LEARNING THEORY
AND ITS APPLICATION TO THE USE OF SOCIAL MEDIA IN MEDICAL EDUCATION

By

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Abstract

This project identifies the rapidly increasing pressure to employ social media in medical education and yet a review of the literature demonstrated that its value and role are uncertain. Given the evidence that application of learning theory is fundamental to sound pedagogy, the aim of the project was to examine whether medical educators have a conceptual framework that informs their use of social media and if this framework can be mapped to learning theory. A workshop was planned and conducted as part of a Social Media Summit in Health Professional Education to explore this issue. Thirty-six participants engaged in an iterative, consensus building process that identified their conceptual framework and determined if it aligned with one or more learning theories. The results of the workshop suggested that the use of social media by the participants could be traced to two dominant theories, Connectivism and Constructivism. Results also suggest that many medical educators may not be fully aware of the theories underpinning their decision making and that future research and faculty development in this area is greatly needed.
Acknowledgements

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Chapter 1 - Introduction

Overview

This project identifies the rapid introduction of the use of social media into medical education curricula without an apparent corresponding foundation of educational theory to guide its effective incorporation.

The purpose of the project was to explore whether medical educators, who currently use social media in their teaching, were introducing social media in a completely unstructured manner or whether there is some degree of educational theoretical underpinnings informing their implementation. The hypothesis was that medical educators carry conceptual frameworks of what works in educational practice, and that these frameworks are informed by their knowledge and previous experience. Moreover, these frameworks, when made explicit, can be mapped onto one or more educational theories. For the purposes of this project, a conceptual framework is considered to be ones’ philosophy of education or the way an individual conceives of how teaching and learning works. Learning theories give accepted explanations of how or why learning occurs. The following describes the existing knowledge of the problem (Chapter 1), discusses educational theories and why they are relevant to the introduction of an educational innovation such as social media (Chapter 2), describes a workshop that explored the current thinking of medical educators using social media (Chapter 3), discusses the outcomes of the workshop (Chapter 4), outlines the implications of the findings and how it might inform future
continuing professional development workshops on the use of social media in medical education (Chapter 5).

**Knowledge of the Problem**

Present day medical students and residents are predominantly members of the demographic group that is known as millennial learners. This group has also been referred to as ‘Generation Y’, the ‘Net Generation’ and ‘Digital Natives’ (Chu et al., 2012). These learners are individuals who were born between 1980 to the early 2000s. This fact makes them unique as learners in medical education. They are the first generation of learners to have grown up with the internet (McGee & Begg, 2008). It is this generation that has utilized and popularized Web 2.0 (McGee & Begg, 2008). The term “Web 2.0” is a term that was originally used by Tim O’Reilly to describe network technologies and services that bring a user-focus to the creation and construction of the content and functionality of the platforms (O’Reilly, 2005). Web 2.0 is characterized by the transition from static web pages to fluid, ever-changing sites that depend on user-generated content and through that the growth of social media.

A national survey conducted in the USA in 2011 revealed that 94% of medical students and 79% of residents actively use social media applications. This is in contrast to the number of practicing physicians who use social media – 42% (Bosslet, Torke, Hickman, Terry, & Helft, 2011). Although this data is dated, and users older than 50 years are now the fastest growing group of users, (Wang, Sandhu, Wittich, Mandrekar, & Beckman, 2012) it does demonstrate the distinction of these learners when compared to the medical educators.
The students and residents have a level of comfort and familiarity with the use of social media that isn’t necessarily present in their instructors.

The millennial learners’ lifelong engagement with Web 2.0 has not only influenced the way in which they utilize the Internet, it has influenced the way they learn. The ‘net generation’ is described as a cohort that is: digitally literate, constantly connected to others, ‘immediate’ in nature, experiential learners and socially centred beings (Chu et al., 2012). This has had an effect on their development as learners and hence their expectations as students. Today’s medical students expect that their teachers will effectively use information technologies to enhance their learning (Bahner et al., 2012; Chu et al., 2012).

In turn, the medical education community and its associated literature increasingly hold the same expectation of the medical educator. Repeatedly it is identified that given the nature of the learners and their ubiquitous use of social media, social media should be incorporated into the teaching and learning in medical education (Bahner et al., 2012; Cheston, Flickinger, & Chisolm, 2013; Chu et al., 2012; Hollinderbaumer, Hartz, & Uckert, 2013; McGee & Begg, 2008). “Harnessing social media’s potential to enhance learning is the logical next step in the evolution of medical education technology” (Cheston et al., 2013, p. 893).

However, there is a dilemma. Despite the recognition of this new generation of learners and the imperative to meet their learning needs, there is a paucity of information that gives the medical educator direction as to how and when to appropriately incorporate social
media in their teaching. The extant evidence of the effective use of Internet based learning in medical education is lacking. A literature review conducted in 2008 reported that internet-based learning is associated with large positive effects when compared with no intervention. When compared with traditional instructional methods, any effects are small suggesting no potential benefit (Cook et al., 2008). Medical educators are charged with the responsibility to adopt the use of social media and to ensure that they use it to enhance and not detract from the educational process (McGee & Begg, 2008). McGee and Begg (2008) explicitly articulate that this is the obligation of faculty and administrators “as stewards of the education system” (p 169). However, the uncertainty regarding benefit remains in more recent literature whereby it is identified that the advantage of web-based learning remains unclear and that although the use of social media in medicine has increased substantially, “its utility for enhancing learning remains poorly understood” (Wang et al., 2012, p. 1163). Further, a systematic review of the published literature on social media use in medical education led to the conclusion, “We found there to be a lack of high-quality evidence, infrequent assessment of skill or behaviour-based outcomes, and no assessment of patient-based outcomes in the studies in this review”(Cheston et al., 2013, p. 897). More concerning is the finding that “Without structure, social media can negatively impact student learning” and yet “it is the instructor who must lead effective ways to implement devices in learning” (Gikas & Grant, 2013, p. 19).

The present situation puts the medical educators in a double bind. It pairs a lack of familiarity with the technological tools and a lack of direction and understanding of how and when to use the tools effectively with the expectation that the tools will be successfully implemented in their teaching. “For medical educators, the question is not whether these
‘social media’ will be applied in their field, but how. Indeed, the emergence of these technologies presents an opportunity to re-imagine the future of medical education” (Sherbino & Frank, 2014, p. 545). It may be an exciting opportunity to be on the forefront of a cultural shift in medical education, but it is also a daunting enterprise for those on the front line.

Although there has been a lack of research regarding the use of learning theory and the use of social media, there has been substantive research into two areas of the use of social media by medical students and the medical profession: Professionalism and Confidentiality (Blackmur, 2013; Cheston et al., 2013; Chretien, Azar, & Kind, 2011; Chretien, Farnan, Greysen, & Kind, 2011; Chretien & Kind, 2014; Forgie, Duff, & Ross, 2013; Shore et al., 2011). This work is extremely relevant and essential to inform the profession of the potential risks of engaging in communication via domains that are freely open to scrutiny by others. However, this is not of benefit to assist faculty with matters of pedagogy. Coincidentally there has been a substantial increase in the integration of social media into medical education (Hollinderbaumer et al., 2013). Research that has looked through a pedagogical lens and the use of social media in medical education reports predominantly on learner satisfaction (Cheston et al., 2013; Cook, 2009; Han, Nelson, & Wetter, 2014). Cook (2009) reports this as a failure of educational research and that studies to date have done little to inform and/or advance educational practice in medicine.

This dilemma has therefore led to the motivation for this inquiry. There is an imperative to meet the needs of our millennial learners. There is increased pressure on medical
educators to incorporate social media into their teaching and learning from both the learners and the academy. This increased use has actually been occurring. And yet, there appears to be no evidence for the practice of using social media to underpin the teaching and learning in medicine.

**Purpose of the Project**

Given the call for more research to determine the best ways to integrate social media into medical education (Blackmur, 2013; Boulos, Maramba, & Wheeler, 2006; Cheston et al., 2013; Cook et al., 2008; McGee & Begg, 2008) and the recognition that it is already being used, it became clear that there was a need to step back and examine how medical educators, who are utilizing social media in their teaching, conceptualize its use and approach its adoption.

The use of social media for education should have the primary goal of promoting learning. At first glance, there is ample evidence that social media is being used in medical education with the best of intentions to enhance the educational environment and to promote learning (Armstrong, 2013; Blackmur, 2013; Cheston et al., 2013; Cook et al., 2008; Forgie et al., 2013; Greene, 2013; Hollinderbaumer et al., 2013). These are appealing educational tools because social media is being utilized to increase the learners’ access to content and help them engage with that content. It increases the access to information and the ability to exchange resources, knowledge and ideas (Blackmur, 2013). It is being used to interact with the instructors and to facilitate the learners’ ability to interact with each other and develop collaboration skills (Cook et al., 2008). The use of social media facilitates the customization of the learning to meet the individual’s needs, it provides the opportunity for
assessment through on-line quizzes, it promotes more feedback to the learners and enhances the potential for individual and group reflection (Armstrong, 2013; Cheston et al., 2013; Forgie et al., 2013).

So, where is the gap? These functions are being utilized as a means of improving the teaching and learning in medical education and to ensure that medical education is keeping step with the times, and yet there is a distinct lack of evidence that these strategies are valid. They appear to be based on the allure of social media versus a deliberate approach to education based on learning theory. Hence, implementation appears to be based on whim and any evidence of effectiveness that is reported is based on user satisfaction.

It is well established that learning theory provides the essential foundation for sound pedagogy. Given the lack of understanding and research into this area, one approach to gaining a foothold into this important area is to determine if we can obtain insights from those who have experience in using social media in medical education and how they approach its implementation. I therefore chose to design a workshop with two co-chairs to examine this relationship. This had the potential to identify whether there were theories underlying their educational practice. Thus, this first step could provide insights into the design of future research into the effective use of social media in medical education and the optimal construction of continuing professional development.
Chapter Two – Learning Theory as a Foundation

The Role of Learning Theory

Educational theory has long been recognized as “the essential background to rational educational practice” (Hirst, 1966, p. 40). Hirst (1966) articulates the role of educational theory as the foundation upon which educational judgments rest and the guide “to determine precisely what shall and shall not be done, say in education” (p. 40). The use of educational theory leads to the formation of ‘practical principles’ that inform one’s approach to education. From that perspective, it follows that it is important for educators to make the link between learning theory to the successful incorporation of social media into the pedagogy/andragogy in order to demonstrate that there is sufficient rationale for its use. By examining the theories, educators will better understand why specific practices work and which theories are most congruent with their educational intentions. Thus, they will also be better equipped to purposefully create activities that will lead students to achieve the desired learning outcomes.

Given this fundamental role of learning theory in education, a literature review was conducted to determine how learning theory is being employed to inform the use of social media in medical education. Overall this led to the discovery that there is a significant increase in the number of articles being published about the use of Social Media in medical education but none identified the educational theory that guides or informs its implementation. Further, there are repeated ministrations in the literature that there is a need for this work to be done. Linda Harasim (2012) specifically identifies that “In such a technology-driven world, it is critical and timely to study the intersection of learning
theory and technology” and “a theory-informed approach to transforming our educational practice remains elusive” (p. 2) Further, she states “Rather than transform pedagogy by using opportunities afforded by new technologies and the changing socio-economic context of the 21st century, a common tendency of educators has been to merely integrate technology into traditional ways of teaching” (Harasim, 2012, p. 2).

What is Learning Theory?

“A theory is an explanation for why something occurs or how it occurs” (Harasim, 2012, p. 3). A learning theory therefore provides an explanation of why or how learning occurs. There are many theories of learning and each provides a unique lens through which to look to understand how learners learn. What is learning? “Learning involves changes in learners’ thoughts, beliefs, knowledge, strategies and skills” (Schunk, 2016, p. 2).

Learning theories differ in how they predict learning occurs. They emphasize different aspects of the learning process. Yet, all learning theories provide an explanation of why, how, where, when and what occurs in learning. They provide a framework to use when making educational decisions and are therefore a guide for practice. They provide a means for understanding the teaching and learning process as well as a foundation upon which to discuss ideas about educational innovation and implementation. Learning theory allows educators to explore and understand their own successful or unsuccessful practices or on a larger scale learning theory provides the opportunity to examine educational practice in a substantive manner of inquiry. All learning theories are based on several fundamental criteria. These are: 1) a set of explicit assumptions about learning, 2) explicit definitions of
key terms, 3) specific principles derived from assumptions that can be tested and 4) explanations of the underlying psychological dynamics of events that influence learning (Gredler, 2009).

Embracing educational theories that align with one’s beliefs and assumptions about learning will therefore influence an educator’s ability to design good educational practice. This will enable consistency through the process of establishing learning outcomes, creating the curriculum, choosing the teaching methods (the teaching and learning activities), and the assessment strategies.

The use of educational theory leads to the formation of ‘practical principles’ that inform every aspect of one’s approach to education. The use of technology in education does not negate the responsibility to refer to a theoretical foundation in one’s teaching, and it may in fact, heighten the need to demonstrate that this change in the approach to education is based on something of substance. This obligation was identified early as technology was first entering the educational realm. “The future of educational technology rests on the ability of educators to interpret and implement sound educational theory into creative and innovative uses of educational technology.... The goal of the use of the computer and technology should be one of improving learning based on sound educational theory.” (Christensen, 1989, p. 137). “How to help people learn better” (Reigeluth & Carr-Chellman, 2009, p. xi) is the goal of educators and the purpose of utilizing a theoretical frame. It is the task of medical educators to demonstrate that their use of social media in their educational practice is based on sound educational principles, which have been
thoughtfully developed. “Theory is in the end, as has been well said, the most practical of all things.” (Dewey, 1929, p. 20)

**Linking Learning Theory and Conceptual Framework**

It is well documented that an educator approaches education in a manner that is consistent with a theoretical frame. Charles Reigeluth (1977) in his article about instructional theory and practitioner needs in the use of technology states, “Everybody I know naturally develops “mini-theories” about why things work the way they do and what helps them to accomplish goals” (p. 42). Brent Wilson (1997) who was writing about his thoughts on theory in educational technology argued that all practitioners approach their work with mental models or schemas; “Theories bear a resemblance to our mental schemas” (p. 22). He suggested that those with more experience could assist more junior personnel by encouraging them to explore their mental models. “How can we help novice instructional designers to develop such mental models without them thinking that theory is too abstract and complex” (Reigeluth, 1997, p. 45)? Indeed, a review of articles describing studies conducted in medical education looked at the quality of the reports and noted that only 45% contained a critical review of the literature (which often leads to a conceptual framework) and 55% reported their conceptual framework (Cook, Beckman, & Bordage, 2007).

Despite this lack of an overt adoption of a theoretical framework, there is a belief that medical educators do adhere to a conceptual framework as they approach their teaching and particularly when engaged in introducing an innovation (Bordage, 2009). Bordage (2009) describes that conceptual frameworks represent the way that an individual
conceives of a problem or their understanding of how something that is complex works. He explains that a conceptual framework arises from theories that have been confirmed by observations or experiments, models that may have been derived from theories, observations or sets of concepts or from evidence-based best practices derived from outcome and effectiveness studies. It is his assertion that “Educators and researchers constantly use conceptual frameworks to guide their work, even if they themselves are not consciously aware of the framework” (Bordage, 2009, p. 318).

This then was the foundation for this project and its workshop. A central premise of this work is that medical educators who are eagerly adopting and implementing social media in their teaching and learning do so using mental models that integrate various theories about teaching and learning - their conceptual framework. It is their conceptual framework of what leads to successful learning. The first step in designing successful learning is to consider how and why activities are effective – just as learning theory proposes to answer those same questions. Examining what medical educators believe about teaching and learning, (their conceptual framework) would allow them to align their practice and perspective with learning theory. This will in turn inform their process, enhance the learning and teaching, assist in their understanding of why specific practices work, allow them to see which educational theory is consistent with their teaching philosophy, their goals and the learning outcomes they hope to achieve. Finally, it will facilitate their ability to publish their work as a contribution to scholarship.

Helping educators to identify which learning theories were consistent with their conceptual framework and the learning outcomes they hoped to achieve by integrating
social media into their pedagogy was intended as an important step for this project. This led to the development of the inquiry questions that would be explicitly examined in this project.

Learning Theories that could guide a workshop on the use of social media

There are a large number of learning theories and conveying these learning theories to the workshop participants required a practical strategy. They needed to be able to familiarize themselves with multiple learning theories if they were expected to align their philosophy with one or more of these theories. How could all (or many) of the theories be presented in a fashion that would allow them to consider them and engage with them?

In order to manage this challenge, the participants were provided with three resources to facilitate their work. The resources were taken from the following online sites: http://edudemic.com/wpcontent/uploads/2013/06/learningtheories-full.jpg and http://www.teachersgarden.com/professionalresources/learningtheorists.html. The resources provided were selected because they concisely presented multiple learning theories, including the key concepts, the identified theorists associated with the theory and a description of the essential elements of the theory. The third resource that was shared with the participants was an online site that provides the same material but is more substantial in terms of content and description of the theories. This allowed for a more in-depth exploration of a theory if the participant found a theory that seemed to align with their educational philosophy. This resource is found at www.Learning-
Additionally, following my review of learning theories, the participants were also provided with a short-list of theories that would allow them to direct their attention to some theoretical frames that were deemed relevant to the use of Social Media in medical education. This was to facilitate their navigation of the substantial amount of information they were asked to review in a very short amount of time.

The list of suggested learning theories to consider were:

• Connectivism
• Community of Practice
• Situated Cognition/Situated Learning
• Discovery Learning
• Social Development Theory
• Experiential Learning
• Activity Theory
• Multimodality Theory

Preparing for the Workshop – How Can Learning Theory Inform the Use of Social Media?

Given the premise articulated above, that educators have a conceptual framework of what works in education that is informed by their knowledge and previous experience and that these frameworks can be mapped to one or more educational theories, five inquiry questions were set by myself and my two workshop facilitators to frame the ninety-minute topic discussion workshop.
Inquiry Questions

1. What is the implicit theory underpinning the work of clinical teachers?
2. How can this implicit theory be mapped onto established theories of epistemology, ontology, axiology and methodology (understanding, being, valuing and acting)?
3. Are there established educational theories that align with individual participant’s identified ways of understanding, being, valuing and acting in educational contexts?
4. Is there a set of educational theories that can capture the implicit theories of practicing clinical educators?
5. How does social media support the enactment of educational theories?

The following session description was created for this workshop. The use of social media for education has one goal – to promote learning. Learning theories are fundamental to the development of sound pedagogy. This session will make the link between what we know about learning theory to the successful incorporation of Social Media into our pedagogy. The learning objectives that were established for the workshop were as follows:

Upon completion of this session, participants will be able to:

- Examine their beliefs, frameworks, values and approaches to education and align them to educational theory
- Describe how educational theory informs the use Social Media to best support the way learners learn
- Make the link between learning theory to the successful incorporation of Social Media into our pedagogy/andragogy
Chapter 3 – Using a workshop to explore how learning theory informs medical educators in the use of social media.

Context for the Inquiry

This 90-minute workshop was undertaken within the context of a 1-day meeting designed to contribute to the goals of the Social Media Summit in Health Professional Education (SoME Summit) that was held in Toronto, Canada on October 22, 2014. This was a pre-Conference Component of the International Conference on Residency Education sponsored by the Royal College of Physicians and Surgeons of Canada (RCPSC). Dr. Jonathan Sherbino, Clinician Educator and the Co-director of the Clinician Educator Diploma at the RCPSC, was the Chair of the SoME Summit and the planning committee consisted of myself, Dr. Ali Jalali, Professeur d’anatomie, Division d’anatomie Clinique et fonctionnelle, Faculté de médecine, uOttawa, Dr. Michelle Lin, AliEM Editor-in-Chief, UCSF Academy Endowed Chair for Emergency Medicine Education, UCSF Associate Professor of Emergency Medicine San Francisco General Hospital, and Dr. Ian Pereira, Resident Physician, Radiation Oncology, Queen’s University.

I was the topic lead for our workshop entitled, “How education theory should inform the use of social media.” Ethics approval was obtained from the Queen’s University Faculty of Health Sciences Research Ethics Board. (Three other workshops were held at the 1-day meeting, 1) Ethical and professional use of social media for health professional education,
2) Defining and evaluating social media education scholarship, 3) Best practices for social media platforms.

These workshops were framed by plenary sessions. The program agenda was established to have an opening plenary, two topic discussion workshops run in parallel with a report back to the large group. Following lunch there was a second plenary followed by two more topic discussion workshops run in parallel with a subsequent report back to the large group. The plenary topics were retrofitted to foreshadow the breakout topics and stimulate the subsequent discussions that would be held in the smaller sessions. The plenary topics were:

- How Social Media Can Change Health Professional Education (a.m.)
- What is the standard that Social Media should aim for in Health Professional Education? (p.m.)

For the purposes of the SoME Summit the planning committee adopted a definition of social media that was agreed upon to allow consistency across plenary and workshop presenters. Social media was defined by Sherbino and Frank (2014) as:

Social media are forms of digital platforms that use Internet-based communications technology to engage geographically dispersed groups or individuals to create or share content related to a common theme, thus forming a “virtual” community. Commonly used modes include blogs, microblogs (e.g. Twitter), wikis, networking websites (e.g. Facebook), podcasts and video casts. (p. 545)
**Who were the Conference Participants?**

The conference planning committee wished to have participants currently using social media in medical education and those representing both early and later career stages. Selection of the summit participants was made using two sequential processes. Firstly, the planning committee engaged in Purposive Sampling. In this type of sampling, the researcher selects the particular qualities that will be able to provide the type of information sought about the topic of interest. Based on this, the decisions are made about who to invite to participate in the work (McMillan, 2010). Therefore the first list of participants generated was made up of those that were familiar to the committee members and represented diversity in specialty, stage of career, geographic location, nature of practice but also represented one of the two key stakeholder traits that were being sought. That is, they were also established as a medical educator and/or a keen and avid user of social media in domains relevant to medical education. Next, we used a snowball process. Snowball sampling is also referred to as network sampling. This is a process whereby the invited participants in turn suggest others who meet the profile of the individuals being sought to participate (McMillan, 2010).

The target number of participants was 75. This target number was chosen taking into account the desired minimum number of participants in two simultaneously running workshops ensuring cross fertilization between the newer and more experienced educators and the size of the designated spaces for workshops. The actual number of SoME
Summit participants was 83. Thirty-six participants from the 83 in-person members of the Social Media Summit self-selected to participate in this facilitated workshop session.

**Workshop Activities**

This 90-minute workshop was divided into four activities, the Workshop Agenda is outlined in Appendix 1.

**Activity 1  Introducing the core concepts**

The workshop opened with an introduction that set the context for the topic of educational theory and its role in using social media in medical education. The introduction was intended to have the participants consider why it is important to avail themselves of learning theory as we proceed to incorporate social media into our educational activities. The point identified in the session description regarding the use of social media should be used to promote the way learners learn was presented. Further, how this occurs is via the design of our educational programs and educational activities. By understanding theories, teachers will know why specific practices work and teachers will create the activities that will lead students to achieve their learning outcomes. The first step in designing successful learning events is to consider *How* and *Why* particular activities are effective. Teachers need to consider what they believe about learning and then align the educational theory with their perspective. The nature of the learner has changed and medical education must therefore re-think how education and teaching are perceived. The question was posed for their consideration: which educational theory is consistent with your teaching philosophy and the goals and learning outcomes you hope to achieve?
Next there was a didactic presentation that provided the participants with background information regarding the extant literature. It is clearly evident that there is an increased use of mobile computing devices by medical students and this has the potential to influence instructional methods. Social media provides increased access to content, increased interaction with instructors, increased ability to interact with peers and the ability to collaborate with others on their work. It allows the students to learn outside of the classroom or clinic during the course of their daily life away from the school.

However, the current state of affairs regarding the lack of applied research into how to effectively use social media to enhance learning was presented, as outlined earlier in this report. The research to date in the literature discusses the vast increase of the use of social media in medical education, the satisfaction of the users – both learners and teachers, and the issues arising from considering aspects of professional behaviour for healthcare providers when using social media.

The rationale for focusing on educational theory was then presented. A learning theory explicates the thought about how people learn. A learning theory establishes a set of explanations about the process of teaching and learning. This in turn informs the development of curriculum and how learning activities should be organized, the creation or choice of those learning activities, the means of assessment of the learners and the anticipated outcomes if the theoretical principles are applied. Learning theories provide essential background to deliberate educational practice. They allow us to understand the way particular things work in education and why things work. They allow us to connect our
observations to build and expand what is known about pedagogy in a meaningful way. They aid educators in developing practical solutions to practical problems.

**Activity Two  Exploring each participant’s conceptual framework**

The next step was to engage the participants in a personal examination of their educational philosophy/conceptual framework using the questions listed below. Proceeding from the assumption that medical educators come to their work with a conceptual framework that may not have previously been articulated, the goal was to assist them to identify the personal theories that shape their approach to teaching and learning. Questions were developed to facilitate their examination of ‘Learning’ from multiple perspectives: Beliefs, Frameworks, Values and Approaches to Education.

The following prompts facilitated this process:

Please tell us about your thoughts about education.

1. Your concept of learning: What does learning mean to you? What happens in a successful learning situation?

2. Your concept of teaching: What does an ideal teaching situation look like to you? What is your role as the teacher? Are you a coach, a general, an “evangelist”, an entertainer?

3. What strategies do you use to help students/trainees reach the stated learning outcomes? (e.g. case studies, group work, simulations, interactive lectures)
4. Your interaction with students/trainees: What are your attitudes towards advising and mentoring students/trainees? How would an observer see you interact with students/trainees?

5. Specific examples: How are the values and beliefs noted above realized in educational/training activities? You may discuss course materials, lesson plans, activities, assignments, assessment instruments, etc.

The first two questions were designed to engage the participants to articulate their beliefs about teaching, learning and the meaning of these concepts. The third question was to guide the participants to describe the frameworks they employ when teaching. The fourth question was intended to bring out what the participants valued about teaching and their interactions with learners. The final question was asked to elicit the participants’ approaches to education.

The questions were posed and the participants were invited to work independently on this exercise. Their responses were recorded by one of either two ways: electronically using an online, cloud-based software program call Socrative or on paper. This free program found at www.socrative.com allows the creation of polls and quizzes.

1 The option of providing response submission by paper was to mitigate the potential that a participant may not have access to technology during the workshop.
The participants were then able to log their answers, which were immediately recorded on the presenter's computer. The data was captured in this program and following completion of the exercise; the responses were then displayed and reviewed together for themes. This program is very simple to use and it was chosen because of the flexibility in its use. It is able to work with any web-or app-enabled device and given the nature of the summit, it was presumed that the participants would have ready access to their technology and easily use it. This was borne out to be true as only two participants worked using a paper-based response.

The questions and the underlying nature of the meaning of the responses were then related to learning theory by linking the qualities that had been considered to the participants' epistemology, ontology, axiology and methodology, as shown in Table 1.

### Exploring Learning Theory

<table>
<thead>
<tr>
<th>Beliefs</th>
<th>Epistemology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frameworks</td>
<td>Ontology</td>
</tr>
<tr>
<td>Values</td>
<td>Axiology</td>
</tr>
<tr>
<td>Approaches to Education</td>
<td>Methodology</td>
</tr>
</tbody>
</table>

**Table 1.** Linking participant responses to educational concepts. Participants articulated their views about the concepts listed on the left of this table. These were mapped to the educational terms listed on the right. The terms on the rights were defined as:

i) Epistemology is concerned with the nature of knowledge – the definition of knowledge, the sources of knowledge, the process of acquiring knowledge and the limits of the
knowledge. It was explained that the participants’ description of their beliefs about teaching and learning was a means of declaring their epistemology. An educator’s epistemology greatly influences their approach to the learning process.

ii) Ontology, as the word is used in communication and information sciences, is understood to be a formal framework for representing knowledge. One’s framework for representing knowledge is used to build theory.

iii) Axiology is the study of the nature, types and criteria of values and value judgments. Values drive a theorist to develop a theory. The participants had examined their attitudes and values about the nature of their interaction with learners while engaged in the process of teaching.

iv) Methodology is the theoretical analysis of the methods applied to a field of study. It offers the theoretical underpinning for understanding which best practices can be applied in a situation.

Given that the participants had thoughtfully engaged in the process of considering their epistemology, ontology, axiology and methodology, it was pointed out that they had outlined their educational philosophy – their beliefs, their conceptual framework, their values and their approaches to education.

This then allowed us to link their use of SoME with a theoretical framework that was reflective of their philosophical approach to teaching and learning. “Constructing your
philosophy of education inevitably brings you to theorizing about education, school, curriculum, instruction, and the relationships between teachers and students.” (Gutek, 2014, p. 14).

The electronic recording of their responses was analyzed post conference confirming major themes identified at the workshop (see Appendix 2).

Activity Three  “Individual” Mapping of Conceptual Frameworks to Learning Theory
The subsequent step was to match the educational philosophy/conceptual framework of the individuals to learning theory. They were asked to particularly focus on how their philosophy informs their use of social media in education. They were asked to begin by selecting the learning theory or theories that best reflects their philosophy and choose those that are applicable to their use of social media. This exercise was staged as an individual exercise to allow each person to review some learning theory. The tools for this exercise were those outlined in Chapter 2.

The task for the individual participants was to first initiate the linking of their educational philosophy with one or two learning theories that reflected their philosophy.

Activity Four  “Small Group” Mapping of Conceptual Framework to Educational Theory
Following their individual consideration of the question, they worked in groups. The participants were seated at tables of six people. They were asked to examine their
individual choices of learning theories and come to consensus as a group on the two or three theories that they deemed most clearly represented their collective approach to the use of social media in medical education. The groups were provided with 30 minutes to complete this exercise.

**Activity Five  “Large Group” Mapping of Conceptual Framework to Educational Theory – Reaching Consensus**

The final activity was to bring the large group together to share the conclusions each table had reached about their educational philosophy and how it relates to established learning theory. The point of this exercise was to determine whether we could come together in consensus about learning theories that reflect the educational philosophy medical educators have when utilizing social media in their teaching. This step would allow for the identification of learning theories that could explicitly be used by the participants to make the link between theory and their practice, and to inform their future use of Social Media to best support the way learners learn. Additionally, a consensus would allow for recommendations to be made to guide all medical educators, beyond this workshop, who use Social Media in their teaching. There were six tables of six participants who presented their deliberations.

When the entire group reconvened, they identified the close consensus of the results of the six working groups (Table 2). In particular, each of the six groups identified Connectivism as a learning theory that was reflected in their use of Social Media. There was agreement that there was a high degree of both alignment of their educational philosophy with learning theory and a consensus about how it influences their approach to the use of social
media in medical education. The results also show that there was a high degree of consensus on both Social Development Theory and Communities of Practice. These latter two theories as well as Discovery Learning and Cognitive Apprenticeship all fall under the construct of Constructivist Learning Theory, as discussed later.

<table>
<thead>
<tr>
<th>Theory</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectivism</td>
<td>6</td>
</tr>
<tr>
<td>Social Development Theory</td>
<td>3</td>
</tr>
<tr>
<td>Communities of Practice</td>
<td>3</td>
</tr>
<tr>
<td>Discovery Learning</td>
<td>1</td>
</tr>
<tr>
<td>Cognitive Apprenticeship</td>
<td>1</td>
</tr>
<tr>
<td>Self-Determination Theory</td>
<td>1</td>
</tr>
<tr>
<td>Cognitive Load Theory</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2. Results of the consensus of theories identified by the six tables. Each table identified one or more theories.

I reported the findings of this workshop to the entire participants of the one-day summit at its closing session.
Chapter 4 – Assessing the Workshop Outcomes

The major finding of the workshop and corresponding definitions of the theories is outlined in Table 5.

Table 3. Results of the consensus of theories identified by the six working groups with theory definitions. The definitions of these theories (right hand column) are from www.learningtheories.com

<table>
<thead>
<tr>
<th>Theory</th>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectivism</td>
<td>6</td>
<td>Explains how internet technologies have created opportunities for learning across online peer networks. Teachers guide students to information and key answers as needed to support students learning and sharing.</td>
</tr>
<tr>
<td>Social Development Theory</td>
<td>3</td>
<td>Social interaction is fundamental to learning. Learning occurs in the Zone of Proximal Development – the area between needed instructor/peer guidance and the learner’s ability to function independently.</td>
</tr>
<tr>
<td>Communities of Practice</td>
<td>3</td>
<td>A process of social learning that occurs when people with a common interest collaborate sharing ideas, strategies, determining solutions and building innovations.</td>
</tr>
<tr>
<td>Cognitive Apprenticeship</td>
<td>1</td>
<td>Cognitive apprenticeship attempts to bring tacit processes out into the open. It assumes that people learn from one another, through observation, imitation and modeling.</td>
</tr>
<tr>
<td>Discovery Learning</td>
<td>1</td>
<td>An inquiry-based theory that believes it is best for learners to discover facts and relationships for themselves by exploring, problem solving and discovering knowledge experientially.</td>
</tr>
<tr>
<td>Self-Determination Theory</td>
<td>1</td>
<td>A theory that addresses intrinsic and extrinsic motivation. To actualize a learner’s inherent potential the social environment needs to nurture competence, relatedness and autonomy.</td>
</tr>
<tr>
<td>Cognitive Load Theory</td>
<td>1</td>
<td>Describes the human cognitive architecture and the need to apply sound instructional design based on knowledge of working memory, long-term memory and cognitive schemas.</td>
</tr>
</tbody>
</table>
These findings were reached in an iterative consensus-building process reflecting the participants’ approach to the use of social media in their educational practice.

To further inform discussion of these outcomes, each of these theories was explored in more depth. The following is a précis of the seven nominated learning theories:

1. **Connectivism**: Connectivism is a very recent learning theory originated by George Siemens and Stephen Downes. It provides a foundational explanation of how Internet technologies provide learning opportunities for people through the sharing of information across the World Wide Web. The technologies referred to in this theory particularly include social media platforms. The premise of connectivism is that “learning is a network phenomenon, influenced (aided) by socialization and technology” (Siemens, 2005). The underpinning of connectivism is that the context of learning is paramount. The context at this juncture in our history is the technological developments of our time. Further, the context facilitates significant learning, which happens via the peer networks that occur and develop online (Siemens, 2006). The instructors guide the learners to relevant information and provide direction for the students to seek answers to the problems posed. The students are encouraged to engage in communities for learning. “Learning .... occurs in communities, where the practice of learning is the participation in the community. Siemens’ position is that learning derives from the making of connections and it is the connections that are more important than the knowledge held by the individual. Learning is an active process and a
learning activity is in essence a conversation [consisting] not only of words but of images, video, multimedia, and more.” (Downes, 2006).

Principles of Connectivism:

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known.
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist earning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

Table 4. Principles of connectivism (Siemens, 2005).

Connectivism is driven by the concept that new information is constantly being acquired and that the ability to reflect and make distinctions between important and unimportant information is essential. Learning is facilitated when students are provided feedback about their thinking, whether that comes from their instructors or their peers. Connectivism has been described “as a network theory of learning that draws on a diverse set of theories from learning, education, philosophy of knowledge, and knowledge management, situated within a discourse of change in education and related to the transformative possibilities offered by emerging technologies” (Bell, 2011).

2. Social Development Theory: Social Development Theory is built upon the foundation of constructivist learning theory. Constructivist approaches to teaching and learning are
grounded in the view that learners hold valuable prior knowledge and experience and bring that to their educational events. The role of the instructor is to approach learners as individuals to assist them to build, organize and interpret knowledge that will assist them to further develop their thinking. Learning is considered to be a social process in that it occurs when learners glean new insights from informed others. However, a constructivist approach does not assume that teaching is a process of transmitting knowledge but instead learners are viewed as those who are constructing or creating their knowledge. Learners actively construct their learning. The constructivist approach espouses that learning is most effective when the learners set and meet their own learning goals. The educational environment provided is able to meet the learners’ goals. Instructional scaffolding is a concept in constructivist learning theory whereby instructors provide greater support and foundational knowledge at the outset of a particular learning event/situation and withdraw it as the learner progresses. The focus is on the process of learning rather than the transmission of knowledge.

Social Development Theory further expands the social aspect of constructivist learning theory. Leo Vygotsky’s theory asserts three major themes in Social Development Theory (Vygotsky, 1978):

i) Social interaction plays a fundamental role in the process of cognitive development.

ii) The More Knowledgeable Other (MKO): The MKO refers to anyone who has a better understanding or a higher ability level than the learner with respect to a particular task, process, or concept. The MKO is normally thought of as being
teacher, coach, or older adult, but the MKO could also be peers, a younger person, or even computers or the connections made through computers.

iii) Zone of Proximal Development (ZPD): The ZPD is the distance between a student’s ability to perform a task under adult guidance and/or with peer collaboration and the student’s ability to solve the problem independently. According to Vygotsky, learning occurs in this zone.

Social constructivists view knowledge as transactional and that knowledge is socially constructed and distributed among the co-participants (Gredler, 2009).

3. Communities of Practice: Jean Lave and Etienne Wenger are the originators of the concept of Communities of Practice. Their collaborative work as a cognitive anthropologist and an educational researcher resulted in the development of the theoretical framework known as Communities of Practice. To them it is a social learning theory (Wenger, 1998). Others also consider it within the framework of constructivist learning theory (Gredler, 2004).

Communities of Practice can be defined, in part, as a process of learning characterized by social participation. Wenger gives a simple definite: “Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly.” (Wenger, 2000). Conceptually, this theory is based on four premises about knowledge and learning.

i) We are social beings and this is a central aspect of learning.
ii) Knowledge is a matter of competence within domains.

iii) Knowing is a matter of active engagement in the pursuit of these domains.

iv) Learning is about the production of meaning. (Wenger, 1998)

This theory is based upon these assumptions where the underlying view is of learning as social participation. There are requisite components necessary to actualize social process as a process of learning. These components include meaning, practice, community and identity. Wenger (1998) presented his conception of the components of learning in the following figure.

Figure 1. Components of a social theory of learning (Wenger, 1998).
Characteristics that are germane to Communities of Practice (CoP) are the concepts of Domain. A Community of Practice is not simply a club but it has an identity, which is defined by a shared domain of interest. A second characteristic is the concept of Community. In pursuing the interest in the Domain, the members engage in discussion, activities, contribute to each other’s development and share information. Relationships are built and these facilitate the ability to learn from each other. The concept of practice is that the communities are not simply a community of people with an interest but they are practitioners. The community develops a shared repertoire of resources including their expertise, their experience, their stories and their approach to addressing problems. A community of practice requires time to develop and a commitment to sustained interaction. The concept of Situated Learning is an aspect of Communities of Practice, which speaks to the idea that learning best occurs within the context in which it will be applied. Finally, the phrase Legitimate Peripheral Participation also arises from the Lave and Wenger learning theory. It refers to the process of newcomers to the community who follow a path from being a newcomer to becoming a full member of the CoP. (Eberle, Stegmann, and Fischer, 2014). As they acquire their knowledge of the CoP they undertake more complex activities and their contribution becomes deeper and more relevant. The idea of legitimate is that a CoP can be inclusive and that any individual has the potential to become a member. Peripheral refers to the recognition that a newcomer will begin at the periphery until they have acquired and demonstrated a requisite amount of
knowledge and skill. Participation refers to the concept identified above in Figure 2 of learning as doing; knowledge is acquired through doing.

4. **Discovery Learning:** Discovery Learning is based on a theory of development articulated in the 1960's by Jerome Bruner who is a cognitive psychologist. Discovery learning argues that it is best for learners to discover facts and relationships for themselves. The learner constructs his or her own knowledge for him/herself. Discovery Learning is a form of constructivist learning theory in that it emphasizes the active role of the learner in building understanding and making sense of information. Bruner believed that education was a means of assisting learners to develop reason and to also promote the development of imagination and creativity. For Bruner, the purpose of education was not to impart knowledge but to facilitate the learner’s ability to think, and solve problems in a broad array of contexts. The teacher’s role is to facilitate the learning process. Discovery Learning is an inquiry-based, constructivist learning theory. The process of learning begins with the instructor posing questions, problems or scenarios. The learners are “inquirers” who explore, or investigate, the questions and issues in order to develop their knowledge and/or arrive at solutions. The belief is that learners are more likely to remember concepts and knowledge discovered on their own.
Models that are based upon discovery learning include: guided discovery, problem-based learning, simulation-based learning, and case-based learning. Proponents of this theory believe that discovery learning has many advantages, including:

- Encourages active engagement
- Promotes motivation
- Promotes autonomy, responsibility, independence
- Promotes the development of creativity and problem solving skills
- A tailored learning experience
5. Cognitive Apprenticeship: Cognitive Apprenticeship has its roots in social learning theory. It posits that people learn from one another and in particular through observation, imitation and modeling. “Cognitive apprenticeship supports learning in a domain by enabling students to acquire, develop, and use cognitive tools in authentic domain activity.” (Brown, Collins and Duguid, 1989). The premise of cognitive apprenticeship is that learners are assisted to learn by those with more expertise who provide support and structure. A crucial concept of cognitive apprenticeship is that it is important for the learners to solve problems within a learning environment that is situated in a real-world context. The learner is immersed in the culture of a particular practice (the domain) and learners observe and imitate the practitioners of that domain who demonstrate or model the tasks.


i) Within Methods there are six teaching methods: modeling, coaching, scaffolding, articulation, reflection and exploration. Modeling is when the teachers explicitly demonstrate a task for the learners. Coaching is when the expert provides feedback and suggestions to the novice. Scaffolding entails the provision of support of the students with the gradual withdrawal of the teacher
and the support when the students are able to manage on their own. Articulation is the process of having the students verbalize or demonstrate their knowledge, their reasoning and their problem-solving process. This process occurs in response to teachers asking questions but also when learners are engaged in cooperative learning activities and are learning together. The goal of reflection is for students to assess and analyze their own performance as well as examine the performances of others, either an expert or another student. They can then determine what they need to do to improve their own performance. Exploration involves giving students room to problem solve on their own and teaching students exploration strategies. The students are encouraged to form hypotheses, to test them and to creatively learn from the experience.

ii) The sequencing aspect of cognitive apprenticeship refers to the concept of Legitimate Peripheral Participation, referred to previously. The new learner comes into the situation as an observer. The initial experience is a holistic process from the periphery. Once the big picture (referred to as global) is understood, the learner moves into a more active role engaging in increasingly more complex activities.

iii) The social element of cognitive apprenticeship is described as the social characteristics of learning environments. The concepts included within this component have been seen earlier in Social Learning Theory and Communities of Practice. The zone of proximal development, situated learning, social
connectedness, intrinsic motivation and cooperative learning are all features identified as aspects of Cognitive Apprenticeship.

iv) Finally, the content knowledge of the model speaks to the types of knowledge required for expertise. This specifically highlights the concept of a domain, which is in keeping with what is espoused in the theoretical frame of Communities of Practice.

<table>
<thead>
<tr>
<th>Method</th>
<th>Ways to promote the development of expertise</th>
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<tbody>
<tr>
<td></td>
<td>Modeling, Coaching, Scaffolding, Articulation, Reflection, Exploration</td>
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<tr>
<th>Sequencing</th>
<th>Keys to ordering learning activities</th>
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<tr>
<td></td>
<td>Global before Local, Increasing Complexity, Increasing Diversity</td>
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<tr>
<th>Sociology</th>
<th>Social characteristics of learning environments</th>
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<tbody>
<tr>
<td></td>
<td>Situated Learning, Community of Practice, Intrinsic Motivation, Cooperation</td>
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<table>
<thead>
<tr>
<th>Content</th>
<th>Types of knowledge required for expertise</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Domain Knowledge, Heuristic Strategies, Control Strategies, Learning Strategies</td>
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*Figure 3. The four concepts of Cognitive Apprenticeship (Adapted from: Collins, Brown and Newman, 1989)*
6. **Self-Determination Theory**: Self-Determination Theory (SDT) is in its essence a theory of motivation and personality versus a pure learning theory. However, it speaks to the individual’s innate tendency when they are at their best. That is, they are inspired, extending themselves to grow, striving to learn and master new skills (Ryan & Deci, 2000). The theory posits that there are three universal, innate and psychological needs: to achieve competence, autonomy, and psychological relatedness. These needs are described as:

*Competence*: Seek to control the outcome and experience mastery.

*Relatedness*: The universal want to interact, be connected to, and experience caring for others.

*Autonomy*: The universal urge to be causal agents of one’s own life and act in harmony with one’s integrated self.

These needs are deemed to be essential for facilitating optimal function for constructive development, growth, social development and personal well-being.

SDT is an important theory of motivation that addresses issues of both the individual’s authentic motivation (intrinsic motivation) and the context in which they function (external regulation or extrinsic motivation). It is these authors’ proposition that the prototypic manifestation of intrinsic motivation is a tendency toward learning and creativity. To actualize their inherent potential, the social environment needs to nurture these needs.
The relevance for education and learning theory is apparent. With extrinsic motivation, a person tends to do a task or activity mainly because doing so will yield some kind of reward or benefit upon completion. Intrinsic motivation, in contrast is characterized by doing something purely because of enjoyment or desire. Vansteenkiste, Lens & Deci (2006) conducted a study that demonstrated that framing learning activities that are directed to intrinsic goal attainment (compared to extrinsic goal framing and no-goal framing) produced deeper engagement in learning activities, better conceptual learning and higher persistence at learning activities.

7. Cognitive Load Theory: Cognitive load theory arose from research in the discipline of Cognitive Science and problem solving as a result of the work of John Sweller in the 1980’s (Sweller, 1998). Sweller (1998) describes human cognitive architecture and advises that this needs to be taken into consideration when designing instruction. Cognitive load theory identifies the manner in which cognitive resources are used during learning. Human cognitive architecture is described as the knowledge of how we learn, think and solve problems. It identifies that working memory has limited capacity and long-term memory has an unlimited capacity. The process of learning requires the active process of working memory and its subsequent inter-relationship with long-term memory. Things are best retained in long-term memory via schemas. Schemas are “cognitive constructs that incorporate multiple elements of information into a single element with a specific function” (Paas, Renkl & Sweller, 2003). Schemas are brought from long-term memory to working memory during the process of
learning. Schemas act as a “central executive” that directly affect the manner in which information is synthesized in working memory. Sweller emphasized that instructional design must take into consideration the manner in which human cognition works in order to facilitate learning and not overwhelm the learner. In the absence of established schemas, the instruction must provide a substitute for learners to develop them.

In Sweller’s view there are three types of cognitive load that contribute to the total cognitive load:

i) Intrinsic cognitive load: Intrinsic cognitive load is the idea that all instruction has an inherent difficulty associated with it. This inherent difficulty may not be altered by an instructor.

ii) Extraneous cognitive load: This is under the control of the teacher. This form of cognitive load is generated by the manner in which information is presented to learners (i.e. the design).

iii) Germane cognitive load: This third kind of cognitive load is the load that is used to form new complex schema. Germane load is the load dedicated to the processing, construction and automation of schemas. Germane load is our set of schemas. They are established but can be enhanced.
While intrinsic load is generally thought to be immutable, instructional designers can manipulate extraneous and germaine load. It is suggested that they limit extraneous load and promote germaine load. Cognitive load theory is intended to assist teachers in their design of educational instruction to consciously and deliberately encourage optimal learning. The goal of the instructor should be to reduce extraneous cognitive load and increase germaine cognitive load.

**Discussion of the Outcomes**

This graduating project sought to examine the potential of educational theory to inform the use of social media in medical education. This question was explored through a workshop format. The results of this study suggest that indeed medical educators do use social media in a manner that reflects their personal conceptual framework and that these frameworks can be anchored by existing theory. The use of social media is purposeful and consistent with their theories as they report them.
It has been well described that medical educators are daunted when considering educational theory. It has been proposed that there are many reasons that they fail to explicitly use educational theory in their teaching (Gibbs, Durning, & Van Der Vleuten, 2011). Gibbs et al. (2011) have identified that some of the reasons for not including more theory in medical education teaching include “lack of time, unfamiliarity with other field’s teaching traditions, the need for more faculty development...confusion over terms, a heavy teaching load, lack of formal training as an educator and uncertainty about the relevance of the work from other specialties”.

A case in point is the use of terms in the educational literature. The questions that were posed to the workshop participants essentially asked them to articulate their epistemology, their ontology, their axiology and their methodology about education. Without a formal background in education, the majority of healthcare professionals would not be familiar with these terms and yet, these medical educators were very easily able to provide responses to the questions posed. This suggests that educators approach their educational activities with a deliberate conceptual framework that correspondences with educational theory but have limited language and little experience in making either their frameworks or the corresponding theories explicit. Without an opportunity to do this, it is very difficult to know the full extent of how medical educators might best utilize these
theories to employ social media and hence whether they are being optimally used to the advantage of the learners.

Despite the challenges outlined above, a large number of participants in this workshop were self-selected parties interested in participating in a conference on the use of social media in medical education. More specifically, they chose to participate in a workshop designed to explore the use of educational theory and the use of social media. They were readily able to identify their beliefs, their conceptual frameworks, their values and their approach to education. They were then able to map their personal educational philosophy to extant learning theory. Finally, the participants were able to reflect on their own learning theory with a particular view of its application to their use of social media in their teaching and learning activities. Upon discussion with their colleagues, they were able to present their agreement of the learning theories that best depicted how learning theory applied to the use of social media in medical education. Together, this suggests that in contrast to suggestions that medical educators are applying social media in an uninformed manner, that in fact, they are using it in a fashion consistent with educational theory. The implication of this is that medical educators do consider how their learners learn and they believe that their learners will benefit from the use of social media.
Learning Theories and Social Media

Traditionally, learning theories tend to be clustered under three large headings. In short, behaviorist theories are those that propose that knowing is the result of objective experience. Cognitivist theories are those that propose that knowing is the outcome of mental processing. Constructivist theories are those that propose that knowing is subjectively constructed.

<table>
<thead>
<tr>
<th></th>
<th>Behaviorism</th>
<th>Cognitivism</th>
<th>Constructivism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning is achieved through...</td>
<td>Transmitted information</td>
<td>Acquisition of knowledge</td>
<td>Construction of knowledge</td>
</tr>
<tr>
<td>Learning is believed to be ...</td>
<td>A change in behavior</td>
<td>Built on previously learned materials</td>
<td>A change in meaning</td>
</tr>
<tr>
<td>Teaching is ...</td>
<td>Instructor-centered</td>
<td>Instructor-centered</td>
<td>Student-centered</td>
</tr>
<tr>
<td>Process of learning</td>
<td>Passive</td>
<td>Active</td>
<td>Active</td>
</tr>
</tbody>
</table>

Table 5. Three Approaches to Learning (Carliner & Shank, eds., 2008)

In the age of technology, behaviorist approaches to learning have given way to constructivist ones (Jonassen & Reeves, 1996). This is certainly evidenced in the results of this work (see Table 2). There were no behaviorist theories put forward as reflecting the philosophy of the workshop participants. Of the seven proposed learning theories that capture and represent the philosophy of these medical educators, four were learning theories that are considered to be within the paradigm of constructivist learning theory. These are: Social Development Theory, Communities of Practice, Discovery Learning, and Cognitive Apprenticeship. The concepts that were common to their philosophical approach
to education and that weave through these constructivist theories are that of the belief that knowledge is subjectively constructed, primarily within a social context. Learners learn from those with more expertise than themselves. That may be the instructor but also may be from other learners. Learning is a social process.

The focus is on the learner and the process of learning versus the transmission of information from the instructor. It is presumed that learners bring pre-existing knowledge and experience to a learning situation. The learners are encouraged to take responsibility for their learning and assume a reflective stance to their learning.

The learning environment is considered to be a critical piece of a constructivist approach whereby the learners are provided with the tools, resources and support needed to build their own knowledge. Support is greater at the outset of learning situations and fades as the learner develops their own knowledge and expertise. The learning environment is flexible and has the capability to adapt to the individual's learning needs. However, the learning environment should also reflect the context and the complexities of the practice (Melrose, Park & Perry, 2013).

Although Self-Determination Theory is considered to be a motivation theory, “theories of learning typically treat motivation as a concept that is an adjunct to
the principles for generating learning” (Gredler, 2009, p. 419). Motivational perspectives on learning consider the educational environment, the teacher’s responses to the learners’ efforts, the social context for learning and the learners’ degree of engagement in the activities as the aspects of teaching and learning that stimulate or inhibit motivation. These same elements are those promulgated in constructivist learning theory.

There is a similar relationship between Connectivism and Constructivism. The entire group came to consensus on Connectivism as a learning theory that was relevant and reflected their approach to using social media in their teaching and learning activities. It is not surprising that Connectivism featured prominently in the participants’ outcomes. It is an approach to thinking about learning that was specifically generated to conceptualize learning within a technological context. It therefore also holds strong implications for teaching in a technological era. Importantly, despite the fact that Connectivism is a very new theory based on the use of technology in education, there are themes of Connectivism that mirror the themes articulated above regarding the constructivist theories. These are that learning is social, learning is an active process, learning requires reflection and learning occurs in a particular context. The concept that is quite unique to connectivism is that how people learn, work and function is altered by the technology that is being utilized. Therefore, educators must recognize the impact of these learning tools in order to adequately prepare learners to flourish in a digital era (Siemens, 2005).
The theme that may appear to be the outlier is that of Cognitive Load Theory. However, upon serious consideration of the theories outlined above, it becomes clear that it sits in position that aligns with the connectivist theoretical frame. It specifically identifies that an individual’s working memory is limited and that information must be transferred to long-term memory. Although theoretically it is proposed that the long-term memory has unlimited capacity, it was developed in the 1980’s, prior to the widespread adoption of computers and what has been described as the information explosion. The concept of the importance of designing instructional activities in a manner, which facilitates the organization of knowledge into schemas, is similar to the connectivist principle of the ability to connect between fields, ideas and concepts as a core skill. This paired with the thought in Cognitive Load Theory that it is important to have ready access to previously stored information, is very much in keeping with the connectivist principle of learning as a process of the connection of information sources.

The workshop addressed 5 inquiry questions (see Page 21). Based on the workshop, the answers to these questions are: 1. Medical educators are guided in their work by implicit theory, 2. These implicit theories can be mapped onto established theories of learning, 3. There are specific theories that align with the participants’ ways of understanding, values and their methods of teaching in educational contexts. These are Connectivism and Constructivism, which in themselves are related, 4. These theories capture their implicit theories of
practice, and 5. The results, although unproven, suggest that the current use of social media is based on educational theory, and therefore it supports the use of educational theories to enact best practices.

The findings of this project identified more than one educational theory that explicitly and properly inform the use of social media in medical education. This identification of more than one theory, which can be effectively applied, is in keeping with the findings of others. Others have stated that it is not necessary or reasonable to imagine that one theory would suffice. There are many different kinds of learning theory and each emphasizes a different aspect of learning (Wenger, 1988). This is useful for educators when considering different purposes. The results of this project demonstrate the marked harmony between the multiple theories that were selected as representative of a theoretical basis upon which to use social media in education. In the connectivist literature, Frances Bell (2011) states, “There is an argument that theories can be complementary” (p. 101).
Chapter 5 -- Optimizing Future Professional Development and Research

Evaluating the Workshop

The workshop reported in this project served to provide one of the first inquiries of how the use of social media by medical educators might map to educational theories. However, several limitations of the workshop were identified that should be considered when designing future workshops for professional development:

1. This workshop was delivered in a short ninety-minute timespan. This was a significant limitation to do justice to do this topic. It was not really sufficient time to make explicit a comprehensive set of theories and beliefs that govern educators’ practice. It was unknown that what degree participants shared a similar knowledge of learning theory. One approach to mitigate this problem would be to have assigned readings prior to the workshop and a pre-test to assure all participants have a common level of understanding.

2. The resources that were provided were selected because they provided a concise description of multiple learning theories in a manner that could be quickly reviewed. The quality of the selected resources was not necessarily optimal. They provided a brief introduction but did not provide a comprehensive description of each learning theory. Selected pre-readings for a future workshop would provide resources identified as reliable academic sources of education theory.
3. The participants in this workshop self selected for their interest in this topic and hence may not fully represent all those in medical education who are applying social media. Further studies are needed to determine whether the findings of this workshop are generalizable to the broader community of medical educators.

4. The results of the workshop were achieved by consensus and not a formal quantitative or qualitative analysis.

5. There was inherent bias in the workshop facilitators in that they shared the belief that medical educators hold a conceptual framework that informs their use of social media and that it could be aligned with educational theory. Consequently, the workshop was designed to generate these connections. While the thinking that medical educators have a conceptual framework that maps to educational theory has previously been established, it has not been tested in the context of the use of social media.

**Recommendations for Future Professional Development**

Future professional development should follow accepted guidelines to optimal professional development for health professionals, such as those recently described by experts in the field (Sherbino and Frank, 2011). One recommendation, that seems particularly relevant to this subject is that several approaches e.g. didactic teaching, independent study, facilitated workshops, use
of educational technology, may be required to achieve the desired outcomes, depending on the objectives.

Some recommendations that have emerged from my workshop inquiry of this topic are:

1. Working with a new and complex topic such as how learning theory should inform the use of social media will require multiple training events to effectively introduce this innovation.

2. A better understanding of each participant’s knowledge of learning theory would benefit the design of what and how learning theory should be delivered to a group that appears to be very heterogeneous. The findings of this workshop should help to guide the content necessary to create an adequate knowledge base. A recommendation, based on the findings of this study, is that those educators who are using social media should have an understanding of Connectivism and Constructivism.

3. There is a need to demonstrate how participants’ educational philosophy maps to educational theory using their “real world” use of social media and why this understanding and application enhances their use of social media.

4. Educational rounds should encourage presentations on the use of social media and challenge the participants to demonstrate how the principles of educational theory enhance their use of social media.
5. Professional development events should be constructed for educators to exchange ideas around the best use of social media, with learning theory tied to the arguments as to best practice.

**Recommendations for Future Research**

Despite the findings of this study, use of social media in medical education is in its infancy and their remains considerable work to be done to optimize its role. If we are not entirely clear on how learning occurs, it is difficult to design effective learning events, curricula and assessment practices. Further, changes in technology, with readily accessible, hand-held access to technology, which in turn provides ready access to vast stores of information, beg for the development of new ways of educating our learners to adequately prepare them for their future practice.

Given this new and complex field, there are many areas requiring further study. Several key areas are:

1. To what degree does the formal teaching of learning theory enhance the application of social media in medical education?
2. Are certain learning theories better suited to specific applications of social media?
3. How can we define and measure success in the use of social media in medical education?
References


*International Journal of Instructional Technology and Distance Learning.*


Appendix One: Workshop Agenda

Social Media Summit

October 22, 2014

How Learning Theory Informs the Use of Social Media

2:00-3:30

2:00-2:10 Welcome
   Introductions – Facilitators
   Introduction – Participants at their Tables
   Introduction to Topic

2:10-2:20 Exploring your Educational Philosophy/Conceptual Framework

2:20-2:30 Review Conceptual Frameworks
   Looking for Themes

2:30-2:40 Learning Theories
   Role of Learning Theory
   Introduction to Resources


2:55-3:10 Review Individually Selected Theories
   Consensus at Table: One or more Theories

3:10-3:30 Coming to Consensus
   Each Table present their Selected Theories
## Appendix Two: Analysis of Participant Responses

### Concepts of Learning

| Learning is successful when.... | Process of exchange  evaluation of knowledge  how to integrate it/use it thereafter  
Successful learning enhances understanding and application of information/attitude/behavior |
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>• Understanding is enhanced</td>
<td>Learning is the comprehensive understanding and application of a concept. A successful learning situation involves shared teaching and application with an educator and learner followed by independent application by the learner</td>
</tr>
<tr>
<td>• New knowledge is integrated with previous knowledge</td>
<td></td>
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<tr>
<td>• There is a sustained change in behavior, attitudes, knowledge</td>
<td></td>
</tr>
<tr>
<td>• There is a progression towards expertise</td>
<td></td>
</tr>
<tr>
<td>• The learner engages with the material</td>
<td></td>
</tr>
<tr>
<td>• It is a shared co-construction between the teacher and learner</td>
<td></td>
</tr>
<tr>
<td>• It becomes applied to practice</td>
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</tbody>
</table>

### Concepts of Teaching

<table>
<thead>
<tr>
<th>Teaching is ideal when....</th>
<th>Ideal teaching situation: a situation where the learner feels comfortable in making mistakes and then getting appropriate feedback to improve</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Learners are active and engaged</td>
<td>An ideal teaching situation to me revolves around discussion, sharing ideas between two or more people</td>
</tr>
<tr>
<td>• Learners are prepared</td>
<td>An ideal teaching situation is one where the learner and the teacher partner to bring together a set of experiences and context to construct new knowledge.</td>
</tr>
<tr>
<td>• It builds on existing knowledge</td>
<td>An ideal teaching situation is one in which the learner and the teacher come together in a process which involves the transfer of knowledge, two-way communication, an exchange of ideas/questions, and arrival at a shared understanding.</td>
</tr>
<tr>
<td>• It is a mutual exchange of knowledge</td>
<td></td>
</tr>
<tr>
<td>• There is a safe environment to ask questions and learn from mistakes</td>
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</tr>
</tbody>
</table>
**Teacher roles**

- Roles depend on the needs of learners
- Most saw themselves as coaches and facilitators
- Entertaining/engaging was also needed to keep learner’s attention
- Working with learners in identifying needs/gaps
- Giving encouragement

<table>
<thead>
<tr>
<th>In an ideal teaching situation I am able to assess the state of knowledge of my learner(s) and coach and/guide them in building on their existing knowledge and correcting what, if any, incorrect beliefs they may hold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role as teacher is to share knowledge and empower the learner to grow and develop. The role the educator plays also depends on the needs and level the learner is at...some may need coaching and guidance while others may need more structured methods.</td>
</tr>
<tr>
<td>Prefer role as facilitator that presents new information or information in a new way that enables learner to (re) think about its application to their own context or vision</td>
</tr>
<tr>
<td>My role as a teacher is to guide that process in a safe environment, to share knowledge/experience, and encourage the learner to pursue his or her own educational goals. For the most part, I see myself as a coach.</td>
</tr>
<tr>
<td>Strategies</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>• Technology</td>
</tr>
<tr>
<td>o Modules</td>
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<tr>
<td>o Quizzes</td>
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<tr>
<td>o Podcasts</td>
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<tr>
<td>o Videos</td>
</tr>
<tr>
<td>• Group learning</td>
</tr>
<tr>
<td>• Bedside teaching</td>
</tr>
<tr>
<td>• Interactive</td>
</tr>
<tr>
<td>• Simulation</td>
</tr>
<tr>
<td>• Flipped model</td>
</tr>
</tbody>
</table>

My main strategy is to facilitate multi-modal learning. We don't all learn the same way, from the same sources, at the same pace. I like to provide material that can be referenced asynchronously to allow for deeper thinking and time for reflection, beyond the "live" situation.

Encourage them to make a start and I can facilitate them further.

Case studies lend themselves to basic knowledge acquisition whereas simulation is better suited for teaching interpersonal communication, system factors, small group leadership, etc.

Small group discussion, guided reading, simulation, project based learning, student as teacher

Traditional didactic style lectures have been moved to online modules so that learners can learn concepts at their own pace, on their own time. "Live" class sessions are then used for active workshopping of topics

Meet to identify learning objectives at the outset
- Planned and deliberate clinical case exposure to meet learning objectives
- Opportunities to reflect on clinical or learning experiences, including identification of knowledge gap

I use interactive lectures, shared clinical interactions and subsequent debriefings, discussion of cases (which is sometimes done in groups), and encouragement of learners to pursue their own areas of interest/knowledge deficit.
### Advising and Mentoring Trainees

- Caring and supportive
- Encourage autonomy
- Encourage discussion/questions
- Being available
- Trusting, non-judgmental
- Helping learner identify needs and take ownership

<table>
<thead>
<tr>
<th>Being open to asking questions, encouraging, stimulating in motivating students to learn on their own</th>
</tr>
</thead>
<tbody>
<tr>
<td>While the learner stands to gain an insight into your cumulative experiences, you as the mentor have the opportunity to try an approach and reflect on your effectiveness</td>
</tr>
<tr>
<td>My attitude toward advising is to be as open and unthreatening a possible</td>
</tr>
<tr>
<td>Spend most of my time listening to the learner to understand his/her needs</td>
</tr>
<tr>
<td>Give guidance and direction but leave the task of &quot;learning&quot; to the learner</td>
</tr>
<tr>
<td>An observer would hopefully see me as supportive, encouraging, accessible, and available.</td>
</tr>
<tr>
<td>Meet the student where they are. I start by identifying their goals or objectives, and working with them to generate a plan of how to meet those goals</td>
</tr>
</tbody>
</table>

### Activities that reflect above values

- Collaboration
- Self-assessment
- Debriefing
- Safe space
- Organized mentoring and interaction
- Flexibility
- Multiple modalities
- Discussion/questions

<table>
<thead>
<tr>
<th>I design sessions to get students to identify what they need to learn, use stories/cases to prompt, support them to collaborate on addressing these learning outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students are given specific objectives for a lesson</td>
</tr>
<tr>
<td>They are given a link to videos they watch online (created by me)</td>
</tr>
<tr>
<td>There is a self-assessment following this, it</td>
</tr>
<tr>
<td>Feedback</td>
</tr>
<tr>
<td>Clear expectations</td>
</tr>
</tbody>
</table>
QUEEN'S UNIVERSITY HEALTH SCIENCES & AFFILIATED TEACHING HOSPITALS RESEARCH ETHICS BOARD-DELEGATED REVIEW
December 03, 2014

Dr. Leslie Flynn
Department of Continuing Professional Development
Queen's University

Dear Dr. Flynn

Study Title: SMED-138-14 How Can Learning Theory Inform the Use of Social Media in Medical Education?
File # 6014233

I am writing to acknowledge receipt of your recent ethics submission. We have examined the protocol, revised information/consent form (December 1, 2014) for your project (as stated above) and consider it to be ethically acceptable. This approval is valid for one year from the date of the Chair's signature below. This approval will be reported to the Research Ethics Board. Please attend carefully to the following listing of ethics requirements you must fulfill over the course of your study:

**Reporting of Amendments**: If there are any changes to your study (e.g. consent, protocol, study procedures, etc.), you must submit an amendment to the Research Ethics Board for approval. Please use event form: HSREB Multi-Use Amendment/Full Board Renewal Form associated with your post review file # 6014233 in your Researcher Portal (https://eservices.queensu.ca/romeo_researcher/)

**Reporting of Serious Adverse Events**: Any unexpected serious adverse event occurring locally must be reported within 2 working days or earlier if required by the study sponsor. All other serious adverse events must be reported within 15 days after becoming aware of the information. Serious Adverse Event forms are located with your post-review file 6014233 in your Researcher Portal (https://eservices.queensu.ca/romeo_researcher/)

**Reporting of Complaints**: Any complaints made by participants or persons acting on behalf of participants must be reported to the Research Ethics Board within 7 days of becoming aware of the complaint. Note: All documents supplied to participants must have the contact information for the Research Ethics Board.

**Annual Renewal**: Prior to the expiration of your approval (which is one year from the date of the Chair's signature below), you will be reminded to submit your renewal form along with any new changes or amendments you wish to make to your study. If there have been no major changes to your protocol, your approval may be renewed for another year.

Yours sincerely,

Chair, Health Sciences Research Ethics Board
December 03, 2014

Investigators please note that if your trial is registered by the sponsor, you must take responsibility to ensure that the registration information is accurate and complete