medical education shows that increasingly evaluation is less about "judging the merit or worth, but also about generating reliable, valid and useful information for curriculum developers seeking to adapt programmes in the light of evolving contexts" (Haji et al., 2013, p. 343).

Given the costs involved in conducting evaluation and the economic forces described above, selecting a theory of evaluation that allows for greatest use would be the cost-effective and most appropriate in a medical school setting. Patton (2008) articulates U-FE as an approach without a temporal distinction between the development and evaluation processes. This positions U-FE as an appropriate theory on which to base evaluation of medical curricula. Review of the literature finds that U-FE has been used as the model for curriculum evaluation in both nursing education (Meyer & Meyer, 2000) and medical education (Vassar et al., 2010).

Evaluand

Like so many other schools, the University of Virginia (UVA) School of Medicine is undergoing curriculum reform, the design and development of which calls for a parallel system of program evaluation. The program to be evaluated is detailed in the following sections.

Program Description

Historically, the University of Virginia SOM has been a very traditional "2+2" curriculum. Little integration and less communication existed between these two primary curricular components and administrative oversight into teaching methods was limited to periodic reviews of courses and clerkships where student evaluation and grades were the primary metrics.

Concurrent with national changes, the SOM was planning and constructing a new state-of-the-art Medical Education Building. This facility was designed to include learning spaces specifically engineered to facilitate active learning as well as two floors dedicated to clinical skill development. To make the most of this investment, the Dean of the SOM commissioned an Educational Task Force (ETF) to study how best to make use of these facilities. The final report of this task force recommended more active learning methods be used (McCollum & Chhabra, 2008).

Based in part on this report, the SOM decided to pursue a curriculum revision moving away from the current traditional, discipline-based curriculum to one that is more integrated and organ systems-based. Concurrent with the curricular charge, a Curriculum Evaluation Community (CEC) was assembled. The participants were chosen to represent several roles within medical education. The CEC was given the following charge:

> The development of the "NxGen" Medical Education Curriculum creates an important responsibility for the parallel development of a robust system of program evaluation. The Curriculum Evaluation Community is charged with the task of developing and implementing an evaluation system to determine the degree to which the goals of the new curriculum are achieved. Evaluation data

will be reported to and utilized by the Curriculum Committee for continuous curricular improvement.

During the time that the CEC met, minutes of the meetings were generated for each meeting. These minutes were available to all members of the committee and were reviewed by the co-chairs of the committee prior to each meeting.

Program Theory & Logic Model

The first task of the CEC was to define the logic model for the UVA curriculum in order to provide a framework for the development of subsequent evaluation questions. A logic model is a "graphical representation of the relationship between a program's day-to-day activities and its outcomes" (Chen, 2005, p. 34). While logic models can take many forms, they often include many of the same elements. Creation of a program logic model has been shown to be beneficial in non-formal educational settings to construct a better understanding of the program and build evaluation capacity (Monroe et al., 2005). Logic models have also been used in medical education programs to provide data to judge how well outcomes were obtained (Armstrong & Barsion, 2006).

The logic model shown in Figure A contains four basic elements. The first are program *Inputs* or a listing of resources that have been either devoted to or consumed by the program. The second element is program *Activities*, which encompasses all work that takes place in order for the program to achieve its goals. The third element is the program *Outputs* defined as the direct products of the program or program activities. While *Outputs* are typically very quantitative, program *Outcomes*, the fourth element, are more broadly stated. *Outcomes* are the benefits derived from the functioning of the program and can occur in the short-, medium- or long-term.

As stated above, a program theory details the assumptions that guide the way a particular program functions. Defining a program theory helps provide a logical framework for collecting data and contributes to understanding of how and why a program works or was not meaningful in any concrete way (Weiss, 2003; Coryn et al., 2011). Like the logic model above, the authors felt that developing the program theory would be useful as a tool to build evaluation capacity within the SOM. Still, a review of evaluation literature demonstrates that in many cases the explication of program theory was not meaningful in any concrete way (Coryn et al., 2011). Like the logic model above, the authors felt that developing the program theory would be useful as a tool to build evaluation capacity within the SOM.

Chen (2005) defines three elements of a program theory: Outcomes, Determinants and Interventions. Using his modeling approach we can graphically depict the program rationale for the SOM as shown in Figure B. Extracting the *Interventions* and *Determinants* from Figure B we can state the program theory as follows: "If program planners provide quality faculty development, appropriate facilities, and support and design policy to reinforce it, faculty will change from a static information delivery instructional mode to a more active, hands-on, clinically integrated, problem based instructional practice resulting in increased student learning and ultimately leading to our graduates becoming life-long learners."

Stakeholders and Primary Intended Users

In evaluation, a stakeholder is defined as individuals or groups having a significant interest in how well a program functions (Rossi et al., 2004). The CEC co-chairs chose to use this term very broadly in the initial membership of the committee. Table 1 shows the range of stakeholders who were initially invited to participate in the CEC and who took part in the initial steps of the evaluation process.

The term "Primary Intended Users" (PIU) is specific to U-FE, referencing those users identified as the consumers of the final evaluation. PIUs are generally a subset of the stakeholders who not only have a direct, identifiable stake in the evaluation but also possess the following characteristics: interest, knowledge, open, teachable, credible, available and are connected to an important stakeholder constituency (Patton, 2002).

With this in mind, PIUs were selected from the overall list of stakeholders during the early stages of evaluation design. These users are identified in italics in Table 1. In most cases PIUs were groups of individuals with representation on CEC. This was true of the System Leaders (both clinical and basic science), the Curriculum Committee and the Clerkship Directors.

Steps in Utilization Focused Evaluation

Overview

U-FE is an evolving theory. The 2008 edition of Patton's book listed 14 steps for U-FE while the latter edition detailed a total of 17 steps (Patton, 2011). For the purpose of this evaluation the older model was use, the steps of which are shown in Table 2. This report describes only the first seven of these as issues of data collection and analysis are already well reported in the literature.

Assess Program Readiness

During this step, the evaluators concern themselves with the readiness of the organization to commit to evaluation. In this case, there were two internal evaluators (VEM & EJB) on the faculty who were given time and resources to conduct an evaluation. Through conversations with stakeholders in the curriculum, and in consultation with an outside evaluator (WH) the CEC membership was selected. Representatives of a wide variety of stakeholder groups were

approached and a commitment to assist with the evaluation efforts was secured. Table 1 shows the variety of stakeholder groups that were represented on the CEC.

Assess Evaluator Readiness

The membership of the CEC was selected in such a way as to assure that the skills necessary to conducting the evaluation were avaialbe. The CEC was co-chaired by two internal evaluators and its membership contained both quantitative and qualitative methodologists. Further, support groups with access to student data and technology staff were included. In this way, the evaluation team felt equipped to conduct the evaluation.

Identification of Primary Intended Users

The process of forming the CEC was in and of itself a mechanism to identify the PIUs for the evaluation. The initial tasks of the CEC were to determine the logic model and program theory for the SOM. This process educated a wide variety of stakeholders about the evaluation process and allowed the evaluation team to assess individual levels of interest, commitment and knowledge. By the time the evaluation had progressed to the point of focusing the evaluation questions, a core group of members remained. This core group consisted of representation from the following groups: Curriculum Design, System Leaders, Clerkship Directors, Curriculum Committee, Clinical Performance Development, Faculty Development and the Dean's Office.

Situational Analysis

Situational analysis began with an assessment of what evaluation processes were already in place including the frequency and duration of data collection and reporting mechanisms. All instruments currently in use at the time were gathered along with any information about the individuals responsible for gathering the data and how that data was used. When possible, these

individuals were included in the CEC membership. Instruments were separated into groups according to their common themes or uses. Table 3 shows the number of instruments by use.

In Table 3, "Other" refers to non-curricular uses of the data such as admissions or scheduling. The inclusion of these types of evaluation demonstrates the breadth of activities being conducted at the SOM by a wide variety of stakeholders. The process of identifying all groups who might be engaged in some form of evaluation activity was challenging. Given the unique needs of the various offices and departments in the SOM, isolated pockets of activity around evaluation data collection and use were widespread.

Following this data collection, key groups of stakeholders were identified and interviewed. These groups included not only the groups represented by the membership of the CEC but also Admissions, Student Affairs and a patient group. Members of the CEC conducted the interviews during which the same five questions were asked:

1. Are you aware that the curriculum is changing?
2. What are your hopes/expectations of the new curriculum?
3. What improvements in medical education would you like to see?
4. What evaluation questions/information would be useful to you?
5. How will you know if we have educated better graduates?

In a few cases, these questions were asked via email due to scheduling restrictions. In all cases, the results were documented via transcript, which were reviewed by the co-chairs and made available for review by all members of the committee. The results of these interviews were discussed within the CEC as a mechanism to facilitate a discussion of both barriers and support for the evaluation. Content analysis was conducted as detailed below.

Identify Primary Intended Users

Once the interviews had concluded, the co-chairs of the CEC independently analyzed the transcripts for themes. Following independent analysis, their findings were discussed until a consensus on the themes was reached. This list of themes was then shared with both the CEC and the chair of the Curriculum Committee, all of whom had access to the original transcripts. These individuals were asked to review the findings and comment on their face validity and completeness. Ultimately, five main areas of concern expressed by the stakeholders. These areas were Pedagogy (Curriculum Planning and Delivery), Faculty Development, Accreditation/Licensing, Resources and Student Assessment. These areas formed the categories of evaluation use.

Focus Evaluation

The process of interviewing stakeholder groups led to the formation of many possible evaluation questions. These evaluation questions were collated and discussed with the CEC to insure a complete representation of concerns. These questions were categorized by the areas of concern noted above and placed into a grid according to the area of the logic model that they corresponded to. The results of this exercise resulted in the findings in Figure C. Through an iterative process these questions were taken to the Curriculum Committee and various other stakeholder groups in an effort to prioritize the list of evaluation questions.

Evaluation Design

Once the evaluation questions were prioritized, the evaluation process itself could be designed. The design of a comprehensive curriculum evaluation is outside of the scope of this paper however it should be noted that evaluation questions were categorized along the lines of not only the areas of concern and logic model component but also by the time frame for

evaluation. To the extent possible, responsibility for data collection, analysis and reporting was given to PIUs of the data. In this way we hoped to increase the evaluation capacity of the SOM, decrease the time between data collection and use and to increase transparency in the evaluation process. It should be noted that with U-FE the focus of evaluation is on providing the information necessary to the PIUs and thus the choice of methodological approach is not dictated by the theory but rather by whatever is appropriate for the particular users in that particular situation (Patton, 2008).

Discussion

At the UVA SOM we had the unique opportunity to develop a comprehensive system of program evaluation concurrent with the implementation of a new curriculum. In many ways this timing was ideal for capturing stakeholder interest in the evaluation process and building evaluation capacity. Further, it allowed for faculty time to be efficiently used in both program development and evaluation concurrently.

Patton (2008) describes U-FE as making little distinction between the development and evaluation processes. Thus, U-FE was a logical choice of evaluation theory in the context of a developing and evolving curriculum. Additionally, U-FE is a cost-efficient model because resources are not spent collecting data that has no pre-defined use.

Still, there are costs involved, as PIUs need to be involved in the evaluation process early. In describing the sociological roots of U-FE, Patton (2015) writes that the evaluator "develops a working relationship with intended users to help them determine the kind of evaluation they need." In the evaluation described above, the formation and active participation of the CEC in the design and planning of the evaluation facilitated this process. The authors feel that this cost is

recovered in the increased evaluation capacity of the institution that is seen when U-FE is used to conduct evaluation.

We were fortunate to be able to collaboratively develop the logic model and program theory and felt that this process was useful for the education of PIUs about the evaluation process, clarification of evaluation questions and building evaluation capacity. One step of U-FE that we were unable to perform due to constraints on faculty time was the simulation of evaluation data use. While this step involves an up-front cost, it may have proved to be timesaving later as evaluation data was analyzed and presented.

Despite this, we could only find two cases in the literature where U-FE was used explicitly as the model for evaluation in a medical education setting.

Conclusions

A comprehensive plan of program evaluation is vital to the success of curriculum reform and renewal. This process should be developed concurrently with the curriculum and involve all stakeholders. Merely carrying over an existing system of evaluation without consideration to what will be done with the data collected is a waste of resources.

The use of an evaluation model allows for the process to be carried out in a way that is thorough and consistent with professional standards for evaluators. It insures that evaluators attend to issues of methodology but also ontology, social programming issues, value definition, and practice considerations including the role of the evaluator themselves. Further, explicating this model early in the design of an evaluation ensures that both evaluator and the users of the evaluation are in agreement on these issues.

U-FE provides a model that is particularly advantageous as it allows for evaluation to be context-specific and grounded in the values and needs of the particular institution. By defining

not only intended users but also intended uses early in evaluation development evaluators can be assured that data collected is data used. Medical education in particular has seen near constant curriculum change over the last several decades and U-FE as a model facilitates the use of evaluation data in ongoing development efforts.

Utilization focused evaluation is an evaluation model that collects data with a pre-defined use, channels data into ongoing development and involves stakeholders in the design and implementation of the evaluation. With the ongoing economic pressures facing medical schools, the efficiency afforded by U-FE makes it a logical choice as an evaluation approach.

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Figure A

Logic Model for the School of Medicine

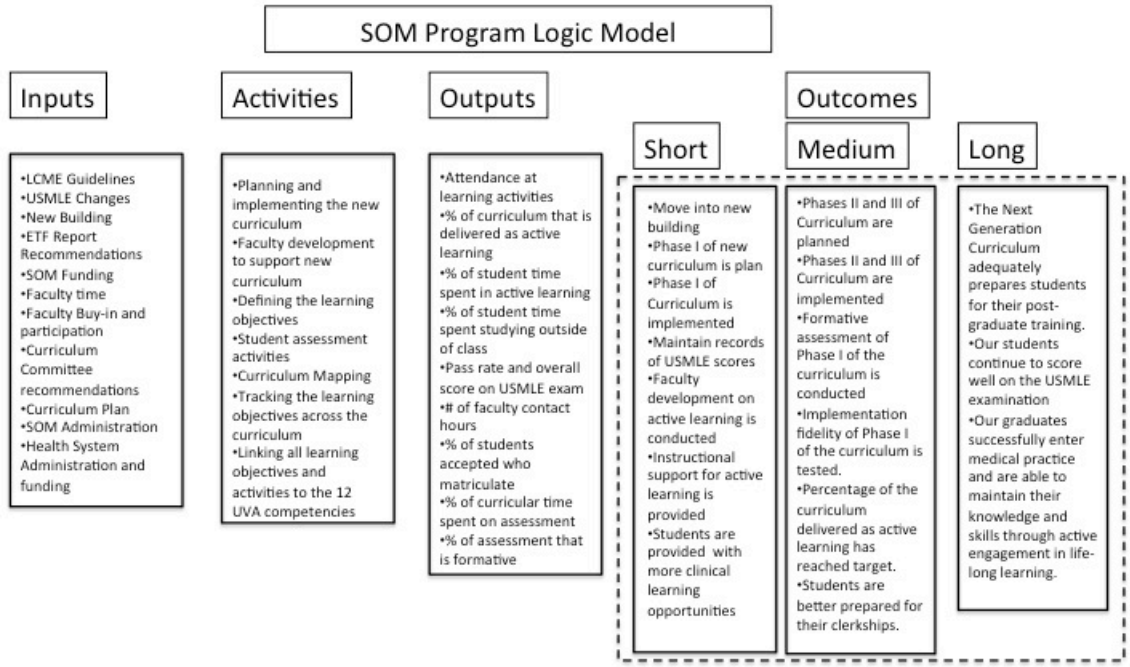

Figure B

Program Theory for the School of Medicine

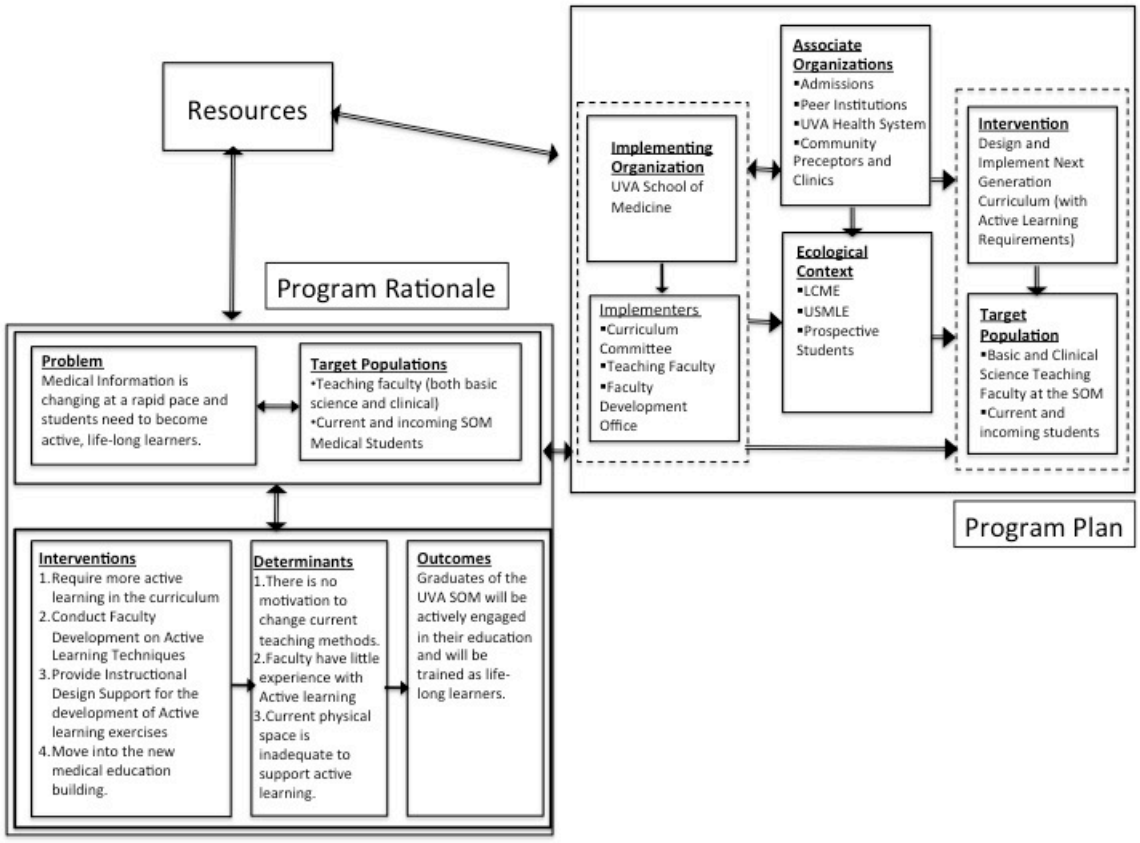

Table 1

Stakeholders Identified by the Curriculum Evaluation Community (Primary intended users are identified in italics)

Clinical Faculty:
Curriculum Committee member
Organ-System Leader
Clinical Discipline Leader
Clerkship Director
Representative of Fourth Year Electives
Clinical Performance Development
Residency Representative
Basic Science Faculty:
Organ-System Leader
Discipline Leader
Curriculum Committee member
Research Program Representative
MSTP
Education Specialists:
Library/Resource Management
Director of Clinical Skills Training Program
Simulation Center Representative
Quantitative Specialist
Qualitative Specialist
Program Evaluation Specialist
Curriculum Developer
Faculty Development
Administrators:
Dean's Representative
Medical Education Support
Student Leadership:
One from each class year
Inter-professional Education
Representative from Nursing School

Table 2

The Steps of Utilization Focused Evaluation (adapted from 27)

U-FE Step	Evaluator Tasks
1. Program/ Organizational Readiness Assessment	Assess commitment to doing evaluation. Assess what needs to be done to enhance readiness. Determine if evaluation clients are ready to assess stakeholder constituencies.
2. Evaluator Readiness and Capability Assessment	Assess the match between the evaluator's knowledge, skills and commitment and what is required in the evaluation.
3. Identification of Primary Intended Users	Facilitate an evaluation climate and build sustainability. Outline and facilitate a process that intended users want to be a part of. Determine real interest and examine PIU's connections with stakeholders.
4. Situational Analysis	Learn the extent to which past evaluations were useful. Identify barriers and supports for evaluation.
5. Identification of Primary Intended Uses	Guide PIUs in examination of formative, summative and compliance issues for the evaluation. Infuse evaluative thinking into the organization culture.
6. Focusing the Evaluation	Actively involve PIUs in determining priorities and narrowing options. Create *specific* evaluation questions according to the priority of uses.
7. Evaluation Design	Select methods in coordination with PIUs such that methods have credibility and validity for the users.
8. Simulation of Use	Using fabricated data, help PIUs decide how findings will be used.
9. Data Collection	Reflect on the process and report preliminary findings along the way.
10. Data Analysis	Organize and analyze data according to the primary intended uses.
11. Facilitation of Use	Determine dissemination mechanisms that are consistent with the intended uses.
12. Meta-evaluation: Evaluating Use	Follow-up to determine to what extent the evaluation was used.

Table 3

Initial prospective evaluation questions by Logic Model Domain and Area of Evaluation Focus

	Inputs	Activities	Outputs	Outcomes	Impact
Curricular Content	7	10	3	2	1
Curricular Methods	5	11	10	1	0
Student Assessment	4	8	5	11	3
Regulatory	5	2	2	0	0
Faculty Development	3	4	1	1	0
Other	8	7	3	18	2

Stages of Concern (SoC) of Faculty during a Curriculum Change

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Author Note

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Abstract

In the case of medical school curricula, change is the rule rather than the exception. Change models provide a tool to guide efforts in implementation of new curricula. Specifically, the Concerns-Based Adoption Model (CBAM) provides diagnostic tools to assess and address faculty concerns. CBAM has been used in health professions education but with only incidental reports in the medical education literature. In this paper, the use of the Stages of Concern Questionnaire (SoCQ) to assess faculty concerns both pre-implementation and early in the implementation of a new curriculum is described. The use of these results in faculty development and curriculum implementation is discussed.

Context of Curricular Change

In the years since the publication of the Flexner Report in 1910, the American system of medical education has been largely composed of two separate segments: the basic sciences and the clinical fields (Flexner, 1910). Basic science training typically took place in the first two years of the Undergraduate Medical Education Curriculum (UME) followed by two years of clinical training. This "2+2" model was almost uniformly applied until post World War II when Western Reserve University in Ohio instituted an integrated curriculum (Bloom, 1998). Over the last two decades trends in curriculum reform have been to include more integration in teaching (Harden et al., 1997) with both professional bodies and funding organizations joining this charge.

The American Association of Medical Colleges (AAMC) in their 1984 report on General Professional Education wrote that the classical curriculum had the "undesirable effect of artificially separating the basic and clinical sciences" (AAMC, 1984). In 1991, the Robert Wood Johnson Foundation (RJWF) set out to encourage change in the ways that medical schools taught under a program titled "Preparing Physicians for the Future." The schools funded under this program were given stated goals that included "to encourage early clinical exposure and vertical integration" (RWJF, 2002).

More recently, the Liaison Committee on Medical Education (2016) has joined the call for more integration. In the most recent edition of the LCME standards, standard 8.1 reads: "A medical school has in place an institutional body that oversees the medical education program as a whole and has responsibility for the overall design, management, integration, evaluation, and enhancement of a coherent and coordinated medical curriculum." This standard maps to an earlier standard which stated: "Evidence of coherence and coordination includes: content that is coordinated and integrated within and across the academic periods of study (horizontal and

vertical integration).” (Liaison Committee on Medical Education, 2007). Thus the accrediting body for schools of medicine has mandated that the curriculum be integrated in specific ways.

Finally, changes in the licensure requirements graduates must meet have led to a reexamination of the ways in which we integrate basic and clinical science content in the curriculum. The three-step United States Medical Licensure Examination (USMLE) was initially implemented in 1992. In 2004 the Composite Committee that governs the USMLE began a review of the design, structure and format of the exam in light of changes in the academic, regulatory and practice environments that had taken place since 1992 (Scoles, 2008). The recommendations that came out of this review are still being discussed and changes to the exam itself are not yet final but key concepts emerged from the initial report. Generally it has been recommended that: “assessment of fundamental science principles should be undertaken in a clinically relevant context” (Scoles, 2008).

Curricular Change at the University of Virginia

Concurrent with these national changes, the University of Virginia School of Medicine (SOM) was designing and constructing a new state-of-the-art medical education building. This facility was designed to include learning spaces specifically engineered to facilitate active learning as well as space dedicated to clinical skill development. To make the most of this investment, the Dean of the SOM commissioned an Educational Task Force (ETF) to study how best to make use of these facilities.

The ETF consisted of members of the faculty and administration as well as current students who undertook the task of researching the best teaching practices at peer institutions. The final report of the ETF made a series of broad recommendations (McCollum & Chhabra, 2008). Regarding the curriculum, the ETF specifically recommended more active learning

methods be used. This led to the design of the NxGen curriculum, which was subsequently implemented in 2010 with the incoming first year class. Roll-out of the NxGen curriculum was incremental. As such, only the first year of the curriculum changed in academic year 2010-11 and all four years of the curriculum would not be in place until AY 2013-14.

The NxGen curriculum was designed around five basic principles, early and developmental clinical skills exposure, integration of the curriculum, optimal use of the new learning studio space, and active learning. one of which was the incorporation of more active learning throughout the curriculum.

Concerns Based-Adoption Model

Change is a "delicate process that can be effective and sustainable only if properly facilitated" (The Evidence-Based Intervention Work Group, 2005). The Concerns-Based Adoption Model (CBAM) is a model for educational change that describes the process individuals within an educational institution must pass through in order to successfully implement an educational innovation (Ensminger & Surry, 2008; Hall & Hord, 1987). The model is unique in that it considers change from the perspective of those individuals directly involved in the implementation of an innovation. Looked at from that perspective, it can be a valuable tool in targeting faculty development efforts during a curricular change.

Overview of the Model

The Concerns Based Adoption Model (CBAM) was first defined in 1974 by a group of researchers at the Southern Educational Development Laboratory (Hall and Hord, 2014). It evolved from the earlier work of Frances Fuller (1969) demonstrating that the perceptions of individuals involved in the adoption of innovations are important for the success of the innovation process.

CBAM makes several assumptions about educational change (Hall & Hord, 2014). To begin with, the authors of the model assert that change is a process rather than a single event. The second assumption is that individuals rather than organizations accomplish change. Thus, the individual must be the primary target of any intervention designed to facilitate change. Other change models view the institution as the primary unit of change but the CBAM model posits that the institution cannot change until the individuals within them change. The third assumption of the CBAM model is that change is a highly personal experience, making personal concerns and actions potentially more critical than the characteristics of the innovation itself. The fourth assumption is that change involves developmental growth of feelings and skills, an assumption that was pivotal in the development of the three tools that comprise the model. This means that the change process is not simply an undifferentiated continuum that relies simply on the passing of time but rather that the process is developmental in nature. The fifth and final assumption is that change can be facilitated by interventions directed toward individuals (Hall & Loucks, 1978; Hall & Hord, 2014).

The three diagnostic tools that compose the CBAM are the Stages of Concern Questionnaire (SoCQ), the Innovation Configuration (IC) and the Levels of Use (LoU) Interview protocol (Hall and Hord, 2014). These are diagnostic tools, which were developed to describe the change process and guide faculty development. Although they were designed to be used together, they may be used either individually or in various combinations (Anderson, 1997). The current study employs the Stages of Concern Questionnaire to examine faculty concerns.

Stages of Concern Questionnaire

The Stages of Concern Questionnaire (SoCQ) is the most commonly used of the three diagnostic tools that make up the Concerns Based Adoption Model and is the focus of this paper.

Hall described seven stages of concern, numbered 0-6, that span a developmental range (Hall and Hord, 2011). These stages are: unconcerned, information, personal, management, consequence, collaboration, and refocusing. According to Hall (1976), concerns directly impact an individual's performance. Thus, lower level concerns must be addressed before higher-level concerns can emerge and subsequently be addressed. These seven stages and the items from the survey designed to measure each are shown in Table 1.

Two assumptions underlying this model deserve mention (Cheung, 2002). The first is that "concern" is a multidimensional construct that exists independent of the innovation. The second assumption is that the seven stages of concern are developmental in nature. That is, that the correlations among the seven variables would form a simplex structure (Joreskog, 1970).

CBAM in Health Professions Education

The bulk of the literature utilizing CBAM and health professions education can be found within the discipline of nursing. As in both K-12 and higher education, this literature is largely concerned with the use of technological innovations. Also, likely due to its ease of use when compared to the other two tools of CBAM, the bulk of the literature is based on the SoCQ. What follows is a brief review of this literature.

Nursing faculty adoption of computer technology was studied using the SoCQ both prior to and following a faculty development program in a study by Lewis & Watson (1997). Years later, following significant advances in computer technology, Dell (2004) used the SoCQ to look at nursing faculty concerns regarding web-based instruction. More recently, Abell et al. (2010) used a quasiexperimental design to study video delivery of synchronous distance education in a BSN program. Ansah et al. (2011), conducted a broader study where faculty concerns towards distance education were examined using the SoCQ across a random cross section of faculty at a

single point in time. This study included faculty from a variety of disciplines, including the school of nursing.

Technology is not the only innovation that has been studied using CBAM in health professions education. The movement to use nursing conceptual models began on the national level in the 1980s. Dalton (1990) used the LoU interview protocol to examine the use of nursing conceptual models by BSN nursing faculty. A total of 40 faculty members from 13 BSN programs were interviewed via telephone using the LoU interview protocol. Of those, only ten scored in the "user" category on the LoU (score of >II) and all of those scored at the IVA level, making sub-group comparisons impractical.

Gwele used CBAM to measure faculty reactions to curricular innovations extensively while studying nursing education in South Africa. Over the various stages of curricular change in the implementation of a comprehensive nursing curriculum, the SoC profiles of faculty at four schools were compared (Gwele, 1996a). The LoU was also examined across the same four nursing schools (Gwele, 1996b). Finally, Gwele (1997) used the SoCQ to track concerns during the implementation of a problem-based learning curriculum in a single nursing school over an 18 month implementation period.

Although most frequently seen there, nursing is not the only discipline within the health professions to utilize CBAM. In 2008, Remus used the SoCQ as part of a larger mixed methods evaluation examining faculty concerns about service learning in a health professions college (Reams & Twale, 2008). Within dental education, Littlefield used the SoCQ with faculty as an instrument to help improve a teaching skills course (Littlefield, 1979).

Focusing specifically on medical education, Broyles et al. (2007) used the SoCQ to assess faculty concerns regarding the implementation of a competency-based curriculum in a

college of osteopathic medicine. This study used follow-up interviews to triangulate the data, and calculated internal consistency and reliability estimates for the SoC in a medical school setting.

Previously, Broyles and Tillman (1985) also examined the elements of a training session and correlated them with the impact of SoCQ. The majority of participants in this study were non-users of the innovation and training was shown to reduce the intensity of awareness, informational and personal concerns. However, when trainers spent more time on introductory content, the intensity of personal concerns was higher after the workshop. Increased time spent on skills reduced the intensity of consequence concerns while more time spent on organizational material resulted in lower informational concerns. Giving examples reduced refocusing concerns. Finally, the more theoretical the nature of the training content, the higher the level of personal concerns seen following the training session. This study suggests that the nature of faculty concerns can be impacted by the format and content of training.

Rationale of the Study

The purpose of this study was to examine the concerns of faculty who are being asked to use active learning methodology in a new curriculum using the Stages of Concern Questionnaire (SoCQ). The literature would suggest that individuals implementing an innovation have a developmental progression of concerns that must be addressed in order for implementation to be successful. Demonstrating these concerns in our faculty may allow us to better target our faculty development efforts to promote adoption of active learning.

Research Questions

Three research questions were identified to frame this work. They are:

1. What were the Stages of Concern profiles for School of Medicine faculty before and during implementation of the Next Generation Curriculum?
2. What are the specific concerns of the faculty during the curriculum change process as measured by the Stages of Concern Questionnaire?
3. How did the concerns profiles of faculty change from the pre-implementation to implementation phases of the curriculum change?

Methods

Subjects

For the purpose of this study, approximately 420 School of Medicine faculty members were identified. This sample included all faculty members who had presented material in the pre-clerkship curriculum as recorded on the student schedule, all faculty members who had completed clerkship evaluations for at least two students in the last academic year and any faculty who were members of the Academy of Distinguished Educators or the Curriculum Committee. Approval was sought and received from the Institutional Review Board (#2009-043000).

Instrument

This project utilized a validated, web-based instrument created by the Southwest Educational Development Laboratory (SEDL), called the "The Stages of Concern Questionnaire" or SoCQ. The SoCQ consists of five items for each of seven factors for a total of 35-items. Individual items are rated on a Likert scale with values ranging from 0-7 where 0 represents "not true of me now" and a score of 7 represents "very true of me now". An additional item (Q36) allows for qualitative comments or "concern statements" to be collected. Percentile tables are provided for converting raw scores into scaled scores and interpretation

manuals are available for both the quantitative (Hall et al., 1988) and qualitative (Newlove & Hall, 1976) analysis of the results. Recognizing that an individual will not have only one concern at a time, user concerns are generally presented as a profile where one or more concerns dominate (Hall et al., 1998). The SoCQ is available online with blinding so participants can be coded by demographics without needing to identify them to the researchers. Subsequent data can then be analyzed by any number of subgroups.

The SoCQ is constructed in such a way as to be applied to any innovation. Each of the items remains the same with only the name of the innovation added to the instrument. In this way, the factor structure and reliability can be preserved. Although the word "innovation" has a variety of connotations, Hall and Hord (1984) define it simply as a program or process that is new to an individual. In the case of the current study, the innovation was active learning. For the purpose of this study, participants were given the following definition of active learning:

> For the purpose of this questionnaire, **ACTIVE LEARNING** is defined as any instructional method that engages students in the learning process. **ACTIVE LEARNING** requires students to do *meaningful* activities and think about what they are doing. While this definition could include traditional activities such as homework, in practice it refers to activities introduced into the classroom. The core elements of active learning are student activity and engagement in the learning process. **ACTIVE LEARNING** is often contrasted to the traditional lecture where students passively receive information.

The SoCQ has been extensively validated (Hall & George, 1979). Estimates on internal consistency (alpha coefficients) range from .64 to .83 with six of the seven coefficients being above .70. Additionally, stage score correlations ranged from .65 to .86 with four of the seven being above .80 (Hall & George, 1979). Finally, test-retest reliability measures are reported to range from .65-.86 (Hall & Hord, 2014). In addition to the 36-items on the SoCQ, demographic items were added to the instrument to allow for sub-group analysis.

Data Collection

The SoCQ was administered online at two time points. The first time point (Cohort 1) was approximately six months prior to the implementation of the new curriculum. The NxGen curriculum began in August 2010 and data from Cohort 1 was collected between 3/1/10 and 4/19/10. The second time point (Cohort 2) was one year later, halfway through the pre-clerkship curriculum. Data from Cohort 2 was collected from 3/22/11 to 4/27/11. The intention is to re-administer the SoCQ annually to follow trends in faculty concerns.

During both administrations, faculty was asked by email to complete the instrument. No compensation was offered and completion of the instrument was taken as consent to use the responses. Two follow-up emails were sent at two-week intervals. Between the first and second administrations the participant list was updated to exclude those individuals no longer at the university and to add individuals who had taken on any of the roles identified (i.e. teaching, clerkship evaluation or leadership).

Data Analysis

All data analysis was conducted using SPSS 20 for the Mac. Raw scores for each of the seven levels of the SoC were first converted into normed percentiles using the table provided in George et al. (2006). Percentile scores were then used to create profiles for each cohort as well as to generate descriptive statistics for each cohort. Pooled data was used to calculate Chronbach alphas for each of the seven scales to demonstrate the reliability of the instrument in this setting. In addition to the profiles, the percentile scores were analyzed using MANOVA to look for significant differences between the stages of concern between the two cohorts.

Finally, the qualitative items were scored according to the manual to give an additional distribution of stage of concern scores (Newlove & Hall, 1976). The scoring manuals, initially

published when the instruments were developed, have not changed significantly since. The most recent edition of the SoCQ manual (George et al., 2006) does not address scoring of the qualitative items, which is covered in the manual by Newlove & Hall (1976). Scoring for the concerns statements is conducted by breaking down the responses into segments – either sentences or phrases – and determining which stage of concern each segment reflects. The manual gives exemplar statements for each stage of concern along with sample scoring sheets.

Results

Respondents

While over 420 invitations were sent to each cohort, the response rate was less than 15% with 57 respondents in the first cohort and 47 in the second. Demographic information is shown in Table 2 for both cohorts as well as the pooled group. Additionally, information was collected about the faculty generally for gender, rank, employment status and departmental affiliation. No statistically significant differences were noted between the overall population and the sample although there was a trend for the sample to hold slightly higher faculty rank than the overall population. Demographic data is only available for the faculty as a whole while this study selected only faculty directly involved in teaching M.D. students. Therefore, it is unclear if this shift represents a sample bias or if it accurately represents the population within the faculty that bears the bulk of the education responsibility in the School of Medicine.

Reliability

Pooled data from the two cohorts was used to determine the reliability of the instruments. Alpha coefficients ranged from .66 to .88 with five of the seven coefficients above .70, consistent with the published data showing values ranging from .64 to .83 (Hall & George, 1979).

Research Question 1: SoC Profiles

The first research question posed was: What were the Stages of Concern profiles for School of Medicine faculty before and during implementation of the NxGen Curriculum? The SoCQ is not intended to derive a single stage of concern for each user or group of users but rather to generate a profile of concerns relative to each other. To begin, the raw scores were converted into scaled scores using the conversion provided in the manual (George et al., 2006). Following this conversion, scaled scores for each of the respondents was used to calculate descriptive statistics. The result of this analysis is shown in Table 4.

These scores were then used to generate the concerns profiles shown in Table 5. George et al. (2006) describe the variety of user profiles possible with the SoCQ. In addition from the four prototypic profiles (nonuser, inexperienced user, experienced user and renewing user), the manual also illustrates eleven different "classic" user profiles along with possible interpretations of profiles with various peak concerns. Profiles are interpreted based on the pattern of concerns, interpreting the intensity of concerns relative to one another as well as the nature of the highest level (peak) concern.

The profile for Cohort 1 (pre-implementation) mirrors the typical non-user profile shown in George et al. (2006, pg. 38) and reproduced in Table 6. In this profile, Stage 0 (Unconcerned) and 1 (Informational) concerns are highest, indicating that there is not full awareness about the innovation (Stage 0) but there is interest in learning more (Stage 1). In the case of this profile, Stage 2 (Personal) and Stage 4 (Consequence) concerns are low while there is relatively more concern about Management (Stage 3) and Collaboration (Stage 5). Finally, the tailing down at Stage 6 (Refocusing) would indicate that there are no competing ideas. In general, this is a favorable non-user profile.

Cohort 2 shows a different picture. In this profile, there is a negative 1-2 split where Stage 2 (Personal) concerns are higher than Stage 1 (Informational) concerns. This indicates that there are various degrees of doubt or even resistance to the innovation. The tailing up at Stage 6 (Refocusing) indicates that there is interest in competing innovations. Coupling these two elements would indicate some resistance to the innovation. For comparison, Table 6 reproduces the exemplar profile from George et al. (2006, pg. 40).

Research Question 2: Specific Concerns

The second research question was: What are the specific concerns of the faculty during the curriculum change process as measured by the Stages of Concern Questionnaire? In order to answer this, the concerns statements collected in Q36 of the SoCQ were analyzed using the guidelines published by Newlove and Hall (1976).

All responses were taken from the data set and broken into logical segments. Each segment was assigned to a stage of concern based on the descriptions in the manual (Newlove & Hall, 1976). Following the scoring, a tally was generated of the number of segments for each stage of concern broken down across the two cohorts. Table 7 shows the results of this analysis.

As the open-ended concerns statement was not a required question, not all respondents completed this item leading to a lower response rate on this item than on the questionnaire overall. Further, given the highly self-selected nature of the comments, these numbers should be interpreted with great caution.

More important than the number of comments would be the qualitative nature of the comments themselves. Comments representative of each stage were found across both cohorts as shown in Table 8. Comments were selected for inclusion if they occurred in more than one

response, if they were the most representative of a particular Stage of Concern as described in the manual or if they were the only example of a particular concern (e.g. Stage 1 for Cohort 1).

Although comments may be coded as the same stage, there are qualitative differences between the two cohorts. For example, Stage 2 (Personal) concerns in Cohort 1 were more likely to be about the process of the curriculum change while Cohort 2 was more concerned about their implementation of the innovation. This is of particular significance given the negative 1-2 split seen in Cohort 2. As reported by George et al. (2006), individuals with such a profile are not likely to accept an innovation until their personal concerns are addressed. Thus, it is of importance for curriculum leaders to note and address these concerns.

Research Question 3: Change over time

The third research question was: How did the concerns profiles of faculty change from the pre-implementation to implementation phases of the curriculum change? To examine this question, a one-way MANOVA was conducted with the seven stages of concern scores as dependent variables and cohort as the independent variable. The MANOVA revealed a significant multivariate main effect, Wilks' $\lambda = .837$, $F\ (7, 96) = 2.668$, $p = .014$, partial eta squared = .163. Observed power to detect the effect was .882.

Separate univariate ANOVAs on each of the stage of concern scores revealed that the only significant difference was on Stage 1 (Information), $F\ (1,102) = 5.310$, $p = .023$, partial eta squared = .049. For this stage of concern, the Cohort 1 had higher levels of concern (mean of 69.23) than did Cohort 2 (mean 59.60).

Limitations

There are several limitations of this current study, the most significant of which is the very low response rate. In Cohort 1, there were only 57 respondents with only 47 responding in

Cohort 2. While this only represents an average response rate of only about 12%, it should be noted that the entire teaching faculty was polled rather than sampling the population. In this way, the respondents could be thought of as a self-selected sample of the total population.

A meta-analysis by Cho et al. (2013) examined how the characteristics of a survey impact the response rate among health care professionals. They found an overall response rate of 50% across all surveys and all types of health care providers in a review of literature published between 1958 and 2012. Three factors were identified in that work that might have contributed to the lower response rates seen here. Both the lack of an incentive and web-delivery would contribute to diminishing our response rate. Interestingly, the 50% response rate reported by Cho et al. is a mean across a wide span of time. Within the data, there is a marked decrease in response rate with time such that the mean response rate reported for 2012 is just over 40%. So while we might expect a response rate closer to 40% for a web-based, several other studies where the entire faculty was surveyed have reported similar response rates to the one found in the current study (Garavalia et. al., 2000; Fisher, 2008).

The low sample size makes generalizing conclusions questionable. Further, the ability to conduct any meaningful sub-group analysis lacks adequate power due to this response rate. Despite this, Chronbach alpha scores show good internal reliability and are consistent with reports in the literature (Hall et al., 1979; Hall et al., 1998). Future work should focus on more selected populations in order to allow targeted requests for participation and enhanced follow-up for non-responders.

Relying on self-report is another known limitation of survey data. There is also literature questioning the SoC seven-stage model (Cheung et.al, 2001). Bailey and Palsha (1992) conducted an exploratory factor analysis of their data as well as calculating Chronbach's alphas

and found the CBAM model to be inadequate. They proposed two modified versions: a 5-factor model with either 35 or 15 items. Confirmatory factor analysis suggested that this maybe a more reliable model but also revealed persistent issues with the validity of this new model, leading Shotsberger and Crawford (1996) to suggest a 27-item 5-factor model.

Finally, there were variations in the relative timing of administration of the instrument within the groups. The first administration, noted as "pre-implementation", sampled individuals who were at differing stages of curriculum development. Some respondents would have been less than a year from implementation of the new curriculum while others, teaching only in the clerkship phase, would have been at least two years away from implementation. During the time of this first administration, faculty development efforts were focused on dissemination of information about the structure of the NxGen curriculum and teaching methods targeted to the curricular goals. System leaders had been identified but only leaders of the first few systems were actively working on developing their coursework and recruiting faculty to teach. Faculty members in non-leadership roles had little to do with either the design or implementation of the curriculum at this phase.

At the second administration, some respondents would have already implemented the curriculum, some would be in preparation and others (i.e. clerkship) would still be years away from implementation. The first two systems were complete and the third was in progress. Faculty teaching in these systems would have experienced the NxGen curriculum while only leadership for the upcoming systems were involved in curriculum design and planning. Faculty development during this time was far less intense than prior to implementation and focused largely on teaching methods targeted to the curricular goals.

Thus, comparison of these two groups should be seen in terms of general trends of a faculty during the planning and implementation of a curriculum rather than a definitive "pre/post" implementation. Current plans are for the SoCQ to be administered annually in order to monitor trends over the implementation and post-implementation period, which, for a four-year curriculum, would span at least five years.

Discussion

As mentioned above, the SoC results are generally interpreted as a pattern. In this case, the profile of concerns for Cohort 1 (pre-implementation) can be described as a "Typical Nonuser" (George et al, 2006, pg. 38). Further, the pattern would indicate a non-user that is open to the innovation, results that would be expected during the pre-implementation stage of a curriculum change.

Cohort 2 shows a different profile of concerns. This profile demonstrates resistance to the innovation with a high level of Personal concerns (Stage 2) as well as a relatively high level of Refocusing (Stage 6) concerns. This could indicate users who have competing ideas to the innovation as well as significant concerns about the personal impact of the innovation for them as individuals.

In this case, the qualitative comments can be used to indicate the nature of these Personal (Stage 2) concerns. Faculty comments reflecting Stage 2 concerns differed between the two cohorts. In Cohort 1, faculty expressed concern about the process of the curricular change and their lack of a voice in it. By the time Cohort 2 was sampled, the curriculum change had been implemented and faculty expressed different Stage 2 (Personal) concerns. At this time point, the concerns related to faculty development and career impact of the new curriculum. Published literature suggests that these concerns need to be addressed directly in order to have successful

implantation of the innovation (George et al., 2006). In other words, faculty development aimed at discussion of management of active learning is unlikely to be effective until personal concerns are addressed. These responses indicate that faculty needed clarity about the ways in which their teaching efforts would be evaluated, the impact that such evaluation would have on promotion and tenure, and the mechanisms by which they would be able to learn the skills needed in this new curriculum.

Given that Cohort 2 includes faculty who have implemented the new curriculum as well as those who are still pre-implementation, this feedback is valuable. The entire four-year curriculum has not yet been implemented and there is still time to address these concerns moving forward. The SoCQ was designed as a diagnostic tool and in this case indicates the diagnosis of some resistance due to faculty concerns about the personal impact of the innovation. As shown by Broyles and Tillman (1985), faculty development that is too theoretical in nature can intensify Stage 2 (Personal) concerns. Additionally, concrete examples can reduce Stage 6 (Refocusing) concerns. This would suggest that in the case of Cohort 2, faculty development should be less theoretical and more practical, consisting of both concrete examples and information about the personal impact of the curricular change to individual faculty.

Taken together these two profiles would indicate an innovation that was initially favorably received but as implementation progressed began to elicit some resistance, likely due to faculty concerns about the personal impact of the innovation. This is understandable in light of the concerns expressed by Cohort 1 regarding their lack of input into the curriculum reform. Faculty members who felt unheard initially are now concerned about the implications of a curriculum they had no part in designing.

As a formative tool, this pattern would indicate the need to address faculty members' personal concerns and faculty development aimed at specific, concrete methods to implement the curricular changes. Annual data collection will yield information about the impact of those interventions and provide guidance for next steps. Targeting particular sub-groups of faculty would allow for even greater specificity of faculty development. Faculty in leadership roles would be expected to have different specific concerns as well as a different concerns profile than faculty involved only sporadically in classroom teaching. The amount of time each of these groups has available to participate in faculty development will also be different, requiring different interventions to address their concerns.

There is literature relating the use of the SoCQ to the design of faculty development programs. This literature can be used to guide our own faculty development efforts. Combined with the data collected using the tools of CBAM, faculty development efforts can be targeted at the appropriate level of concern. This will allow faculty development to be more efficient and contribute more effectively to the successful adoption of the innovation. Although contextual factors and a small sample size may limit generalization, this work should still be able to contribute to the body of research on the use of CBAM in medical education.

Conclusions

Medical education is in a state of rapid change for social, economic, and scientific reasons. These changes have led to a variety of innovations being adopted both in healthcare practice and within academic health centers. Models of change generally, and CBAM specifically, give us both the theory and the tools to navigate this rapid change. By examining faculty concerns about curricular innovations, we can better focus faculty development efforts and ensure appropriate implementation of the curriculum as envisioned by the leadership.

This report cites two years' worth of data from the SoCQ with recommendations for the utilization of the finidings. The SoCQ should be used annually to follow trends over time. Further, given the response rate, future use should target specific sub-groups of interest (e.g. course leadership, new faculty, faculty with the highest teaching load) in order to target faculty development efforts to those groups. Other tools of the CBAM model are currently in use and should provide for triangulation of data as the implementation of the curriculum moves forward. Specifically, the Levels of Use could be used to determine how well faculty are implementing active learning while the Innovation Configuration could help define the ways in which faculty operationalize active learning. These studies are currently underway and should help to guide the curriculum change process.

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Table 1

The Seven Levels of the Stages of Concern

Level	Stage	Items
Self-Directed	Awareness	3. I am more concerned about another innovation.
		12. I am not concerned about the innovation at this time.
		21. I am preoccupied with things other than the innovation.
		23. I spend little time thinking about the innovation.
		30. Currently, other priorities prevent me from focusing my attention on the innovation.
	Informational	6. I have a very limited knowledge of the innovation.
		14. I would like to discuss the possibility of using the innovation.
		15. I would like to know what resources are available if we decide to adopt the innovation.
		26. I would like to know what the use of the innovation will require in the immediate future.
		35. I would like to know how the innovation is better than what we have now.
	Personal	7. I would like to know the effect of the innovation on my professional status.
		13. I would like to know who will make decisions in the new system.
		17. I would like to know how my teaching or administration is supposed to change.
		28. I would like to have more information on time and energy commitments required by the innovation.
		33. I would like to know how my role will change when I am using the innovation.
Task-Directed	Management	4. I am concerned about not having enough time to organize myself each day.
		8. I am concerned about conflict between my interests and my responsibilities.
		16. I am concerned about my inability to manage all that the innovation requires.
		25. I am concerned about time spent working with non-academic problems related to the innovation.
		34. Coordination of tasks and people is taking too much of my time.
	Consequence	1. I am concerned about students' attitudes toward the innovation.
		11. I am concerned about how the innovation affects students.
		19. I am concerned about evaluating my impact on students.
		24. I would like to excite my students about their part in this approach.
		32. I would like to use feedback from students to change the program.
Impact-Directed	Collaboration	5. I would like to help other faculty in their use of the innovation.
		10. I would like to develop working relationships with both our faculty and outside faculty using this innovation.
		18. I would like to familiarize other departments or persons with the progress of this new approach.
		27. I would like to coordinate my efforts with others to maximize the innovation's effects.
		29. I would like to know what other faculty are doing in this area.
	Refocusing	2. I now know of some other approaches that might work better.
		9. I am concerned about revising my use of the innovation.
		20. I would like to revise the innovation's approach.
		22. I would like to modify our use of the innovation based on the experiences of our students.
		31. I would like to determine how to supplement, enhance, or replace the innovation.

Table 2
Demographic data for all respondents compared to all School of Medicine faculty

		Overall		Cohort 1		Cohort 2		Population	
		n	%	n	%	n	%	n	%
Gender	Male	57	54.8%	34	59.6%	23	48.9%	724	69.5%
	Female	47	45.2%	23	40.4%	24	51.1%	318	33.4%
Department	Basic	36	34.6%	17	29.8%	19	40.4%	210	20.3%
	Clinical	68	65.4%	40	70.2%	28	59.6%	825	79.7%
Rank	Instructor	11	10.6%	4	7.0%	7	14.9%	122	11.2%
	Assistant	14	13.5%	8	14.0%	6	12.8%	320	31.6%
	Associate	40	38.5%	21	36.8%	19	40.4%	344	29.4%
	Professor	39	37.5%	24	42.1%	15	31.9%	303	27.8%
Degree	M.D.	44	42.3%	28	49.1%	16	34.0%	-	-
	Ph.D.	38	36.5%	19	33.3%	19	40.4%	-	-
	M.D./Ph.D.	6	5.8%	4	7.0%	2	4.3%	-	-
	Other	14	13.4%	6	10.6%	8	17.0%	-	-
Years Teaching	<10	25	24.0%	13	22.8%	12	25.5%	-	-
	11-20	37	35.6%	18	31.6%	19	40.4%	-	-
	21-30	27	26.0%	18	31.6%	9	19.1%	-	-
	>30	15	14.4%	8	14.0%	7	14.9%	-	-
Teaching Hours/year	<50	59	56.7%	26	45.6%	33	70.2%	-	-
	51-100	19	18.3%	11	19.3%	8	17.0%	-	-
	101-150	14	13.5%	8	14.0%	6	12.8%	-	-
	>150	5	4.8%	5	8.8%	0	0.0%	-	-
Status	Part-time	7	6.7%	4	7.0%	3	6.4%	86	7.9%
	Full-time	97	93.3%	53	93.0%	44	93.6%	1003	92.1%

Table 3
Alpha coefficients for all seven stages of concern using pooled data from both cohorts.

Stage	Alpha
0	0.699
1	0.665
2	0.820
3	0.768
4	0.802
5	0.884
6	0.709
overall	*0.776*

Table 4

Mean, percentiles and standard deviations for all seven stages of concern by cohort (scaled scores)

Stage	Cohort 1			Cohort 2		
	Mean	**%ile**	**SD**	**Mean**	**%ile**	**SD**
0	69.67	87%	31.57	66.06	75%	28.31
1	69.23	69%	23.20	59.60	60%	18.51
2	68.54	72%	25.62	63.23	63%	21.51
3	44.79	47%	28.04	52.53	56%	26.88
4	32.23	24%	27.01	33.32	27%	21.52
5	40.65	36%	32.68	33.28	28%	26.11
6	31.96	26%	25.89	40.91	38%	23.79

Table 5

Stage of Concern Profiles for each cohort.

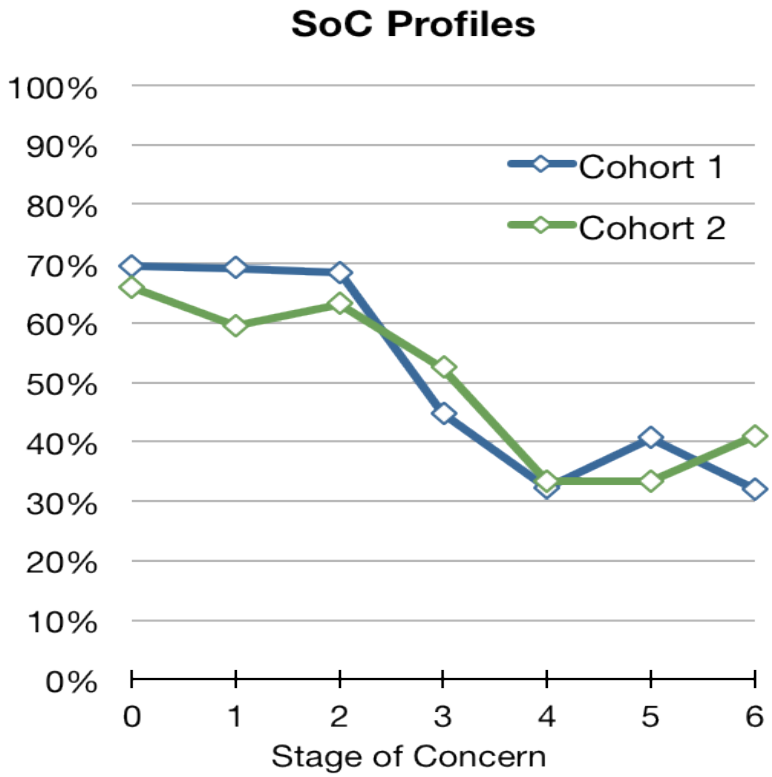

Table 6

Typical User Profiles (from George et. al, 2006)

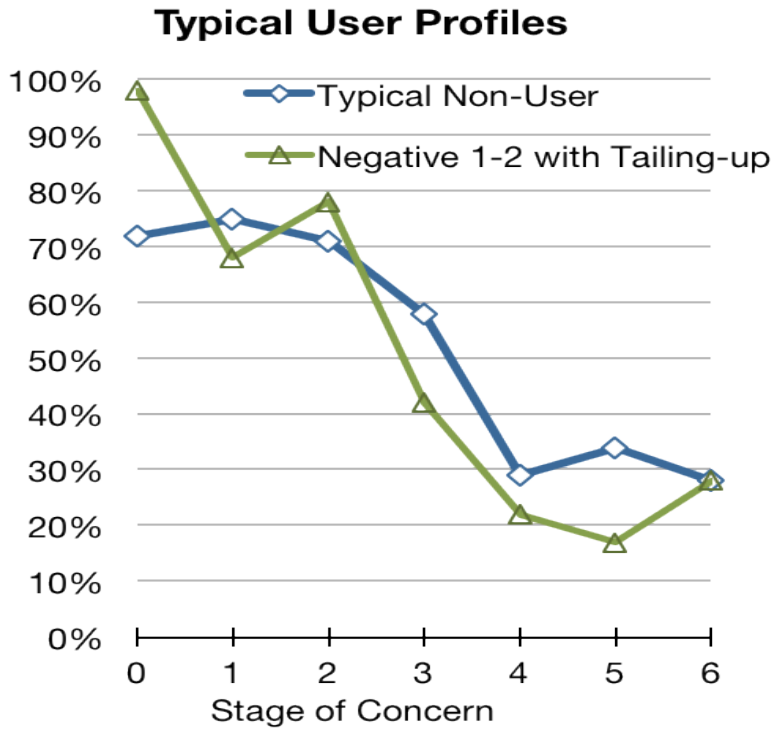

Table 7

Number of comments for each Stage of Concern by cohort.

Stage	Cohort 1	Cohort 2
0	10	4
1	1	4
2	8	5
3	14	10
4	5	17
5	2	1
6	1	4

Table 8
Representative Concerns Statements for each Cohort.

Stage	Cohort 1	Cohort 2
0	I know very little about this program yet.	I am not concerned about active learning.
1	Knowing more about the concept and practice of it.	What it means.
2	I feel left out of the process and unclear about just what is being instituted or adopted. I find myself with no voice in the process.	How will I get teaching credit for P&T when lectures are no longer the norm. Making sure that I am able to learn new methods of using active learning and integrate them into my teaching style.
3	What are the specific strategies and how reliable is the technology for active learning?	Talkative students will dominate.
4	I believe that retention is improved but am concerned that the curriculum becomes significantly less comprehensive. I am concerned with the depth of learning when active learning is the main approach.	Concerned about meeting student needs to go forward in their training. Will students be better trained in the end.
5	I am concerned that faculty will continue to lecture even during active learning sessions.	Whether other people who have committed to doing it are really able to deliver on their promises.
6	I think active learning is great sometimes, but it is not as efficient as lectures for helping medical students absorb the huge amount of information they need to absorb to pass the boards.	We shouldn't just be consumed with focusing on one mode of instruction. I think there is a place for lectures and didactic time where faculty can impart information.