Applying Learning Design Principles in the Development of Training Materials for Paramedic Instructors

by

Donnita Derbyshire

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Royal Roads University
Victoria, British Columbia, Canada

Supervisor: Dr. Sophia Palahicky

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Abstract

In Saskatchewan, the level of medical training determines the certification of the paramedic; for example, Primary Care or Advanced Care. There is no designation for instructors, although as the governing body, the Saskatchewan College of Paramedics (SCoP) is considering moving in this direction. Currently, SCoP does not require paramedic instructors to complete training in adult learning theories or instructional design as a pre-requisite for delivering paramedic training courses. Therefore, there is a need to develop instructional materials for paramedic instructor candidates, vis-à-vis adult learning theories, learning design principles, and instructor competencies. Examination of these concepts is critical to developing a strong foundation for effective teaching and facilitation, whether face to face or online. This final report describes the plan and process for design and development of three self-paced, online module prototypes that will be used to provide “proof of concept” for a paramedic instructor certification course. The three modules cover the following three topics; adult learning theories, writing learning objectives, and designing assessments. The design and development of these online module prototypes are informed by research and include a thorough investigation of relevant literature sources to ensure the modules employ appropriate instructional and assessment strategies.

Key words: paramedic instructor, adult learning theory, learning design principles, educator competencies
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Section 1: Introduction

Project Summary

The goal of this project was to create three self-paced, online module prototypes that will be used to provide “proof of concept” for a paramedic instructor certification course. The three modules cover the following three topics: adult learning theories, writing learning objectives, and designing learning assessments. The design and development of these online module prototypes are informed by research and include a thorough investigation of relevant literature sources to ensure the modules employ appropriate instructional and assessment strategies. It is my hope that these three modules will lead to stronger instructors and improved education for paramedics in Saskatchewan.

Rationale

This project provided me the opportunity to apply knowledge acquired through the MAIS program to make something useful for my fellow paramedics. The three online modules developed in this project can be used as part of a Paramedic Instructor Certification Course. I see the Paramedic Instructor Certification Course as providing a foundation for those interested in developing and facilitating continuing education for other paramedics. There is currently no standardized regulations or requirements in Saskatchewan for paramedics who provide continuing education; namely training in adult education and facilitation skills for the instructor. There is a mix of face to face and online continuing medical training in Saskatchewan. However, many services and providers find that online education is a good fit with the nature of the career, the remote locations of some services, and the shift-work lifestyle.
**Background**

Currently, the Saskatchewan College of Paramedics (SCoP) does not regulate instructional skills requirements for paramedic instructor candidates and content mastery is the sole requirement. Present-day paramedic instructors may not have any knowledge of the principles of teaching or facilitating, design and development, or how adults learn. There are a few programs (i.e. Heart & Stroke) that require paramedic instructors to attend a class and go through a monitoring process before they are allowed to teach. However, even these do not provide much in the way of adult learning theories and do not provide instruction on design and development as these classes only include pre-designed materials. In contrast, many Emergency Medical Services in the United States require paramedic instructors to complete training in facilitation before they are certified and given an instructor designation (Holt, 2011; National Highway Traffic Safety Administration, 2009, p. 63).

**Audience**

The intended audience for the modules are urban and rural medics at all levels (Primary, Intermediate, and Advanced Care Paramedics). The experience level of potential participants varies from novice to having some prior teaching experience. Motivation for potential applicants to enrol will be for self-improvement and possibly to obtain a designation as an instructor through SCoP or other institutions at a later date.
Conceptual Map

Research for this project began with a concept map (see Figure 1) based on adult learning theories, learning design principles, and educator competencies. Adult learning principles, learning design principles, and educator competencies are foundational elements that form the basis for the design and development of online learning modules for paramedic instructors.

Figure 1: Conceptual Map
Section 2: Literature Review

A strong foundation constructed using principles of adult education will develop “flexible, lifelong learners who can keep pace with the rapid expansion of information” (Stern & Kaur, 2010, p. 70). Adult learning theories examine how adults learn best and propose appropriate methods for providing adult education. Adult learners have vastly dissimilar needs from those of children. As instructors, we need to understand these differences in order to be effective in adult learning environments. This section provides a review of literature that examines three broad areas; adult learning theories, learning design principles, and competencies for online instruction.

Adult Learning Theory

Instructors who understand their audience will be able to provide a more meaningful experience for the learners. Cercone (2008) states, in deference to Merriam and Caffarella (1999) that “learning theories have their basis in philosophy and psychology, and provide the overall framework for teaching and learning activities” (p. 142). No single theory fits every learning situation (Frey & Alman, 2003; Cercone, 2008). Each learning event will be unique in its content, audience, and objectives. However, each event should incorporate some key concepts and principles from the many adult learning theories. Theories support instructors to focus on how learning takes place (Cercone, 2008). Focusing on frameworks that support adult learning will result in modules that are well received and effective for the students.

Characteristics of adult learners. Cercone (2008) suggests thirteen characteristics that need to be considered in adult learning contexts: 1) learning preferences; 2) limitations; 3) active
involvement; 4) support and scaffolding; 5) previous learning background; 6) facilitator vs. teacher preferences; 7) prior learning experience; 8) immediacy of application; 9) learner-centered; 10) deliberate practice; 11) safe learning environment; 12) self-reflection; and 13) collaboration. Adult learning theories and principles include selections of these characteristics as their focus. A common theme from this set of characteristics is that adult learners are diverse individuals that bring with them preferences and history, which impacts how they learn. Cercone suggests that adults take on learning voluntarily and manage their learning around work, family, and other responsibilities. Merriam and Cafarella (1999) note that adult learners also tend to be highly motivated and task orientated (as cited in Cercone, 2008, p. 139). Furthermore, adults tend to approach learning in ways that are familiar and that they trust (Cercone, 2008).

**Theories and Principles of Adult Learning**

Building education based on adult learning principles will attract and retain learners because it suits their needs, and because it fits with the reality of their lives (Imel, 1998). The frequency of adults learning online is increasing, so we need to design programs to fit their unique needs. Cercone (2008) states: “Adults want the advantages of the online learning environment because they are busy and it is convenient” (p. 138), and an “increasing number of adult learners will be tapping into this resource” (p. 139).

**Andragogy.** Andragogy is one of the main theoretical frameworks of adult learning and is both learner-focused and humanistic in nature (Cercone, 2008). Knowles (1980) provides four assumptions of adult learners which underscore the principles of andragogy:

1) their self-concept moves from one of being a dependent personality toward being a self-directed human being;
2) they accumulate a growing reservoir of experience that becomes an increasingly rich resource for learning;

3) their readiness to learn becomes oriented increasingly to the developmental tasks of their social roles; and

4) their time perspective changes from one of postponed application of knowledge to immediacy of application.

(Knowles, 1980, p. 45)

Knowles’ (1980) first principle highlights a fundamental characteristic of adult learners, i.e. being self-directed. The concept of self-direction is common among many adult learning theories because as an adult the student is capable of making informed decisions and is used to being in charge of the comings and goings of life. No longer is this person used to being told how, when, or why to do things. The assumption that adults have this strong self-concept influences many decisions in teaching adults - from choosing the setting to involving the learner in the content, the discovery of the information, and even in self-evaluation of the learning (Knowles, 1980). The self-directed learner is an active participant who is in control, independent, persistent, self-confident, self-disciplined, takes the initiative, and has a desire to learn (Cercone, 2008, p. 148).

The second assumption given by Knowles (1980) refers to experience. He tells us that adult learners have past experiences that can be drawn on for individual learning as well as to share with fellow learners. Experience can be used by the students to make connections with the new materials. Knowles also explains that “because adults define themselves largely by their experience, they have a deep investment in its value” (p. 50). Similarly, Fidishun (2000) acknowledges that “adults want to use what they know and want to be acknowledged for that
knowledge” (Section Technology and the Assumption of Andragogy, para. 7). Kolb (1984) also includes experience as a critical component in the process of active learning. Given the importance of prior experience, facilitators should consider what the learners already know, and relate that background to new concepts (Lieb, 1991).

Knowles’ (1980) third assumption explains that adults seek out learning opportunities out of a need or because it fits with life events; no longer because an educational system told them to. The needs of the learner tend to relate to the period of life in which the person is in, and the motivation is internal. One example provided by Knowles is acquiring or maintaining knowledge for a new career as opposed to strengthening leadership skills for a senior employee. Merriam (2001) supports Knowles’ assumption that adult learning tends to be related to changing social roles. As adults, this group of learners is goal-oriented (Lieb, 1991), problem-focused, and practical.

The last of Knowles’ (1980) original assumptions tell us that adult learners “enter an educational activity in a problem-centered or performance-centered frame of mind” (p. 53). These adults want to focus on what brought the learner to the learning and how the knowledge can be applied immediately; as opposed to pedagogy where the focus is on the distant future.

Darden (2014) proposes that “Knowles’ model of andragogy is well suited to the factors that affect learners in an online environment” (p. 811). However, andragogy is not without criticisms. The first is that some adults remain of a dependent nature, or lack in self-confidence. Dependent individuals may require more of a teacher-directed approach and may not do well initially in a self-directed learning environment. For some people, providing support before the learning activity takes place will overcome this internal conflict. Similarly, Cercone (2008) suggests that learners may be used to the more traditional or pedagogical approaches to
education. Culture, as well as individual strengths and weaknesses, need consideration in these cases. A second criticism relates to mandated training, as the principles of andragogy do not address the differences that may be present when adults are required to take classes that are not of interest to them, or that they do not feel are relevant. McGrath, Back, and Management (2009) suggest that the same desire to learn may not be present in the mandated setting. Other sources of motivation may become more important in these cases.

**Experiential learning theory.** Experiential learning is a cyclic theory that is noted by Cercone (2008) to be vital to adult learning. Kolb (1984) states that: “Learning is the process whereby knowledge is created through the transformation of experience” (p. 38). Kolb suggests six concepts of experiential learning that are common between most theorists:

1) Learning is a process, not an outcome.

2) Learning is continuous, not static.

3) Learning is the resolution of conflict.

4) Learning is holistic.

5) Learning involves “transactions between the person and the environment” (p. 34).

6) Learning is “the process of creating knowledge” (p. 36).

Each of the six principles is an active process of learning, which relates back to the characteristics of adult learners. Other features of adult education found in experiential learning theory include a focus on the present, the importance of experience, and collaboration (Kolb, 1984).

Cercone (2008) summarizes experiential learning into three components: “(a) knowledge of concepts, facts, information, and experience; (b) prior knowledge applied to current ongoing events; and (c) reflection with a thoughtful analysis and assessment of learners’ activity that
contributes to personal growth” (p. 147). These components are in line with Piaget’s (1970) suggestion (as cited by Kolb, 1984, p. 23) that adult learning is a constructivist view where new information is assimilated into existing schema to produce higher level thinking.

Despite its strengths, and as with any single learning theory, experiential learning has its downsides. Similar to andragogy, there have been criticisms that experiential learning does not consider differences in learners about culture or past learning experiences (Conian, Grabowski, & Smith, 2003). Conian et al. also state that experiential learning does not define how goals and purpose fit into the theory. Both of these are areas that I would consider important when facilitating adults.

**Connectivism.** Siemens (2005a) introduces six principles of connectivism: 1) Learning is a process of making connections between nodes. 2) Knowing how and where to find information is more important than personal knowledge. 3) Having the ability to find connections between ideas, people, and fields of study is a skill. 4) Maintaining connections and networks are an important part of continual learning. 5) Making decisions is an important part of learning. 6) Learning may come from technology. Connectivism, therefore, is a process of obtaining information and experiences (nodes) through networking and technology and making connections between those nodes. Siemens (2005b) tells us that the connections we have allow us to know where and how to find information, which is important because the speed in which information is changing has increased dramatically over the last several years. Duke, Harper, and Johnston (2013) reinforce that: “The sheer amount of data available makes it impossible for a learner to know all that is needed to critically examine specific situations. Being able to tap into huge databases of knowledge in an instant empowers a learner to seek further knowledge” (p. 8). In today’s age of technology, it is common for these resources and databases to be
accessed online. However the networks with peers and others with similar interests are not to be ignored. Dron and Anderson (2014) state, “by being connected to both other humans and knowledge resources, we retain the currency and benefit from the diversity of ideas and cultures that abound” (p. 60).

Connectivism is learner-centered and autonomous (Kop & Hill, 2008), and is cyclical in nature (Siemens, 2005a). Connectivism shares several principles with other adult learning theories, including the concept that learning is an active process and is constructed not acquired (Downes, 2007). Siemens (2005a) feels that connectivism is a useful theory for designing learning environments. The theory is ideal in life-long learning endeavours of adults, as it holds important the ability to find required information rather than memorize it.

There are several criticisms of connectivism. Similar to andragogy and experiential learning, connectivism assumes all learning is self-directed and does not address mandated learning (“Connectivism,” 2011). Secondly, connectivism requires a high level of computer literacy (“Connectivism,” 2011). However, this will become less relevant as technology becomes more and more a part of everyday life. A third criticism that is more challenging to overcome is that “connectivism does not address the issues of learning to identify information accuracy, relevancy, or appropriacy” (“ETEC512”, n.d., Limitations of connectivism section, para. 4). Learners need to be aware that internet based information is difficult to validate and translation may alter the original intent of the information.

**Constructivism.** Constructivist learning theory explores how people make sense of experiences (Merriam, Caffarella, & Baumgartner, 2007, p. 291; Hein, 1991). The focus of this theory is the process of how the learner creates meaning from experience (Merriam, Caffarella,

1) learning is an active process
2) people learn about learning as they go about learning
3) learning involves engaging the mind, not solely the hands
4) language impacts learning
5) learning is a social activity
6) learning is contextual
7) learning assimilates new knowledge into previous learning
8) learning takes time and reflection
9) motivation is important and can result from understanding why

These nine principles stress the importance of active and social learning through interaction, connections, and conversation. Hein (1991) advises that learning does not occur in isolation, rather it is connected to our relationships, beliefs, experiences, and everyday lives.

Both personal and social constructivism (Merriam et al., 2007) share many aspects with other adult learning theories. Similar to andragogy and experiential learning, constructivism holds that experience is the foundation on which learners build new knowledge. In constructivist learning, the focus is on the student (Hein, 1991) and fits well with the concept of self-directed learning (Huang, 2002). Both are important elements of many adult learning theories. Huang also suggests that learning events should focus on authentic learning to increase motivation and to support adult education (p. 29). Vygotsky (1978, as cited in Huang, 2002, p. 29) emphasizes
the importance of social context and interaction in the learning process, which highlights the theme of collaboration.

A difference to note between experiential learning and constructivist learning theory is that constructivism pays more attention to the context in which learning takes place (Merriam et al., 2007). While other adult learning theories promote authentic learning, constructivist learning suggests that society and social learning also have a significant role to play.

Several concerns exist with constructivist learning. Huang (2002) suggests that it may be difficult to evaluate outcomes derived from constructivism, as the process of learning to learn is as important as the tangible learning. It will be important to consider this abstract concept when designing learning. A second issue was noted by Fenwick (2003, as cited by Merriam et al., 2007, p. 183), who feels that constructivists view people as having a fixed identity. I would argue that people may resist change that is unknown to them. However, adult learners take on learning voluntarily as for reasons that interest them so they may be more open to change and can develop their identity.

**Adult Learning Theory Summary**

Many theories support adult learning and each has a different focus. There are, however, themes within adult learning theories: 1) the experiences and background that adults bring with them are essential; 2) adults tend to be self-directed; 3) social interaction and networking are important; and 4) facilitation should be learner-centred. No single theory addresses all aspects of adult learning, rather understanding the general principles will provide a solid basis for facilitating and instructing in adult learning contexts. It is important to consider the principles of adult learning theories when designing training for adults.
Learning Design Principles

Branch and Merrill (2012) advise that “Instructional design (ID) is a system of procedures for developing education and training curricula in a consistent and reliable fashion” (p. 8). Learning design principles provide instructors with frameworks on which to design and develop training based on the principles of adult learning theories. The process of change that results from adult learning (Cerce, 2008; Biggs, 2003) is more effective when supported by effective facilitation techniques and learning design theory. Stern and Kaur (2010) agree that “instructional design theory should always inform training” (p. 72). Similar to adult learning theories, many learning design principles may be blended or applied to different learning contexts.

Carman (2005) provides five design elements that are essential to learning: Online content, collaboration, assessment, reference materials, and live events (p. 2). While Carman refers to blended learning specifically, these elements are present in online adult training in general. The advantage of online content is that it is individual and self-paced (Carman, p. 2); relating to principles of adult learning theory and asynchronous learning. Collaboration involves sharing ideas and working with others (Carman) which ties in principles from connectivism and constructivism. Assessment is a common theme between design principles and adult learning theory and is important to ensure that learning has taken place. Including reference materials in the design of training can “enhance retention and transfer” (Carman, p. 2), supports just in time learning, and fits with connectivism as the learner knows where to find the information when it is needed. I would suggest that Carman’s (2005) element of live events could be more aptly
referred to as instructor presence in the context of online training for paramedics. Carman states that live events require the learning to involve: attention in the form of gaining and maintaining engagement, relevance, confidence that stems from clear expectations and feedback, and satisfaction from using new skills or information. Authentic learning, feedback, engagement, and motivation are all components of adult learning principles that can be achieved via strong facilitator skills and asynchronous online learning. Live events such as synchronous collaborative sessions or question periods may be used to supplement asynchronous learning design (Carman), but are not required to provide effective online training (Johnson, 2008).

**Constructive alignment.** Constructive alignment has two components: 1) to “construct meaning through relevant learning activities”; and 2) to “set up a learning environment that supports the learning activities in order to achieve outcomes” (Biggs, 2003, p. 13). The aim of constructive alignment is to promote effective facilitation that creates actively engaged students (Walsh, 2007). Walsh tells us that using this framework results in higher level learning that incorporates several domains of learning, and increases motivation as opposed to students only studying to pass. Similarly, Biggs suggests that instructors need to align objectives, learning tasks, and assessments, as students tend to base their learning on expected evaluations.

Following constructivist principles, constructive alignment allows learning to become a product of the students’ activities and experiences (Walsh, 2007). It is active, student-centred, problem-based and outcome-focused (Walsh, 2007); themes which are present in many adult learning theories. Presage, process, and product are elements of constructive alignment (Walsh, 2007).

Presage brings the prior learning and experiences of adults into program design. Walsh (2007) explains that personal factors such as motivation, ability, age, and personality are
important considerations when creating adult learning. Situational factors including family and work circumstances will also influence the needs of adult learners (Walsh, 2007). Offering online training is one way to provide flexible learning for adults that incorporates personal and situational factors. Cercone (2008) provides that “everyone is different and shaped by his/her history” (p. 146). Similarly, Masie (as cited by Carman, 2005, p. 1) notes that “people are not single-method learners.” It is invaluable for instructors to know and understand the background of the students and to consider their prior learning and experiences when developing learning events.

The second element of constructive alignment focuses on process, which is in line with adult learning principles found in constructivism. The types of activities that are used to assist the learners to meet the objectives, and how students gain the desired level of knowledge is more important than only providing content (Walsh, 2007). Collaboration is essential for adult students as it augments self-paced learning (Carman, 2005), especially in the online learning environment where socialization can sometimes be lacking. Carman suggests including areas for synchronous collaboration such as regular email correspondence or threaded discussion boards to maintain peer to peer and peer to facilitator relationships. Wang, Su, Cheung, Wong, and Kwong (2013) suggest that process includes using a formative framework where learners receive regular feedback on their progress as part of their learning.

The third element Walsh (2007) suggests is the product or the desired outcomes. Learning outcomes can include grades, competencies, attitudes, behaviour changes, program completion, and satisfaction with learning (Wang et al., 2013). The verbs chosen when developing learning objectives determine the standard of performance for the outcomes. Success is attained by matching the objectives and the learning tasks to the desired outcomes. Alignment
will support the student to understand the instructor’s expectations, why the course is important, how it relates to other areas, and the goals of the program; in turn increasing learner satisfaction and motivation (Wang et al., 2013, p. 487).

Constructive alignment is outcome-based and asks “What do I intend my students to be able to do after my teaching that they couldn’t do before, and to what standard?” (Biggs & Tang, 2009, p. 1). Constructive alignment has three components that work together to accomplish this goal and build effective learning: 1) learning outcomes and or objectives; 2) learning tasks and activities, and 3) assessments.

**Learning objectives.** Learning outcomes exist at program and unit levels (Biggs & Tang, 2009) and are the basis of creating learning objectives. Objectives are written for the student, and describe in detail the requirements for mastery. Each learning objective includes a verb from one of the taxonomies that explains the desired level of action, behaviour, or “qualities of performance” (Biggs, 2003, p. 4) required from the student. In keeping with adult learning principles, using verbs such as apply, invent, and solve problems create authentic learning experiences. These verbs will become markers to ensure consistency throughout the learning design. Well defined objectives ensure that the intended audience and course content match, and will be used as a foundation to assess the success of the learner.

**Learning tasks.** Learning objectives become the foundation from which learning tasks are created. Learning tasks “provide rich experiences and opportunities to construct and internalize knowledge in context” (Wang et al., 2013, p. 487). Biggs and Tang (2009) tell us that while declarative knowledge provides a foundation, it is important for students to have functioning knowledge to utilize the information. Similarly, Walsh (2007) recommends that students have opportunities to demonstrate understanding by interacting with new tasks,
incorporating feedback, and applying learning to authentic situations to be successful. Aligning the verbs used in the stated outcomes and objectives into our teaching methods and learning tasks will support the students through the process of learning. Biggs (2003) states that well-designed tasks direct the students through the learning process to arrive at the intended outcomes, as opposed to students focusing solely on the assessment process.

**Learning assessments.** Learning assessments also need to be tied to learning objectives. Assessments measure the degree to which students deploy the verbs identified in the objectives (Biggs, 2003). Carman (2005) similarly states that assessments allow students to try out their new knowledge while allowing a measurement of the effectiveness of learning events. Criterion-referenced assessments are supported by both constructive alignment and adult learning theory and can be developed based on the learning objectives. Assessment, therefore, “checks the quality of learning” and “defines what is to be learned” (Biggs, 2003, p. 2).

**Learning design frameworks.** Branch and Kopcha (2014) describe instructional design frameworks as “conceptual tools to visualize, direct, and manage processes for creating high-quality teaching and learning materials (p. 77), and “guiding principles for analyzing, producing, and revising learning environments” (p. 80). Instructional design is “intended to facilitate active, multifunctional, inspirational, situational approaches to intentional learning” (Branch & Kopcha, p. 85) which provides robust frameworks on which to build effective training based on adult learning principles. Branch and Merrill (2012) describe nine components that are common to effective instructional design: systematic, systemic, responsive, interdependent, redundant, dynamic, cybernetic, synergistic, and creative (p. 8). The nine components form a robust iterative, self-correcting systems approach. Branch and Kopcha describe learning design as both
descriptive (illustrates relationships) and prescriptive (goal-orientated, active, and guiding) (p. 80).

Among others, Branch and Kopcha (2014) suggest that “effective instructional design models need to be sensitive to different educational contexts and be responsive to complex teaching and learning situations” (p. 77-78). Design frameworks, therefore, are necessary to assist instructors in matching appropriate processes to the intended learning situations. The process involved in differing models may be linear, rectilinear, or nested and concurrent. Linear models work from start to finish in a step-by-step pattern completing one element before another begins. Rectilinear is cyclic and allows for new information to influence revisions of earlier material; often helpful when in-depth analysis cannot occur before design and development are initiated (Branch & Kopcha, p. 81). Branch and Kopcha describe nested and concurrent as a rapid design model where “key design phases must occur simultaneously or in near succession” (p. 82). In nested and concurrent models, the analysis phase includes developing goals and objectives, allowing for the early development of prototypes (Branch & Kopcha). The needs of the project will influence the type of framework chosen. Gustafson and Branch (2002, as cited in Branch & Kopcha, 2014, p. 84) offer a taxonomy for making an educated choice for a learning design framework based on the desired delivery format, nature of the situation, audience, nature of the course, and the degree of flexibility.

**Project design approach.** There are many learning design frameworks from which to choose. However, most instructional design models incorporate the five main elements of ADDIE: Analysis, Design, Development, Implementation, and Evaluation (Branch & Kopcha, 2014; Branch & Merrill, 2012). These five elements “inform each other” through each step of creating a learning event (Branch & Kopcha, 2014, p. 80). The ADDIE model itself is said to be
linear and sequential (Russell, 2015) and offers a solid analysis section for identifying gaps in knowledge or skills (Cox, 2009).

Closely related to ADDIE is the Successive Approximation Model (SAM). The Successive Approximation Model focuses on the learners’ experiences, engagement, and motivation (Russell, 2015, p. 41). SAM starts with a preparation phase (Russell, 2015) which includes gathering background information, and conducting analyses. Cox (2009) identifies training needs, learner characteristics and needs, setting analysis, and content requirements as areas to be analyzed. In the case of the current project for adult learners, the analysis will be informed by research and a thorough investigation of relevant literature sources to develop instructional materials vis-à-vis adult learning theories, principles, and instructor competencies. Setting analysis will involve investigating options for hosting the completed modules to allow the intended audience convenient access. SAM involves a Savvy Start meeting (Russell, 2015) before beginning the iterative design phase to develop the project charter and to start outlining the objectives and layout of the project; fitting with elements of nested and concurrent design.

The nature and limited scope of the instructor certification modules requires the instructional designer take on more than one role (Branch & Merrill, 2012) and results in some modifications of the Savvy Start. After establishing a layout, the iterative design phase (Russell, 2015) continues with the design and development of the course resulting in a prototype. The prototype includes content, graphics, narration, menus, and navigation features (Cruz, 2015). Russell suggests that interactive activities and opportunities for practice, including case studies and simulated scenarios, be developed first while supporting-content is added later in the development phase (p. 34). SAM is an ideal model for the design and development of the self-paced, online module prototypes for the paramedic instructor certification project as it is agile,
flexible, and non-linear (Russell, 2015). The model allows the course to be broken down into standalone modules that can be developed quickly and released independently (Lotz, 2013).

Instructional design frameworks have been criticized for breaking learning down into isolated components that do not allow students to understand the entire picture and makes integrating the new knowledge into real-world situations difficult (Branch & Merrill, 2012, p. 12). Branch and Merrill suggest using whole task models that offer authentic, sequential, and progressively more challenging tasks. The design portion of existing frameworks such as SAM can be modified to support whole task learning resulting in multiple opportunities for students to apply new knowledge and skills (Branch & Merrill, 2012).

**Universal Design**

Universal design was originally a set of principles intended to make physical spaces more accessible (Story, 1998). Since then, however, the idea of designing to be inclusive has made its way into education and learning. Several terms are associated the universal design: Universal Design for Learning (UDL), Universal Instructional Design (UID), and Universal Design for Instruction (UDI) (McGuire, Scott, Shaw, 2006). While the focus of each branch differs slightly, the basis of universal design has several core principles:

1. Equitable use
2. Flexibility in use
3. Simple and intuitive
4. Perceptible information
5. Tolerance for error
6. Low physical effort
7. Size and space for approach and use
8. A community of learners
9. Instructional climate

(McGuire, Scott, Shaw, 2006, p. 170)

These nine principles form a framework that can be used to design and develop accessible learning for the greatest possible number of people. Several of the principles have a direct impact on applying learning design principles in the design and development of training materials for paramedic instructors.

**Equitable use.** McGuire, Scott, and Shaw (2006) define equitable use as designing instruction “to be useful and accessible by people with diverse abilities. Providing the same means of use for all students” (p. 170). Similarly, Story (1998) refers to equitable use as “useful and marketable to people with diverse abilities” (p. 8). While intended for architecture, the idea of making design appealing to all fits for education as well. I would contend that the principle of equity would include creating courses that are useable despite geography or physical location of the learner. McGuire, Scott, and Shaw, (2006) state that “advances in technology have opened many doors and made flexible communications more feasible (e.g. audio, visual, and text communication that is instantaneous and widely available)” (p. 168). In the case of my major project, equity will also involve developing modules that are open to learners despite their experience level.

**Flexibility.** Two of the key points of the flexibility principle are designing for a comprehensive array of abilities and providing choices for the learner (McGuire, Scott, & Shaw, 2006). Story (1998) and Elias (2011) both suggest providing options for the student. Rose, Harbour, Johnston, Daley, and Abarbanell (2006) discuss choices in terms of providing: options
for textbooks to support student learning preferences (p. 146), flexibility to learners to express what they have learned (p. 148), and options to choose which discussion groups to join (p. 146). Flexibility would also include making the learning accessible for shift workers. The ability to work on course materials anytime day or night, anywhere, and with the capacity to start and stop are key points for the target audience.

**Simple and intuitive.** Instruction should be uncomplicated and predictable in its design (McGuire, Scott, & Shaw, 2006). King-Sears (2009) suggests using visual organizers and scaffolding new learning onto previous knowledge as methods to support students. Rose, Harbour, Johnston, Daley, and Abarbanell (2006) recommend taping lectures and making them available online for students to review at later dates to compensate for those who need to hear things more than once, those with language difficulties, or for students to review sections where concentration may have disappeared. Not all participants in the instructor certification modules will have the same level of comfort or expertise with technology. Therefore, it will be necessary to keep the modules easy to access and navigate, and Elias (2011) suggests making content available offline. Similarly, there will be limited IT support for the course, so the learning platforms and interface will need to be easy to access and use.

**Tolerance for error.** Tolerance for error involves expecting that participants will vary in their learning pace and in the skills and knowledge they come into the course with (McGuire, Scott, & Shaw, 2006). King-Sears (2009) suggests that formative feedback is a necessary component within the principle of tolerance for error, as learning occurs from making mistakes. Elias (2011) recommends allowing the students the ability to edit their posts. Including timely feedback during discussions, on assignments, or with online assessments will support all
learners. Tolerance for error can also be considered creating a safe, supportive place for students to learn.

**Low physical effort.** The principle of low physical effort relates to not requiring students to expend energy not directly related to learning (McGuire, Scott, & Shaw, 2006). An example provided by King-Sears (2009) is providing a bookmark to prevent lost time and effort of the learner trying to find where he or she left off; a concept which is also applicable with online learning. In the case of the instructor certification modules, the principle may include limiting the need for IT support, using caution with using technology that may not be familiar to the students. Keeping the layout simple and easy to navigate will also apply here.

**Learning Community**

Interaction and communication are key concepts in the community of learners principle (McGuire, Scott, & Shaw, 2006). Communication needs to occur between the facilitator and the students to ensure that everyone is getting what they need from the course. Providing multiple methods of communication is important, as is providing easy access to support links (Elias, 2011).

**Instructional climate.** McGuire, Scott, and Shaw (2006) state that “instruction is designed to be welcoming and inclusive” (p. 170). Starting off learning events with ice breakers sets the tone for the course, allows the participants to start to form connections with classmates, and builds trust (Anderson, 2008, p. 350). Positive climates are supported by small group sizes (Wilcoxon, 2011), as small numbers make it easier to manage details such as scheduling meetings, yet allows for dialogue, and interaction. Involving learners in the content, for example creating a user-generated reference list, can have a constructive power on the climate (Elias, 2011). Elias (2011) suggests establishing and maintaining regular correspondence with
participants. Also, Shatz and LoSchiavo (2006) note that humour reduces anxiety and stress when used appropriately in the educational setting.

**Social presence.** Anderson (2008) states the importance of social presence in online learning communities for social support as well as for learning activities. Social presence is “establishing a supportive environment such that students feel the necessary degree of comfort and safety to express their ideas in a collaborative context, and to present themselves as real and functional human beings” (Anderson, 2008, p. 344). Dron and Anderson (2014) add:

> Processes of meaning-making, integrating new information, and creating knowledge are not only enhanced and stimulated through reaction, discussion, and argument with others but also much knowledge confirmation, interpretation, contextualization, and validation happens only through interaction with others. (p. 39)

The Community of Inquiry (CoI) model describes social presence as the “extent of identification with a community and trusting inter-personal engagement” (Dron & Anderson, 2014, p. 46).

Social presence is a major factor in connectivism, as the adult learning theory outlines the need to establish and maintain connections with others to support learning (Dron & Anderson, 2014, p. 59). Armellini and De Stefani (2016) offer that: “Social presence can be a major lever for engagement, sense-making and peer support…Both teaching presence and cognitive presence have ‘become social’.”

Engulfing the connectivist, constructivist, and community of inquiry views of social presence is the Fully Online Learning Community Model (FOLC). The self-directed, collaborative, and learner-centred model combines social presence with cognitive presence in a digital space to create collaborative learning (Van Oostveen, 2016). Social presence is heavily weighted in the FOLC model and is described as “the ability of learners to project themselves
socially and emotionally in a community of inquiry” (Ionnouolga, 2017, Para. 2). Social presence includes interpersonal relationships, sharing control, working together, mutual engagement, and sharing resources (Ionnouolga, 2017, Para. 3). The design of the FOLC model reduces the feeling of isolation within online learning as well as welcoming new participants to existing learning communities (Van Oostveen, DiGiuseppe, Barber, Childs, Mykhailenko, & Blayone, 2013). Van Oostveen (2016) suggests that social presence involves open, cohesive, and affective communication while actively supporting the use of open, non-proprietary educational resources.

**Online Design**

Online design incorporates the principles of adult learning theory, learning design, and universal design. Mason (2006) states:

> Online learning is considered to be particularly appropriate for adult continuing education: it is more flexible than face-to-face teaching, it supports a self-directed approach to learning rather than a teacher-directed approach and it facilitates choice and the use of a wide range of resources. (p. 121)

Cercone (2008) tells us that “one must be familiar with the way in which to design an online environment, understand the strengths as well as limitations that are inherent in this type of instructional medium, and balance that with the information about how adults learn” (p. 143). Johnson and Aragon (2002) suggest seven principles of online learning which relate directly to adult learning theory: 1) Address individual differences; 2) Motivate the student; 3) Avoid information overload; 4) Create real-life context; 5) Encourage social interaction; 6) Provide hands-on activities; and 7) Encourage student reflection (p. 34).
**Individual differences.** Adult learning theory informs us that adults have different learning preferences as well as different experiences. Mason (2006) recommends that online design must consider the intended audience. Dykman and Davis (2008) suggest that requiring the learners to post meaningful profiles may assist with getting to know the students (p. 282). Johnson and Aragon (2002) suggest that “online courses need to address the variability in student learning [preferences]” (p. 2). The flexibility of online design can support the use of a variety of instructional methods to meet individual learners’ needs. Potential options include offering content in multiple formats, allowing the student control over when and how the content is accessed, and supporting collaborative interaction (Johnson & Aragon, 2002).

**Motivation.** Motivation can impact participation, confidence, and satisfaction with the learning event (Johnson & Aragon, 2002, p. 35). Offering the option to choose learning tasks that are personally relevant may increase motivation for the adult learner. Johnson and Aragon also suggest using entertaining approaches such as games, varying speakers, and incorporating multimedia such as graphics or videos to build motivation. Dykman and Davis (2008) offer that “concise timelines, clear assignments, specific deliverables, and unambiguous due dates are essential to provide the sense of understanding and control that will foster a productive online learning environment and make it possible for students to feel comfortable and motivated” (p. 283).

**Information overload.** Information overload occurs from too much information or too rapid of a pace as “the capacity for mentally holding and manipulating words and images in working memory is limited” (Mayer & Moreno, 2003, p. 44). Johnson and Aragon (2012) recommend chunking content into workable sections which each revolve around learning cycles of presentation, application of a limited number of activities, and assessment. Dykman and
Davis (2008) advise starting out with a slower pace until the learners are comfortable with the layout and requirements and then moving at a quicker pace as the course proceeds. Graphic organizers are useful tools to orient participants to their place in the material (Johnson & Aragon, 2012; Williams, 2015), as are bookmarking features found in many learning platforms. Online technologies can provide the learners with opportunities to access additional resources and make connections related to the content, supporting principles of constructivism and connectivism.

Huang (2002) suggests that providing resources such as hyperlinked text or media will encourage students to actively search to solve problems or construct knowledge (p. 30). Learners can use these opportunities as much or as little as they wish and at their own pace as to not increase cognitive overload.

Cognitive overload can also be avoided using three powerful graphic design principles: 1) multimedia principle, 2) contiguity principle, and 3) modality principle (Clark, 2002; as cited in Carman, 2005, p. 4). The first principle, multimedia, tells us that “people learn more deeply from words and pictures than from words alone” (Mayer, 2001, p. 31). Second, the contiguity principle refers to keeping text and graphics close together (Carman, 2005). Mayer and Moreno (2003) agree that integrated presentation allows more processing power to be available for learning as opposed to the learner having to search to find corresponding text and graphics. The third principle of modality states that adding audio to graphics can reduce cognitive overload (Carman, 2005). Mayer and Moreno explain that the audio is interpreted in the verbal channel of the information processing system and therefore does not compete with the graphics that are making use of the visual channel. Also, standardizing the layout and look between modules with a consistent design allows learners to navigate the course easier and minimizes the mental load (Dykman & Davis, 2008).
**Real-life context.** Authentic learning in the form of activities and assessments are important to adults and will promote learning. Real-life context may include case studies (Johnson & Aragon, 2012), or the use of portfolios (Mason, 2006; Cercone, 2008). In the context of paramedic instructor students, this could include developing objectives for a future class as a learning task.

**Social interaction.** Johnson and Aragon (2012) stress the importance of quality interaction among participants as well as between participants and the instructor. Identifying minimum participation requirements in advance may be of benefit. Jonassen (2000, as cited in Huang, 2002) advocates for the use of chatrooms, bulletin board systems, and e-mail networks to support the needs of adult learners including active learning, reflection, sharing, socialization, and community. Dykman and Davis (2008) also stress the importance of class size with regards to social interaction, stating that large class sizes may isolate learners and in turn decrease the much-needed interaction.

**Hands-on activities.** Active learning is a major component of adult learning theory. Group work, discussions and hands-on activities will support active learning. Mason (2006) suggests that group work can be partially collaborative where activities are designed to be “relatively time- and person- independent, yet use the input of others” (p. 125). Activities such as submitting work of peers to review still achieves the benefits of active learning without the stress of “being dependent on specific students to carry out their part of the work” (Mason, 2006, p. 125). The process of creating teams is also important. Rather than assigning students to alphabetical or computer-generated teams, it may be more productive to create the groups based on criteria such as skillset or allow the students to choose their groups based on their self-developed criteria. Maintaining small group sizes, as noted previously, is of particular
importance for online learning to facilitate participants from varying time zones with varying schedules. Hands-on activities correlate with authentic learning and allow the learner to put the new knowledge or skills to work. Paramedics training to become instructors may be asked to develop a combination of objectives and assessments and post the list for feedback from their peers, combining different forms of active learning.

**Reflection.** Reflection is another principle of adult learning that applies to online learning. Following principles of constructivism, reflection combines new information with existing knowledge to form new mental models. Reflection may be done through journals or online discussion posts or may result from feedback from instructors or peers (Johnson & Aragon, 2012).

**Learning Design Summary**

Carman (2005) states: “to get maximum value…from a self-paced learning offering, it must be based on effective implementation of instructional design principles” (p. 4). Constructive alignment offers a clear link between the desired outcomes of a learning event and its instructional design (Walsh, 2007) that will support the development of effective online training. The framework dictates the ‘what,’ ‘how,’ and ‘to what standards’ of designing learning events, and offers logical, practical, efficient, and satisfying training for learners (Biggs & Tang, 2009).

The link between teaching and learning suggests that how we teach affects how the learner constructs knowledge and skills (Branch and Kopcha, 2014). Therefore, it is important to use effective learning design frameworks as an “iterative process of planning outcomes, selecting effective strategies for teaching and learning, choosing relevant technologies, identifying
educational media, and measuring performance” (Branch & Kopcha, 2014, p. 77). Learning design frameworks ensure the consistent production of useful learning materials and events that meet their intended goals. Using the Successive Approximation Model with whole task considerations in the design will support the training of paramedic instructors.

Employing the principles of universal design in developing and delivering instruction, as well as in planning assessments and evaluations, will support the diversity of learners and can be used to build an inclusive educational experience (McGuire, Scott, & Shaw, 2006). Following the framework created by the nine principles of universal design will assist educators to provide learning that is accessible, and engaging, to the greatest number of students possible.

Johnson and Aragon (2002) suggest that “the technology used in an online program is not as important as other instructional factors, such as pedagogy and course design” (p. 1). As Russell (2015) describes, the learning experience will create a realistic context with activities that challenge the participants to apply the knowledge to real-life situations while receiving feedback on their progress (p. 42). The layout of the course will support a constructivist model that will allow learners the opportunity to “use technology directly to explore, converse, articulate, collaborate, and reflect, facilitating the creation of knowledge” (Brandon, 2004, Relationship between instructional design and project management section, para. 8).

**Educator Competencies**

Davis, Stullenbarger, Dearman, and Kelley (2005) advise that “competence encompasses the essential knowledge, skills, and abilities needed to perform a specific task at the expected level and degree of quality” (p. 206). Carracio, Wofsthal, Englander, Feretz, and Martin (2002) take the definition of competencies a step further to highlight the importance of attitude (p. 362).
Competencies are sometimes referred to as best practice, roles, or expertise (Srinivasan, Pratt, Skeff, & Hales, 2011, p. 1213). Srinivasan, Pratt, Steff, and Hales (2011) refer to competencies as “core values or behaviours that are crucial to the viability of a field” (p. 1213). Educator competencies then can be described as set standards to “demonstrate their ability to appropriately and systematically teach, role model, evaluate, and provide feedback to learners” (Srinivasan et al., 2011, p. 1212).

The use of competencies allows for a common language and provides an organizing framework for students and instructors for determining what skill sets and resources are required for success (Srinivasan et al., 2011). Similarly, Davis, Stullenbarger, Dearman, and Kelley (2005) describe competencies as the essential knowledge, skills, and abilities that an instructor must be able to demonstrate. Competencies can be used as a rating scale for adult learners to self-assess their knowledge and expertise before and throughout their learning and as benchmarks to improve their practice as educators (Kalb, 2008). At times, competencies are used to describe the scope of an individual’s role (Kalb, 2008). Defining specific competencies for instructors ensures consistency, quality, and accountability to the public, to employers, and to accrediting bodies (Davis et al., 2005) such as the Saskatchewan College of Paramedics (SCoP).

Becoming an instructor is not intuitive, it takes preparation (Billings, 2003). Bigatel, Ragan, Kennan, May, and Redmond (2012) offer seven categories of competencies for online educators: active learning, administration and leadership, active teaching, multimedia, classroom decorum, technological competence, and policy enforcement. Each category is made up of multiple competencies. However, it is not intended to be an exhaustive list. Rather, the framework provides “an organizational structure that may aid in the design and development of faculty development programs” (Bigatel et al., 2012, p. 73).
Paramedic instructors will be better equipped to provide continuing education with training in these competencies adapted to their unique environment.

**Active learning.** Active learning and student-centred learning are synonymous (Bigatel, Ragan, Kennan, May, and Redmond, 2012), and both elements are essential to adult education. Davis, Stullenbarger, Dearman, and Kelley (2005) suggest that instructors must be able to define instructional objectives and organize content and tasks “according to accepted principles of learning” (p. 209). Bigatel et al. list several active learning competencies for educators:

- Encourage students to interact with each other by assigning team tasks and projects, where appropriate.
- Include group/team assignments where appropriate.
- Encourage students to share their knowledge and expertise with the learning community.
- Encourage students to participate in discussion forums, where appropriate.
- Provide opportunities for hands-on practice so that students can apply learned knowledge to the real-world.
- Provide additional resources that encourage students to go deeper into the content of the course.
- Encourage student-generated content as appropriate.
- Facilitate learning activities that help students construct explanations/solutions.
- Use peer assessment in his/her assessment of student work, where appropriate.
- Show respect to students in his/her communications with them.

(p. 65).

Davis et al. (2005) reinforce that instructors must know how to involve learners in the planning and assessment of their learning. Student-centered, active learning competencies are noted by
Bigatel et al. (2012) to increase student engagement and motivation. Paramedic educators need to have knowledge of adult learning theory and have the skills required to facilitate student-centred approaches to learning. Billings (2003) adds that instructors need to be able to “establish an inclusive, learner-centred environment that is mindful of the needs of multicultural, multigenerational learners” (p. 99).

**Administration, leadership, and policy enforcement.** Bigatel, Ragan, Kennan, May, and Redmond (2012) provide four instructor competencies relating to administration and leadership and one related to policy enforcement: (a) use transparent grading techniques; (b) communicate expectations clearly; (c) demonstrate proficiency with the learning management system and technology being used; (d) use appropriate technology that supports learning; and (e) demonstrate competency in monitoring students for academic integrity. Bigatel et al. summarize the administration and leadership competencies as the ability of instructors to lead, organize, and direct the process of learning (p. 72). Paramedic instructors need to be competent in administrative tasks as they are often responsible for setting up and managing training events for their staff. Davis, Stullenbarger, Dearman, and Kelley (2005) support the need for instructors to maintain records and require that educators be able to assess programs to meet future needs. Bigatel et al. advise: “to adequately prepare a novice or intermediate instructor for online teaching success, the ability to track student performance, submit grades, mark papers, and manage the course roster and other functional skills necessary for general course operation are also necessary” (p. 73). Billings (2003) suggests the need for instructors to participate in material and course development in collaboration with stakeholders, not only as individuals but as part of multidisciplinary teams. The aspect of multidisciplinary teams is relevant to
paramedic instructors. Emergency Medical Services (EMS) collaborates with other professions, and the training is often in conjunction with, or due to demands of, other departments.

Leadership can involve ongoing self-assessment for the instructors. Davis, Stullenbarger, Dearman, and Kelley (2005) suggest that competencies are useful for “assessing one’s own need for and participation in professional development” (p. 208). Competencies can provide a framework for existing and future instructors to ask for more training or resources to “enhance their personal success and the quality of their teaching” (Srinivasan, Pratt, Steff, and Hales, 2011, p. 1212). Not only do competencies classify great teachers, but they also identify if individuals are instructing competently and provide frameworks for remediation (Srinivasan et al., 2011, p. 1212). Leadership competencies can also refer to the ability of the instructor to research and stay current on evidence and scholarly-based material (Davis, Stullenbarger, Dearman, and Kelley, 2005) to disseminate to their EMS colleagues.

**Active teaching and learning environment.** Bigatel, Ragan, Kennan, May, and Redmond (2012) describe a “need for online instructors to be visible, active, and responsive to the online learner in order to support student progress” (p. 72). Active teaching is similar in nature to three components of Anderson, Rourke, Garrison, and Archer’s (2001) teacher presence: design and organization, facilitating discourse, and direct instruction.

Anderson, Rourke, Garrison, and Archer (2001) suggest that competencies in the design and organization component include the ability to set up the curriculum for the students, create the methods to be used, establish time parameters, and establish rules and guidelines. Bigatel, Ragan, Kennan, May, and Redmond (2012) highlight the need for instructors to develop online materials with manageable workloads (p. 66).
Facilitating discourse shares some characteristics with creating a social presence and includes several competencies: (a) build and support the learning community; (b) maintain interest, motivation, and engagement; (c) encourage and balance learner participation; and (d) create a positive learning environment (Anderson, Rourke, Garrison, & Archer, 2001). Bigatel, Ragan, Kennan, May, and Redmond (2012) add two other competencies: Instructors take an interest in the student’s learning, and instructors keep participants on track and task (p. 66). Billings (2003) also suggests the need for instructors to “be caring, flexible, and patient, and have a sense of humour, adventure, and humility” (p. 99). Bigatel, Ragan, Kennan, May, and Redmond (2012) suggest that instructors must also be competent in decorum, specifically resolving the conflict that may occur within collaborative learning. Anderson et al. (2001) confirms the need to mediate conflict: “(t)he absence of social presence leads to students’ inability to express disagreements, share viewpoints, explore differences, and accept support and confirmation from peers and teacher” (p. 344).

Direct instruction includes the ability of instructors to: (a) scaffold learning; (b) present content and encourage critical thinking; (c) provide feedback, (d) design assessments; (e) provide additional resources; and (f) summarize discussions and content (Anderson, Rourke, Garrison, & Archer, 2001). Bigatel et al. (2012) summarize that instructors will provide clear, detailed, and timely formative feedback on tasks, assessments, and discussions (p. 66).

**Multimedia and technology.** Spector and Michael-de la Teja (2001) note that there are: A range of activities available in online settings and that the multiple conditions of time in which they take place are evidence that the technology demands placed on online teachers are somewhat more significant than those associated with classroom teachers. (p. 2)
Instructors competent in multimedia employ a variety of resources to meet the course objectives and ensure such resources are appropriate for the learning tasks (Bigatel, Ragan, Kennan, May, and Redmond, 2012, p. 66). Along similar lines, instructors must be proficient and confident with the technologies used in learning events that they are facilitating (Bigatel et al., 2012).

**Development.** Carraccio, Wolfsthal, Englander, Feretz, and Martin (2002) describe competency-based instructions as: (a) outcome-based; (b) non-hierarchical; (c) shared between student and instructor; (d) includes authentic tasks; and (e) includes formative, criterion referenced assessments based on defined objectives (p. 362). The ideologies, core values, and core knowledge associated with a professional practice form the basis of competency-based instruction (Davis, Stullenbarger, Dearman & Kelley, 2005). Objectives, tasks, benchmarks, and performance indicators are combined to create competencies. Successful mastery of competencies is performance-based, not time-based. Criterion-referenced measures evaluate learners based on standards rather than against their peers. Carraccio et al. (2002) suggest that competency can be “attained through didactic learning, small group discussions, on-site experiences or information technology” (p. 363); however, it is necessary for the objectives, tasks, and assessment tools to align to be valid. Four elements can be combined to create effective competency-based learning:

1. Identify and define the skills and knowledge required for the profession
2. Outline the performance indicators
3. Describe the knowledge, skills, or attitudes needed for each competency
4. Match the assessment tools specific to each competency to evaluate the outcomes

(Carraccio et al., 2002, p. 365).
Srinivasan, Pratt, Skeff, and Hales (2011) caution that instructors may need specialized competencies in addition to core competencies depending on who, what, or where they are teaching. As an example, paramedic instructors who design and develop entire courses will need more competencies than those who deliver individual lessons, and those who provide academic training will have different competency requirements than instructors who offer clinical instruction.

Certification. Certification is a common way to validate that a student has demonstrated a given set of competencies (Spector & Michael-de la Teja, 2001; Davis, Stullenbarger, Dearman, & Kelley, 2005; Garavan & McGuire, 2001). Instructor certification based on competencies is standard in many fields. Competencies are not new to Emergency Medical Services (EMS) and are in fact used in training at all practitioner levels. However, the same competency-based training is not currently in place for paramedic continuing education instructors. Outlining instructor competencies will ensure “that students are prepared to function in each educator role component upon entry to practice” (Kalb, 2008, p. 218).

Assumptions and drawbacks. As with any other theory or framework, competency-based learning has assumptions and drawbacks. First, Davis, Stullenbarger, Dearman, and Kelley (2005) caution that competency-based learning has only been validated in academic institutions, not in clinical or workplace settings. As noted previously, EMS provider training is competency based. The existing structure and the prior experience of these students will be a good fit for paramedic instructor training to follow the same structure. Secondly, Carraccio, Wolfsthal, Englander, Feretz, and Martin (2002) highlight concerns that competency-based training may focus too much on skill acquisition and not enough on critical thinking and interpersonal skills (p. 363). Designing learning events to include authentic tasks and peer to peer assessments will
develop critical thinking in the paramedic instructors. Following the suggested competencies for active learning and active teaching will also support critical thinking and the development of interpersonal skills. Lastly, Holmes (1995, as cited in Garavan & McGuire, 2001, Philosophical & Epistemological Tensions Section, para. 3) questions whether competency-based learning forces students to conform and reshape themselves to be successful. Following adult education principles, considering different learning preferences, and offering choices in the methods used to achieve the objectives, will prevent students from feeling like they have to follow prescriptive type learning and will allow the training to fit their needs. Garavan and McGuire (2001) also suggest focusing on developmental learning rather than short-term learning and considering context when designing training.

**Competencies Summary**

Adult learning theory stresses the importance of providing students with objectives and outcome-based training. Adequate instructor preparation increases instructor confidence and will have a positive effect on student learning outcomes. Identifying required skills improves quality and results in better outcomes (Srinivasan, Pratt, Skeff, & Hales, 2011, p. 1211). It is important for instructors to be competent in several key areas to provide adequate adult education: technology, facilitation, and communication. Online instruction requires that instructors choose media and technology that supports learners, and that the facilitators are comfortable with using. Facilitation involves presenting content, monitoring discussions and participant engagement, and building a learning community. Elements of instructor presence are needed to provide student-centered learning. Bigatel, Ragan, Kennan, May, and Redmond (2012) emphasize that communications related competencies are critical to the role of online
instructors (p. 73). Competencies provide a consistent and reliable method of assessing students and ensuring both accountability and continuous improvement. As Kalb (2008) notes, there is a need to incorporate competencies into educator programs, instructor role descriptions, and assessment processes (p. 217).
Section 3: Analysis and Personal Reflection

Paramedic instructors are required to develop continuing medical education packages for Emergency Medical Services (EMS) staff across Saskatchewan. The three self-paced, online module prototypes presented are designed to provide “proof of concept” for a paramedic instructor certification course. Currently, the paramedic instructor certification course is not mandated by the Saskatchewan College of Paramedics (SCoP). However, the College is expected to move in that direction within the next five years.

Activities will be provided in each module to develop the paramedic instructor candidates’ knowledge and skills. Formative and summative assessments will be included throughout to ensure that learning has taken place. The modules are intended to provide a foundation in instructing and facilitating for paramedics who are interested in providing continuing education. Weimer (as cited in McGuire, Scott & Shaw, 2006, p. 166) recognizes that “faculty [and instructors] are first and foremost content experts, and that they rarely receive training in pedagogy.” The three self-paced, online module prototypes will provide an opportunity for paramedic instructor candidates to begin learning about pedagogy and improve teaching and facilitation practices.

Instructional Goals

Module 1: Learning Objectives

This module will introduce paramedic instructor candidates to learning objectives and will support them throughout their program as well as in their facilitation experiences as instructors.
Understanding and writing learning objectives are an integral part of being an instructor. This module will introduce learning domains and taxonomies. Paramedic instructor candidates will learn a process for, and the importance of, writing robust learning objectives.

Module 2: Learning Assessments

This module will introduce paramedic instructor candidates to learning assessments and will provide them with a foundation on which to create effective assessments. Paramedic instructor candidates will learn that assessments are as imperative and useful for instructors as they are for students. This module covers two types of assessments; formative and summative. As well, information will be presented on constructive alignment and how to choose assessment types.

Module 3: Adult Learning Theories

Adult learning theories will provide paramedic instructor candidates with an understanding of how, why, and under what conditions adults learn best. This module will provide an in-depth study about the characteristics of adult learners. An introduction to adult learning theories will also be provided.

Learning Objectives

Module 1: Learning Objectives

Upon completion of this module, the paramedic instructor candidate should be able to:

- Identify the domains contained in learning taxonomies, including at least three domains
• Illustrate knowledge of learning domains by combining the domains with the examples of classroom activities provided

• Choose the appropriate domain of learning and/or the level in the hierarchy of the correctly written objectives as provided

• Define who learning objectives should be written for

• Differentiate between goals and objectives in the context of learning

• Evaluate the importance of learning objectives, by identifying at least five qualities of learning objectives

• Recognize all four components of the A-B-C-D model of writing objectives

• Evaluate learning objectives to determine their effectiveness based on the A-B-C-D model

• Apply the four elements of the A-B-C-D model to create three measurable and observable objectives

Module 2: Learning Assessments

Upon completion of this module, the paramedic instructor candidate should be able to:

• Define formative assessment, including at least two characteristics

• Define summative assessment, including at least two characteristics

• Compare the reasons for using formative and summative assessments, including at minimum two explanations

• Define constructive alignment; including the three necessary components

• List the reasons for ensuring constructive alignment in learning events, including at least two explanations
• Choose examples that are appropriate for low, mid-level, and high-level assessments from the list provided
• Construct an assessment to fulfill the specified criteria; including the action, subject, and the method to be used

**Module 3: Adult Learning Theories**

Upon completion of this module, the paramedic instructor candidate should be able to:

• Define andragogy, including at least four features
• Name the characteristics of adult learners; including at least five characteristics
• Recall barriers to adult learning; including at least four barriers
• Identify key factors of motivation in adult learning; including at least four factors
• Apply adult learning principles, to a given scenario
• Identify the reasons adult learning theories are important to instructors, including at least three reasons
• Compare learning theories; including behaviourism, experiential, connectivism, constructivism, and deliberate practice
• Choose the active learning theory in the scenario presented
• Propose an adult learning theory, given a learning event or topic

**Learner Definition & Analysis**

The paramedic instructor candidates will have varied EMS backgrounds including rural, urban, or industrial experience, and they may be professional or volunteer paramedics. In most
cases, participants will hold a license from the Saskatchewan College of Paramedics (SCoP) at the level of Emergency Medical Responder (EMR), Primary Care Paramedic (PCP), Intermediate Care Paramedic (ICP), or Advanced Care Paramedic (ACP). As licensed EMS providers, the paramedic instructor candidates are known to have a high school diploma (or GED) as well as some post-secondary education and experience. As well, all paramedic instructor candidates will require a basic knowledge of computer skills; including word processing, accessing online materials, and a familiarity with online forums. There are no educational pre-requisites to enrol in the modules.

Paramedic instructor candidates will have a variety of backgrounds with regards to education level and teaching experience. Most paramedic instructor candidates in the certification course will be either new instructors with no knowledge of education or those with experience teaching but no formal training. There will be a smaller subset of individuals who will identify that they have previously completed courses in Adult Continuing Education.

Paramedic instructor candidates will register as interested persons or as representatives from EMS services. While it is expected, based on current information that candidates will be self-motivated and attend the course of their free-will, it will be essential to watch the pre-course surveys to identify any exceptions; particularly if the course becomes mandated. Being that the participants in the program will be from all over the province, including some remote locations, the modules’ online format will be necessary to them. Technology and distance learning are integral parts of education in EMS, which ties the delivery method and content together for the learners.
Context Definition & Analysis

The three self-paced, online module prototypes presented will be asynchronous and entirely online. As part of a more extensive certification course, Moodle will host the modules and track participants’ progress. The modules will be based on self-enrolment and are designed to be self-paced allowing students to start and work on the learning events at their own pace. All resources and activities are designed to be self-explanatory (Justice, 2003). The modules are mobile friendly and designed to work on a PC or a Mac. All resources and activities will be available online. Where possible, materials are provided in a pdf format for working offline. The modules do not require significant bandwidths or high-speed connections as there are limited videos and animations.

Time requirement. The expected time on task for a module is three to six hours, and the paramedic instructor candidate may complete the coursework wherever he or she is comfortable. The asynchronous and distance format will allow flexibility for those participants who are working shift work, as well as decreasing travel costs and lost wages.

Technology. Articulate 360’s Storyline and Rise programs are the software used to develop the modules. The program has a significant start-up cost associated with it ($1000USD). However, Articulate is current, meets the needs of the users, and has a vast network of support for the designer. The Learning Management System (LMS) Moodle is free to use, and support is available through user groups.

Delivery of modules. The three modules are designed and developed by a single project manager. The project manager will also take on the role of facilitator. The delivery or implementation of the three modules is outside the scope of this project. However, the following are some brief guidelines for future implementation of the modules:
• No set office-hours for the facilitator.

• Asynchronous communication with the facilitator will be through email and the online discussion forum which will be regularly monitored throughout.

• Real-time communication options such as phone or Skype will be available by appointment.

• Subject matter experts (SMEs) and technical support will be accessed as needed.

• Paramedic instructor candidates would be required to supply their computer and internet access.

Description of Instructional Materials

Each module follows a similar layout for ease of use, consistency, and to create an “identity” or “brand” for the learning package: what to expect, facilitator notes, resources, and activities. Facilitator notes will provide an overview of the week’s topic and any key points or clarifications. The Resources Section will allow paramedic instructor candidates to interact with content; articles, videos, or other materials. Each module includes an optional activity or task to promote the transfer of learning. In addition, each module contains forums to share additional resources or to ask content related questions of the facilitator. A link is also available in the Community Learning Section for accessing a social media site to connect with other students and instructors.

The Facilitator Notes are provided in a variety of ways: 1) online in print-format for those who prefer to read the material; 2) as a pdf available for downloading and working offline; and 3) as a video, to make use of the auditory channel for learning. Providing the Facilitator Notes as a video will also increase facilitator presence. Most of the content in the videos is static, as
instructional design principles favour reserving animations for learning that involves motion (Clark & Lyons, 2010). However, the Activities Section of the module is intended to be interactive to support the process of moving the learning from the short-term working memory to long-term memory. Each of the activities will provide feedback on the paramedic instructor candidate’s work, including the interactions completed in Storyline which will offer additional resources if the student supplies incorrect answers. The following instructional design principles were used to create the three modules; proximity, alignment, repetition, contrast, and colour.

**Proximity.** The use of proximity is most visible on the introductory page of the quizzes. Spacing separates the block of text from the rest of the directions. Also, the definitions are placed close to the corresponding button while each row has white space around it to separate it from the ones above and below.

**Alignment.** Alignment of the content in the activities and the quizzes was used to create a “hard vertical edge to follow” (Williams, 2015, p. 35). The hard edge helps the student to distinguish the menu from the page contents. Left alignment is used throughout the quizzes and activities to “unify and organise the page” (Williams, 2015, p. 54) while providing lines for the eye to follow.

**Repetition.** The layout of the modules, the topics, and the quizzes are consistent which creates repetition. The use of the same blue colouring and orange accent that is present on the Moodle homepage and throughout will also add to the repetition. Repetition creates unity and visual interest for the viewer (Williams, 2015, p.68). The repetition is also useful for decreasing cognitive overload. For example, repeating the same format on the quiz intro page will make it easier for the paramedic instructor candidate to understand what they see once they start the quiz.
Contrast. Contrast can be used to create an interest or to add to the organisation of a page (Williams, 2015). One example of contrast in the modules comes from the save buttons in the quizzes where colouring is used to differentiate between the options. Another example comes from using bold characters to highlight essential words in the assessments.

Colour. The colour scheme of blue and orange came from the existing Moodle site which I cannot adjust at this time. However, Williams (2015) notes that blue and orange are complementary colours and as such should work together. The fill in the blank boxes are tints of the primary blue colour scheme. Colour is also repeated throughout the module to make things quickly recognizable. For example, the formative activities throughout the modules are orange while the summative quizzes are blue.

Instructional Strategies

The paramedic instructor modules support many of Cercone’s (2008) characteristics of adult learners. These modules will provide the advantages of online learning with the support of adult learning theory including andragogy, constructivism, experiential learning, and connectivism.

Adult learning theory. All of the instructional strategies contained in Module One will support adult learning principles which identify adult learners as:

- self-directed
- having a wealth of experience as a resource for further learning
- concerned with education that applies to their stage in life, and
- demanding an immediacy of application

(Knowles, 1980)
Learner-centred. Learning theories such as andragogy and constructivism suggest that adult education needs to be learner-centred and self-directed. The consistent layout and the design of the modules provide a supporting structure for those paramedic instructor candidates who wish to have a guide through the materials; and, support will be available from the facilitator through the Ask the Instructor Forum as well as by phone or email. However, control of how to approach the content and what order activities are completed in remains with the paramedic instructor candidate.

The design of the formative assessments and summative quizzes allows the paramedic instructor candidate control over the questions. While the questions do advance automatically, the paramedic instructor candidate ultimately has power over which he or she wishes to answer and in what order, through the menu on the left side of the page. There is also an option to flag items to return to for review before submitting the assessment. The paramedic instructor candidate is not restricted by the number of attempts and may return to an activity, resource, or quiz at any point in the module or once the learning event is complete.

The objectives for each module and each topic are learner-centred. The objectives follow the A-B-C-D (audience – behaviour – condition - degree) model which provides paramedic instructor candidates with the information they need to complete the learning successfully.

Previous learning background. Consideration of prior learning experience is a crucial factor in many adult learning theories, including andragogy, constructivism, and connectivism. Each module recognizes that adult learners bring with them prior learning. The participants are encouraged to take the self-assessment at the beginning of the modules to identify their background knowledge. The self-assessment will also allow the learners to self-identify what areas they wish to focus more time on.
Cercone (2008) tells us that adult learners have preferences in how they learn. The paramedic modules include print-based materials as well as audio and video. Learners are encouraged to control their learning experience (for example, the order of the lessons and the resources they wish to use) based on past knowledge and learning preferences that are pre-established.

**Active involvement & immediacy of application.** Participants will be actively involved in each module. The Facilitator Notes provide questions or self-reflection ideas to complement the content for each topic. Each topic provides the opportunity for paramedic instructor candidates to practice the new knowledge and receive formative feedback. The modules are broken into short chunks or topics, and the associated activities will allow the paramedic instructor candidates to practice the new understanding before moving on to new areas. Deliberate practice increases the probability of moving the knowledge from the working memory to long-term memory and builds triggers that allow for retrieval later.

The social media group and peer resource forum will allow paramedic instructor candidates to make connections and contribute to the learning process despite the self-paced asynchronous nature of the modules. This social interaction brings in qualities of andragogy and connectivism. Paramedic instructor candidates will be encouraged to participate in the social aspect not only to support their learning experience but also to make connections with other instructors and find ways to apply the new knowledge.

**Safe learning environment.** Feedback, including additional resources, is given to the learners with each of the activities. Activity and quiz attempts are unlimited so the users can retake them as often as they wish without penalty. The facilitator will be available to answer questions and provide additional support.
Limitations. Paramedic instructor candidates enrolling in the modules will have limitations as do any other adult learner. The design of the content and activities will allow paramedic instructor candidates to come and go as they are able and track their progress to make it easy to return. The platform chosen for the content and quizzes is responsive and allows the learner to work off a smartphone, tablet, or home computer without losing the quality.

Assessments. The paramedic instructor candidates will apply the new material from the resources using individual activities designed to match each objective. Each question in the activities includes formative feedback for the paramedic instructor candidates. Summative assessments at the end of the module are intended to measure mastery of the objectives. The assessments in each module are automatically marked and are designed to provide immediate feedback and results to the learners.

Universal Design

To make the learning event useful for the highest possible number of people, I have included several of McGuire, Scott, and Shaw’s (2006) principles of universal design: equitable use, flexibility, intuitive and straightforward, and tolerance for error.

Equitable use & flexibility. Equitable use and flexibility are both visible in the design of the modules. The online, responsive model allows students to complete the work despite their geographical or physical location. The self-paced nature of the modules removes any concerns of time zones, synchronous meetings, or working around pre-determined deadlines which can otherwise be barriers for paramedics who work varying shifts. The modules are also designed to guide and support novice learners while providing more flexibility and choice for more experienced learners.
Straightforward, intuitive, & low physical effort. The modules are meant to be intuitive and straightforward, so participants can readily access the content and not spend valuable time trying to figure out the navigation or purpose of the learning event. Despite using two authoring tools to design the modules and hosting them in Moodle, the content of the packages requires minimal effort for the user to navigate and use. Each section is marked, and the menu makes moving through the content straightforward. Resources are hyperlinked to take the student directly to the materials. Each module and each topic follow the same layout so the student will be able to access what they are looking for quickly.

Tolerance for error. Learning is a process, and so errors are to be expected. The self-paced, asynchronous nature of the modules will allow paramedic instructor candidates to explore the content at their leisure and return to sections at any point for review. There is no limit on attempts for activities or quizzes which will allow paramedic instructor candidates to retry as often as they like. The questions in the exercises provide immediate formative feedback to reinforce correct responses and to prompt paramedic instructor candidates if they choose incorrect answers. The final quizzes allow paramedic instructor candidates to flag questions to review or to change answers before submitting the assessment for grading.

Online Design

The paramedic instructor modules demonstrate many of the unique characteristics of online design. Johnson and Aragon (2002) provide several principles of online learning that these modules include: 1) address individual differences, 2) avoid information overload, 3) create real-life scenarios and provide hands-on activities, and 5) encourage student reflection. Also, the modules include several principles of interactivity.
**Individual differences.** The modules are intended for an audience that may vary widely in background and previous experience. The content is presented in multiple formats where possible to address the preferences of the learners. For example, the Facilitator Notes in each topic are available as a video, a pdf for download, and in written-format for reading online. As well, there is variety in the types of resources available and the kind of activities for each topic. The paramedic instructor candidates have control throughout the learning event from choosing the order they complete the material to picking which question they answer first in a quiz.

**Avoid information overload.** The paramedic module aims to avoid cognitive overload in several ways. Paramedic instructor candidates are provided with graphic organizers in the quizzes and progress indicators for each topic and module to orientate them to their place in the material. Each module is broken down into smaller sections comprised of similar objectives that can be completed in and practiced before moving on to the next. Novice learners are guided through the topics in the modules while more experienced learners can control their path. All paramedic instructor candidates can set their own pace to learn the materials.

**Create real-life scenarios and use hands-on activities.** Authentic learning is essential in adult education. As such, the Facilitator Notes in each topic offer suggestions on how the content relates to the paramedic’s role as an instructor. Similarly, the activities found in each topic and the assessments in each module promote authentic learning for paramedic instructor candidates by using examples from actual classes that the paramedic may teach, or actions they may perform as an instructor. As an example, in Module One the learners are encouraged to create learning objectives that may be useful in facilitating future classes. Another example is seen in Module 2 where students are presented with authentic situations and mini case studies where they can apply the theories they learned.
Interactivity. Interactivity is the active engagement with concepts or agents that allows the construction of meaningful learning (Rhodes, 2009, p. 1). These engagements are formally designed into learning events or can occur informally outside of the course and content. The effectiveness of online learning and student satisfaction are both influenced by interactivity. Croxton (2014) states: “A well designed online course should not sacrifice interaction, but instead provide an active-learning environment in which students are highly engaged in the learning process through interactions with peers, instructors, and content” (p. 315). While these modules adhere to constructivist principles rather than social cognitive theory, interactivity is still essential.

Anderson (2003) suggests three types of interactivity: student-student, student-instructor, and student-content. The design of the paramedic instructor modules focuses on student-instructor and student-content interactivities, as Rhodes (2009) notes that student-student interactions are less critical to learners in self-paced settings. Two other interactivities that are important to online learning are student-network and student-collective (Rhodes, 2009).

While Anderson (2003) allows that one robust element of interactivity may be enough to provide a valid learning event, the recommendation is still there that three components will provide a better foundation. Rhodes (2009) clarifies that each student will be unique and will benefit from different types of interaction (p. 2). To ensure that these modules are useful for many learners, I have included a variety of interactivity.

Student-student. Student-student interactions build a sense of community and are essential to the satisfaction of some learners. However, as I found with the paramedic modules, the nature of self-paced learning makes these types of interactions a challenge to incorporate. Due to the shift-work nature of paramedic instructor candidates, I elected to have the modules asynchronous
and self-paced which meant designing the modules without direct student-student interaction. I choose to use informal student-student interactions such as including an asynchronous forum for peer-resources and establishing an online community group for instructors outside of the modules. As Croxton (2014) points out, balance is as essential as interactivity. Rhodes tells us that online professional development or corporate training students are “willing to forgo interpersonal interactions…in exchange for the flexibility afforded by the self-paced learning approach” (2009, p. 8) which supports my decision to place less emphasis on the student-student element.

**Student-instructor.** While the one-to-one interaction between learners is limited in these self-paced modules, it is offset by the student-instructor interactivities. In fact, Rhodes (2009) found that interactions with an instructor and quality content were more important to most students than the peer connections. Croxton (2014) suggests that the prevalence, quality, and timeliness of interactions between students and instructors were the most prominent predictor of student happiness (p. 318). The student-instructor element is present in the modules through the questions forums, the direct link by email or phone, and through the Meet Your Facilitator posts. Timely feedback and check-ins from the facilitator will also foster this element.

**Student-content.** Based on the definition of interactivity, the student-content element needs to be an active process rather than a passive reading of material (Palahicky, 2017). Palahicky (2017) suggests using activities that align with the learning objectives and assessments, and that provide a reaction. I endeavored to meet the student-content interactivity in several ways:

- including a self-assessment in each module to start the learner thinking about the materials
- including reflection questions in the Facilitator Notes
• incorporating formative feedback into the lesson activities
• creating a mind map for the adult learning theories and highlighting similarities/differences between them
• allowing the user control over the content

**Student-interface.** The student’s ability to control the content ties into the student-interface interactivity. The student needs to use the interface to access and manipulate the materials. However, it must not interfere with the learning. To support the student-interface element, I included both written instructions and a video describing how to navigate the learning platforms. The paramedic instructor candidates have control over the order of the materials and the functions of any multimedia. They are also provided with options to read or download the Facilitator Notes if they prefer not to watch the video. I was not able to offer transcripts for external multimedia resources, which is a consideration for the future.

**Student-network, student-collective.** Student-network involves students developing connections outside the formal learning event, while student-collective is the ability of the students to access resources (material and people) outside the learning event (Croxton, 2014, p. 315). Together, the student-network and student-collective share many similarities to connectivism. Rhodes (2009) tells us “learners have the opportunity to engage not only with the instructor and fellow learners in the given course but also with countless ‘experts’ and other supporting resources that are available online only a few clicks away” (p. 2). Including a Facebook page for participants to meet other facilitators represents both the student-network and student-collective elements. Providing links and suggestions for further resources may provide a foundation for the student-collective aspect.
Cognitive Information Processing

Clark and Harrelson (2002) tell us that “the goal of instructional programs for professionals… is to build knowledge and skills that can be transferred to the career field after learning (p. 1). For the paramedic instructor modules to be useful in creating useful learning, there needed to be methods to gain attention, practice to build new information into existing knowledge schemas, and means to retrieve the data back from long-term memory (Clark & Harrelson, 2002).

The modules are designed only to include information that is relevant preventing cognitive overload. Graphics are kept to a minimum and are directly related to the content when they are present. Cueing the learner is incorporated by:

- using bold text to stress importance (in the quizzes when the student must pick more than one answer)
- using graphic representations (in the facilitator videos)
- using repetition (highlighting key points through the Facilitator Notes)
- providing objectives (specific to each topic)

The narrated PowerPoints included as Facilitator Notes work on the modality principle (Clark & Lyons, 2011) to maximize the working memory’s ability by combining visual and auditory senses.

The activities found in each topic can be a method to gain attention as the student will recognize areas of weakness. However, the undertakings are also important as a method to practice the new knowledge and to assist paramedic instructor candidates to move the information from short-term memory into long-term memory. Near-transfer tasks are seen in Module One where students learn how to create objectives following a designated set of steps.
Examples of far-transfer tasks are visible in Module 2 where case studies are used to apply the new knowledge to new situations.

**Challenges Encountered**

One challenge that I discovered while designing the paramedic instructor modules is that my findings from the literature review did not always mesh well with each other. One example is the notion that adults learn better where there is collaboration and group work involved. In the initial design phase of Module One, I planned to incorporate forums and peer-assessments to provide collaborative opportunities for paramedic instructor candidates. However, it was noted as I prepared to move to the development phase, that the collaborative elements did not align with the self-paced, asynchronous format of the modules. Allowing learners control over their start date and progression through the material was not compatible with requiring them to work with others. It would be difficult to ensure that there were paramedic instructor candidates at the same place in the program or who have the same availability as others. The desire for collaboration was not feasible with the flexible and independent learning that I feel is important to offer adult learners, specifically, paramedics.

As part of the revision process of SAM, I was able to bring in the element of collaboration in other ways. First, I added a forum where students are encouraged to share resources for current or future students to benefit from. While this type of sharing is not real-time, it may still foster a sense of collaboration with other instructors. Second, I provided a link to a Facebook group for instructors to meet and share resources, to ask questions of other instructors regarding coursework or facilitating, or to make connections for teaching opportunities.
Design. A design area that I found challenging was that activities I had made on paper to support the transfer of learning, did not always work with the platform or the Learning Management System (LMS) that I was working in. For example, in my planning, I had intended to offer the students choices within the activities to allow them to substitute authentic materials whenever possible. I had also planned to have the students create their objectives based on materials provided or materials they supplied to incorporate higher levels of learning taxonomies. Having students bring in outside materials or allowing them to create anything free-form became a challenge to find ways to keep the course self-contained and self-marking.

Revisiting the design phase of the SAM model, I was able to move past this challenge in a couple of ways. In some cases, I went back to the objectives and changed the wording to fit with options that I had available for activities and assessments while trying to keep the original intent. For a couple of the questions, I choose to eliminate the bonus points to simplify the format of the assessment. By the end of the development of Module One, I decided to meet my goals by moving to another platform to build the modules, while keeping Moodle as my LMS for housing the learning.

Another design area that I had to work through was including the adult learning principle of control throughout the entire course including the assessments. Balancing low physical effort and user control in the activities and quizzes involved some thought. The first draft of the assessments was solely technology driven where the user answered the questions as they came up and could not revisit a question. At the end of the development of Module One, I made some revisions which put the paramedic instructor candidate in complete control of the questions. Now the learner had to pick every question from the list, there was no auto-advancing to the next question. However, even as the designer, I felt that it may be a bit cumbersome as I would wait
for the next question after I hit enter, and it would require extra effort on the part of the paramedic instructor candidate. I tried to minimize this concern by including specific instructions at the beginning of each quiz. As the design and development process continued for the next modules, I came back to the assessments with a new plan. The questions are now set to advance automatically through the list each time the user checks or saves their answer. However, paramedic instructor candidates can still choose any question from the menu at any time, and they have the options to flag questions for review or to revisit questions and change answers at their will.

**Deciding on platforms.** One of my most significant challenges with the development of the modules was choosing a platform to use. I went back and forth a few times before deciding on using Articulate to develop the modules and Moodle to host the learning. Moodle, Rise, and Storyline each had benefits and drawbacks, so in the end, I choose to blend them to take the best features and minimize the ones I felt were less desirable.

Moodle is a great LMS. The software allows students to self-enrol in the modules and tracks completion based on criteria that the facilitator sets. The forum capabilities are a convenient way to enable asynchronous student-student and student-facilitator interaction. One drawback to Moodle is that it did not let me bring in some of the design aspects that I felt were important, such as providing visual reminders to the students of their progress. I also found that Moodle limited the types of interactions that I was able to include in the activities and quizzes to lower level taxonomies and limited question types. One example is the self-assessment included in the modules. I did not find a way in Moodle to have the students answer a set of questions and then provide them with feedback based on answers to specific groups of questions.
Articulate 360 allows more flexibility in design and activity development. While Rise offers less control over instructional design, it is easy to use and provides quick access to a consistent look for the modules. Rise also allows me to incorporate higher-level activities designed in Storyline into the modules providing another level of flexibility.

One challenge that remains with moving the activities out of the LMS and creating them in Articulate is that I can no longer track the participant’s progress. Unlike working solely in Moodle, I cannot see the time that is spent in each section, the attempts at quizzes, or establish the validity of questions. Tracking of this detail is not an issue currently, but it may be a consideration for the future. For now, I have chosen to leave the final quiz as a stand-alone package in Moodle that can be tracked for completion. The downside is that the students have to exit the module to complete the quiz. However, with clear instructions, I feel that it should not be a significant disruption to their learning. I will continue to look into other options for this hurdle as the technology available is changing continually. In fact, as I submit this project, Moodle has released a new version of software which will allow me to include many of the question types I had been looking for. It may be feasible for future modules to be developed completely in Moodle while keeping a similar design.

A final note on choosing platforms is my decision process on which Moodle to use. Both the RRU and the Medavie site we use at work came with challenges. I did not have the permissions required to upload the SCORM packages to RRU Moodle site due to their size. I understand there would have been the option to have IT upload them once they were completed but it would have been difficult to test my ideas and to make changes using this route. The Medavie site is an active LMS for several EMS sites and as such came with its own restrictions. I was not able to change colours or the logos without impacting other courses. As well, when the
company made upgrades part way through my project, some additional colours appeared that I had not considered when I choose themes for the modules: For example, the purple for the forums.

### Conclusion

The process of designing and developing these three modules was a fantastic experience for me. It allowed me my own authentic learning experience as I incorporated learning from each of my MAIS courses into creating something new. Along with the content, I discovered in each specific course, I was able to take broader themes forward from my overall program into this project. The Concepts and Theories of Leadership class (LEAD516) encouraged me to take a look at my potential as a leader in EMS and to take on this project to create something for others in the field. LEAD516, along with Coaching for Performance (EXMN675) have played a role in becoming a stronger facilitator. The Social Science Research (INDS510) and Theory in Interdisciplinary Studies (INDS500) courses taught me the importance of theories and frameworks, how to correctly reference materials, and how to write a literature review; without which this project would not be successful. Graphic Design (IDSN521), Instructional Design (LRNT504), and Community Building for Online Learning (LRNT505) have all directly impacted the design and development of each module as well as my daily work. The Project Management Course (IDSN522) provided me with a foundation on how to get a project of this nature started, what the steps and timeline would be, and how to identify stakeholders. I knew course by course that a lot of learning had taken place for me, but to take that knowledge and apply it to create something tangible allowed me to make use of the far transfer learning and helped me to solidify some of the mental models that I had built.
## Appendix A: Module 1 Blueprint

<table>
<thead>
<tr>
<th>Learning Objective (verb portion only)</th>
<th>Learning Level Using Bloom's revised taxonomy</th>
<th>Learning Activity/ies</th>
<th>Assessment/s</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identify</strong> the learning domains contained in learning taxonomies</td>
<td>Understand</td>
<td>Review the resources provided and identify the learning domains by matching them to the correct definitions</td>
<td>Complete end of module assessment quiz that requires students to identify at least three learning domains discussed in the resources provided (Summative Assessment A)</td>
</tr>
<tr>
<td><strong>Illustrate</strong> your knowledge of learning domains</td>
<td>Understand</td>
<td>Review the resources provided and illustrate your knowledge of learning domains by matching the domains with the examples of classroom activities provided</td>
<td>Complete end of module assessment quiz that requires students to illustrate their knowledge of learning domains by matching the domains with the examples of classroom activities provided (Summative Assessment A)</td>
</tr>
<tr>
<td><strong>Choose</strong> the appropriate domain of learning &amp;/or the level in the hierarchy</td>
<td>Remember</td>
<td>Review the resources provided and choose the appropriate domain of learning &amp;/or the level in the hierarchy of the correctly written objectives as provided</td>
<td>Complete end of module assessment quiz that requires students to choose the appropriate domain of learning &amp;/or the level in the hierarchy of the correctly written objectives as provided (Summative Assessment A)</td>
</tr>
<tr>
<td><strong>Define</strong> who learning objectives should be written for</td>
<td>Remember</td>
<td>Review the resources provided. Define who learning objectives should be written for.</td>
<td>Complete end of module assessment quiz that requires students to define who learning objectives should be written for (Summative Assessment B)</td>
</tr>
<tr>
<td><strong>Differentiate</strong> between goals and objectives</td>
<td>Analyze</td>
<td>Review the resources provided and differentiate between objectives and goals</td>
<td>Complete end of module assessment quiz that requires students to differentiate between objectives and goals (Summative Assessment B)</td>
</tr>
<tr>
<td><strong>Evaluate</strong> the</td>
<td>Evaluate</td>
<td>Review the resources provided.</td>
<td>Complete end of module assessment quiz</td>
</tr>
<tr>
<td>Importance of Learning Objectives</td>
<td>Decide which qualities highlight the importance of learning objectives. Select the statement that is not a quality of learning objectives.</td>
<td>that requires students to decide which qualities highlight the importance of learning objectives and select the statement that is not a quality of learning objectives. (Summative Assessment B)</td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Recognize the components of the A-B-C-D model of writing objectives</td>
<td>Remember Review the resources provided and match the components of the A-B-C-D model to their definitions</td>
<td>Complete end of module assessment quiz that requires students to recognize the components of the A-B-C-D model of writing objectives (Summative Assessment A)</td>
<td></td>
</tr>
<tr>
<td>Evaluate learning objectives</td>
<td>Evaluate Review the resources provided. From the list select two ineffective objectives, and defend your reasoning based on the A-B-C-D format</td>
<td>Complete end of module assessment quiz that includes a list of objectives that requires students to select ineffective objectives and defend their reasoning, based on the A-B-C-D model provided in class (Summative Assessment C)</td>
<td></td>
</tr>
<tr>
<td>Apply the four elements of the A-B-C-D model to create three measurable and observable objectives</td>
<td>Apply Review the resources provided. Create objectives that fit the criteria provided.</td>
<td>Complete the end of module assessment quiz that requires students to create objectives that fit the criteria provided. (Summative Assessment C)</td>
<td></td>
</tr>
</tbody>
</table>
## Appendix B: Module 2 Blueprint

<table>
<thead>
<tr>
<th>Learning Objective (verb portion only)</th>
<th>Learning Level Using Bloom’s revised taxonomy</th>
<th>Learning Activity/ies</th>
<th>Assessment/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define formative assessment</td>
<td>Remember</td>
<td>Review the resources provided. <strong>Define</strong> formative assessment by matching it to the correct definition</td>
<td>Complete end of module assessment quiz that requires students to <strong>define</strong> formative assessment as discussed in the resources provided (Summative Assessment B)</td>
</tr>
<tr>
<td>Define summative assessment</td>
<td>Remember</td>
<td>Review the resources provided. <strong>Define</strong> summative assessment by matching it to the correct definition</td>
<td>Complete end of module assessment quiz that requires students to <strong>define</strong> summative assessment as discussed in the resources provided (Summative Assessment B)</td>
</tr>
<tr>
<td>Compare the reasons for using formative and summative assessments</td>
<td>Analyze</td>
<td>Review the resources provided, and <strong>compare the</strong> reasons for using formative and summative assessments. Drag &amp; drop the reasons to the appropriate column.</td>
<td>Complete end of module assessment quiz that requires students to <strong>compare</strong> a list of reasons for using formative and summative assessments (Summative Assessment B)</td>
</tr>
<tr>
<td>Define constructive alignment</td>
<td>Remember</td>
<td>Review the resources provided. <strong>Constructive alignment</strong> by matching it to the correct definition</td>
<td>Complete end of module assessment quiz that requires students to <strong>constructive alignment</strong> as discussed in the resources provided (Summative Assessment B)</td>
</tr>
<tr>
<td>Action</td>
<td>Task</td>
<td>Context</td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>List the reasons for ensuring constructive alignment in learning events</td>
<td>Remember</td>
<td>Review the resources provided. Label the components of constructive alignment on a diagram. List the reasons for ensuring constructive alignment in learning events.</td>
<td></td>
</tr>
<tr>
<td>Choose examples that are appropriate for low, mid-level, and high level assessments</td>
<td>Apply</td>
<td>Review the resources provided, and choose examples that are appropriate for each: low, mid-level, and high level assessments.</td>
<td></td>
</tr>
<tr>
<td>Construct an assessment to fulfill a specified criteria</td>
<td>Create</td>
<td>Review the resources provided. Construct an appropriate assessment based on the specific criteria provided.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete the end of module assessment quiz that requires students to: Label the components of constructive alignment on a diagram. List the reasons constructive alignment agreement in learning events. (Summative Assessment B)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete end of module assessment quiz that requires students to choose examples that are appropriate for low, mid-level, and high level assessments (Summative Assessment B)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete the end of module assessment quiz that requires students to construct an appropriate assessment based on the specific criteria provided (Summative Assessment B)</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix C: Module 3 Blueprint

<table>
<thead>
<tr>
<th>Learning Objective (verb portion only)</th>
<th>Learning Level Using Bloom’s revised taxonomy</th>
<th>Learning Activity/ies</th>
<th>Assessment/s</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Define</strong> andragogy</td>
<td>Remember</td>
<td>Review the resources provided. <strong>Define</strong> andragogy by matching it to the correct definition</td>
<td>Complete end of module assessment quiz that requires students to <strong>define</strong> andragogy as discussed in the resources provided (Summative Assessment C)</td>
</tr>
<tr>
<td><strong>Name</strong> the characteristics of adult learners</td>
<td>Remember</td>
<td>Review the resources provided. <strong>Name</strong> the characteristics of adult learners by selecting them from a list</td>
<td>Complete end of module assessment quiz that requires students to <strong>name</strong> the characteristics of adult learners as discussed in the resources provided (Summative Assessment C)</td>
</tr>
<tr>
<td><strong>Recall</strong> barriers to adult learning</td>
<td>Remember</td>
<td>Review the resources provided, and <strong>recall</strong> the barriers to adult learning by selecting them from a list.</td>
<td>Complete end of module assessment quiz that requires students to <strong>recall</strong> a list of barriers to adult learning (Summative Assessment C)</td>
</tr>
<tr>
<td><strong>Identify</strong> key factors of motivation in adult learning</td>
<td>Remember</td>
<td>Review the resources provided. <strong>Identify</strong> key factors of motivation for adult learners.</td>
<td>Complete end of module assessment quiz that requires students to <strong>identify</strong> key factors of motivation for adult learners as discussed in the resources provided (Summative Assessment C)</td>
</tr>
<tr>
<td><strong>Apply</strong> adult learning principles</td>
<td>Apply</td>
<td>Review the resources provided. <strong>Apply</strong> adult learning principles to the scenarios provided</td>
<td>Complete end of module assessment quiz that requires students to <strong>apply</strong> adult learning principles to the scenarios provided, as discussed in the resources provided (Summative Assessment C)</td>
</tr>
<tr>
<td><strong>Identify</strong> the reasons adult learning theories are important to instructors</td>
<td>Remember</td>
<td>Review the resources provided. <strong>Identify</strong> the reasons adult learning theories are important to instructors.</td>
<td>Complete the end of module assessment quiz that requires students to <strong>identify</strong> the reasons adult learning theories are important to instructors (Summative Assessment C)</td>
</tr>
<tr>
<td><strong>Compare learning theories</strong></td>
<td><strong>Understand</strong></td>
<td><strong>Review the resources provided, and compare learning theories, including constructivism, deliberate practice, behaviorism, experiential learning, and connectivism. (drag &amp; drop, fill in blanks)</strong></td>
<td><strong>Complete end of module assessment quiz that requires students to compare learning theories, including constructivism, deliberate practice, behaviorism, experiential learning, transformational learning, connectivism. (Summative Assessment C)</strong></td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td><strong>Choose the active learning theory in the scenario presented</strong></td>
<td><strong>Apply</strong></td>
<td><strong>Review the resources provided. Choose the active learning theory in the scenario presented</strong></td>
<td><strong>Complete the end of module assessment quiz that requires students to choose the active learning theory in the scenario presented (Summative Assessment C)</strong></td>
</tr>
<tr>
<td><strong>Propose an adult learning theory</strong></td>
<td><strong>Create</strong></td>
<td><strong>Review the resources provided. Propose an adult learning theory and its elements that would be an appropriate fit for a given scenario</strong></td>
<td><strong>Complete the end of module assessment quiz that requires students to propose an adult learning theory and its elements that would be an appropriate fit for a given scenario (Summative Assessment C)</strong></td>
</tr>
</tbody>
</table>
Appendix D: Summative Assessment A
[Key: red italics = answer. 1 point each question]

1. Identify 3 of the common learning domains.
   *Affective, Cognitive, Psychomotor*

2. Choose from the list below, all of the qualities which highlight the importance of learning objectives.
   *Form the basis for assessments*
   *Drive learning*
   *Describe what is required for mastery*
   *Form the basis for effective course design and development*

3. Match the following definitions related to learning objectives.
   *Objectives- Specific, Measureable*
   *Goals- Broad, Overarching*

4. Learning objectives promote all of the following except:
   *Cheating*

5. Learning objectives should be designed for the :
   *Learner*

6. Choose the appropriate domain of learning & the level in the taxonomy for the following objective:  *Given a scenario, the paramedic student should be able to differentiate between asthma and anaphylaxis 100% of the time.*
   *Cognitive, Analysis*
7. Choose the appropriate domain of learning & the level in the taxonomy for the following objective: Within 1 month of completing the online module, the paramedic must be able to demonstrate the proper technique for intramuscular injections to a designated trainer, following the approved checklist.

*Psychomotor, Application*

8. Choose the appropriate domain of learning & the level in the taxonomy for the following objective: After reading the assigned article, the student should be able to list 5 ways to improve patient handoffs.

*Cognitive, Remember*

9. Illustrate your knowledge of learning domains by combining the domains with the examples of classroom activities provided. Move the term to the correct definition.

*Cognitive Domain- Assigned readings on pediatric anatomy
Affective Domain- Self-reflection on dealing with a SIDS call
Psychomotor Domain- Practice using a stairchair
Interpersonal Domain- Scenario of working with other agencies*

10. Choose the correct components of the A-B-C-D model for writing learning objectives

*Audience, Behaviour, Condition, Degree*

11. Select and drag to the blue box, the ineffective component and the reasoning based on the A-B-C-D model for the following learning objective: After reading the 3 resources provided, identify the domains contained in the learning taxonomy; including at least three domains.
12. Select the ineffective objectives from the list provided and defend your reasoning, based on the A-B-C-D model provided in class. You will need to make two selections to complete this question.

- At the completion of this 4 week module, the instructor candidate must be able to discuss the importance of learning objectives; by providing a minimum of 3 written arguments.
- The behaviour is missing or is too vague.

13. Select the ineffective objectives from the list provided and defend your reasoning, based on the A-B-C-D model provided in class. You will need to make two selections to complete this question.

- Given a block of content, the instructor candidate should be able to create 3 objectives aimed at a hypothetical class; sufficiently.
- The degree is ambiguous and cannot be measured.

14. Select the ineffective objectives from the list provided and defend your reasoning, based on the A-B-C-D model provided in class. You will need to make two selections to complete this question.

- Presented with a case study, the paramedic student should know the correct drug therapy; including dosage, route, contraindications, and expected results, without error.
- The behaviour is ambiguous and cannot be measured.
15. Using the verbs below, drag the appropriate word to fill in the blank to create an objective from the cognitive domain at the level of ‘understand’. Given a list of 10 patients and their respective injuries, the instructor candidate must be able to ________ the triage process; without error in 10 minutes or less.

*Describe*

16. Using the verbs below, fill in the blank to create an objective from the psychomotor domain at the level of ‘apply’. Within 1 month of completing the online module, the paramedic must be able to ________ the proper administration routes of analgesic; to a designated trainer, following the approved checklist.

*Demonstrate*

17. Using the verbs below, fill in the blank to create an objective from the cognitive domain at the level of ‘remember’. Given a resource to review, the instructor candidate should be able to__________ facts about depression and bipolar disorder; Including at least three signs or symptoms.

*List*
Appendix E: Summative Assessment B

[Key: red italics = answer. 1 point each question]

1. Select the statement that does not fit with the definition of formative assessment.

   Results in a grade or shows mastery

2. Select all of the statements that define summative assessment.

   Found at the conclusion of a module
   Results in a grade
   Shows mastery

3. Select and drag to the appropriate blue box the reasons for using formative or summative assessments.

   Formative:
   - Provide feedback to learner
   - Allievates misunderstandings
   - Determine a need to re-teach
   - Check on student comprehension
   - Identify areas for improvement

   Summative:
   - Determine mastery
   - Grading students

4. Select the statement that best describes constructive alignment.

   Achieving outcomes by aligning objectives and tasks

5. Label the diagram to show the components of constructive alignment.

   Objectives, Activities, Assessments
6. Select all of the statements that describe the reasons for using constructive alignment.

- Ensures authentic tasks
- Ensures fair assessments
- Creates appropriate levels of assessments

7. You need to assess a student’s ability to rapidly analyze a cardiac rhythm. The most efficient choice of assessment would be a(n)

*Simulated session where the learner is asked to classify the rhythm as shock-able or not shock-able*

8. You need to assess a student’s ability to remember the structures of the heart. The most efficient choice of assessment would be a(n)

*Asking the student to correctly label 5 structures of the heart on a diagram*

9. You need to assess a student’s ability to apply critical think skills on a call. The most efficient choice of assessment would be a(n)

*A scenario asking the student to formulate a treatment plan for a patient showing signs of shock*

10. Construct an appropriate assessment of the following objective: Identify the signs & symptoms of impending respiratory failure in a child.

*Choose the signs and symptoms of respiratory failure in a child from a multiple choice list.*
11. Construct an appropriate assessment of the following objective: **Apply effective communication techniques as a member or leader of a resuscitation team**

*Utilize effective communication techniques in a scenario.*

12. Construct an appropriate assessment of the following objective: **Create a module for a paramedic student on burns.**

*Design a module for a paramedic student on burns as a final project.*
Appendix F: Summative Assessment C

[Key: *red italics* = answer. 1 point each question]

1. Select **all** of the key concepts of andragogy.
   - Self-directed
   - Experience
   - Immediacy of use
   - Problem-orientated

2. Select **all** of the statements that apply to the learner in terms of andragogy.
   - Active participant
   - Take initiative
   - Involved in the process

3. Select and drag to the blue box the characteristics of adult learners.
   - Prior learning experience
   - Learner-centred
   - Learner preferences
   - Responsibilities
   - Active learners

4. Recall barriers in adult learning.
   - Shift work
   - Pre-requisites
   - Computer skills
   - Confidence

5. Identify the key concepts of motivation.
   - Using adult learning theories
   - Building community
   - Using humour
   - Chunking information
6. Apply your knowledge of adult learners to the following situations. Choose all of the statements that apply. You are preparing a mandated review of company policy.

- Chunk the information into manageable portions
- Explain how the policies will impact them

7. Apply your knowledge of adult learners to the following situations. Choose all of the statements that apply. You are preparing an upgrade package for ACP to CCP.

- Create an online package allowing the student control over when and where they complete the material
- Recognize the students' prior learning experience and encourage them to share that experience with other students

8. Identify the reasons adult learning theories are important.

- To offer more meaningful experiences for the learners
- To examine how adults learn best
- To propose appropriate methods for providing adult education

9. Compare the attributes of the following learning theories:

<table>
<thead>
<tr>
<th>How we learn</th>
<th>Behaviourism</th>
<th>Deliberate Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behaviour change</td>
<td>Focused repetition</td>
<td></td>
</tr>
<tr>
<td>Stimulus, Response</td>
<td>Practice, Feedback</td>
<td></td>
</tr>
<tr>
<td>Understand; remember</td>
<td>Apply; utilize; practice</td>
<td></td>
</tr>
</tbody>
</table>
10. Compare the attributes of the following learning theories:

<table>
<thead>
<tr>
<th></th>
<th>Experientialism</th>
<th>Constructivism</th>
<th>Connectivism</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>How we learn</strong></td>
<td>Do, reflect, modify</td>
<td>Learner creates</td>
<td>Networking, patterns</td>
</tr>
<tr>
<td><strong>Learning takes place by</strong></td>
<td>Process, experiences</td>
<td>Build, socialization</td>
<td>Adding nodes</td>
</tr>
<tr>
<td><strong>Key concepts</strong></td>
<td>Experience; make use of</td>
<td>Analyze, apply</td>
<td>Recognize, connect</td>
</tr>
</tbody>
</table>

11. Propose an adult learning theory and its corresponding elements for the following topic:

**Use of a new brand of IV cathlons**

*Deliberate Practice: Practice on mannequin; Receive feedback; Incorporate feedback*

12. Propose an adult learning theory and its corresponding elements for the following topic:

**Polypharmacy overdose**

*Connectivism: Toxicology rounds; OD scenario; Accessing poison control; Guest pharmacologist; Present 1 OD case to peers; research OD incidents*

13. Propose an adult learning theory and its corresponding elements for the following topic:

**Scene safety to entry level PCPs**

*Behaviourism: Teacher led skills stations; Scenario with negative reinforcement; Scenario with positive reinforcement; True/false exam questions*
14. Propose an adult learning theory and its corresponding elements for the following topic:

ACLS course

*Constructivism: Build on prior experience; Actively build relationships; Sequencing; Move from simple to complex; Use mnemonic*

15. Propose an adult learning theory and its corresponding elements for the following topic:

EMS Practicum

*Experiential: Self-motivate; Critical reflection; Active modification; Journal writing*

16. Choose the active learning theory in the scenario presented. You are teaching a module on eclampsia to a group of experienced providers. You start with a review of terminology before moving into pathophysiology of pre-eclampsia and eclampsia. During a lesson on magnesium sulfate you review what the medics already know about the pharmacology of the drug. After all the students have mastered all the components, scenarios are incorporated to build on the learning and tie everything together.

*Constructivism*

17. Choose the active learning theory in the scenario presented. You are teaching a module on infectious diseases. After an introductory discussion, including students’ current knowledge, the group forms teams based on their interests. The teams research the infectious disease topic of their choice and present the information back to the class.
Areas they are encouraged to consider are further resources, contacts, and relationships to or impact on, their work.

*Connectivism*

18. Choose the active learning theory in the scenario presented. You are facilitating a session on conflict resolution. The group discusses past experiences and potential ways to diffuse conflict. Small groups then work through practice scenarios. Self-reflection and peer feedback are taken into account when the student attempts the next scenario.

*Experiential*

19. Choose the active learning theory in the scenario presented. You are upgrading your certification to ACP. The course involves advanced airway practice on mannequins in a lab with feedback from an instructor. Once you are proficient in the lab, you spend four shifts in the OR with anesthesia before moving onto to your practicum. You must then demonstrate competency in advanced airway on six occasions.

*Deliberate practice*

20. Choose the active learning theory in the scenario presented. You are teaching a lab on IVs. You require your students to pass a quiz on infection control before they can attend the lab. Students are shown a video and a live demonstration at the start of the class. They are then permitted to attempt an IV start on a mannequin where they will have a flash of simulated blood if they use proper technique and are successful at cannulating the vein. Those students with an 80% success rate are allowed to move on to practicing on
fellow classmates. Successful students are the permitted to use the new skill on car under supervision.

*Behaviourism*
References


Van Oostveen, R., DiGiuseppe, M., Barber, W., Childs, E., Mykhailenko, O., & Blayone, T. (2013). Transforming online learning: The fully online learning community (FOLC)


