CREATION AND IMPLEMENTATION OF AN
ADAPTED AQUATIC THERAPEUTIC EXERCISE INSTRUCTIONAL VIDEO

A project submitted in partial fulfillment of the requirements
For the degree of Master of Science
in Kinesiology

By

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May 2013
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DEDICATION

There are certain times in our life, where we have the chance to stop, evaluate our current and past situations, and reflect upon the people and instances that impacted where we stand at that very moment. During these times, we sometimes see the faces of those whom have influenced our lives the most. These are the people who were there to support us at every instance where we thought we couldn’t go on. These are the people who celebrated our greatest achievements, and still took no credit even though they had much to do with our successes. These are the people who did not force advice upon us, but waited patiently and gave guidance when necessary. These are the people whom we know that without their presence we would not be where we are today. For me, those influential people are my Papa Babe (Dr. Marvin Lewis Burdg) and my advisor Dr. Jennifer Romack.

For 24 years, my entire life, my late Papa has been one of the greatest sources of strength in my life. No matter the occasion, he could always be counted upon to provide stability, keeping me tied to the real world – encouraging me to dream ever higher while simultaneously keeping myself planted firmly in reality. As a former professor, counselor, Vice President of Instruction, and interim President at San Diego City College, he knew how to talk to and encourage overwhelmed students who were ready to give up, even when the student was his own granddaughter. Papa also understood that sometimes words were not necessary; that the best type of support is simply holding someone’s hand and letting them know that you are there for them. My Papa instilled in me the belief that you always try your hardest, look adversity straight in the eye, and carry on because perseverance, dedication, passion and a humble heart will get you through what at times
can appear impossible. It is for these reasons and many more that I dedicate this Master’s thesis and project to my beloved and dearly missed Papa Babe.

Dr. Jennifer Romack is the epitome of exceptional teaching and fortitude. She has by far, been the professor that has influenced my personal, professional, and academic life the most. This is because Dr. Romack teaches beyond the textbook and classroom, and doesn’t just mold our brains, but changes the way students look at and interact with the world. She has the ability to transform entitled students into ambassadors for progress. When students take her classes they are taught to be accountable for their own learning, and that knowledge becomes powerful when we are able to connect theory with practice through pertinent real world applications. Furthermore, Dr. Romack does not let hardship get in the way of living life and doing what she loves. She has taught me that we are strengthened by adversity, and not defined by it. Her example of courage and tenacity inspired me to keep pressing on and finish my Master’s project when I dealt with hardships in my own life. Dr. Romack and her inspirational teaching have set the golden standard for the professional I strive to be and forever changed the way that I will look at the world.
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month volunteer experience has blossomed into a mentorship and friendship that I will be eternally grateful for. God has a mysterious way of guiding us in our lives, and she has served as a compass to direct me towards finding my calling in life as an occupational therapist.

The process of completing a Master’s project and writing a thesis is time consuming and periodically overwhelming and stressful. My friends and family have been understanding to why I have had to miss out on social experiences and family events. They too have made sacrifices and have gone out of their way to accommodate my schedule and make sure that I feel included. I am grateful for my father’s humor, wit, and boundless support. My mother, who has earned two Master’s degrees of her own, has set an example for excellence in academic pursuits and work ethic. She does not let anything stand in her way when she has set a goal, not even cancer. She inspires me to work through tribulations, rely upon inner strength, and (in her words) to “just get it done.” My sisters Challen and Kelsey always lend a listening ear when I needed to vent about how stressed I was. In the last three years, through family changes and each of our own challenging educational pursuits, we have grown closer and learned to rely upon each other for strength and sanity. Our shenanigans were the best way to decompress and without their support and humor I could not have completed this project.

Sean Laraway has been my rock from beginning to end. He convinced me to finish my degree even when I felt completely overwhelmed, uninspired, and let down by the educational system. He selflessly took on almost all of the responsibilities at home so that I could focus on my studies, writing my thesis, and finishing my project. He dealt with my emotional, sleep deprived mood swings and loved me nonetheless. He continues
to see my potential and supports, loves, and encourages me every day. Babe, if we can make it through graduate school, we can make it through anything.

Finally, I acknowledge that without God I would be completely lost. I find solace in that God has a plan for my life and that through each experience, no matter how arduous, I am able to see evidence of His hand guiding my life. I look back on my past two and half years and know that God orchestrated the right people at the right time, gave me the strength to rely on, blessed me, and will continue to guide me on this crazy adventure called life. For that, I am eternally thankful, and choose to walk in faith, love, and humility.
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ABSTRACT

CREATION AND IMPLEMENTATION OF AN

ADAPTED AQUATIC THERAPEUTIC EXERCISE INSTRUCTIONAL VIDEO

By

Kyla Janel David

Master of Science in Kinesiology

Completing coursework in adapted aquatic therapeutic exercise is a rewarding yet intimidating experience. Through the instruction of lecture, lab, and the use of a hardcopy manual, students are expected to learn a variety of techniques and apply them to clients in a clinical setting. Though these are valuable methods, the use of an instructional video would facilitate observational learning and may affect student engagement. Additionally, the use of video instruction helps faculty meet the multimodal learning styles of a diverse range of students.

This study focuses on the subject of observational learning and integration of technology into the classroom setting. A brief history of adapted aquatic therapeutic exercise (AATE) was included to provide background information and validate its importance in the field of kinesiology. Research on observational learning and other topics that are closely associated with the subject were addressed. Topics on motor learning, learning styles, classroom engagement, and the use of technology in teaching were researched and linked to observational learning to create the component portion of this project.

The product of this project consisted of a video comprised of three AATE techniques for the use of undergraduate kinesiology students at California State University, Northridge. The video was made available in a DVD and digital format and included instructional video clips as well as pictures of proper hand placements.

This study examines the implementation of technology and creation of an instructional resource to help assist with student engagement and skill acquisition. From this research, recommendations or the expansion of this project were presented to create a more comprehensive project.
CHAPTER ONE

INTRODUCTION

In 2010, nearly 20% of Americans reported having some type of disability (Brault, 2010) and over 35% of adults and nearly 17% of children were classified as obese (Ogden et al., 2012). These alarming statistics boosted public interest in the importance of preventative and interventive care. In fact, according to the Bureau of Labor Statistics (BLS), half of the top 20 fastest growing occupations are in the healthcare field (BLS, 2012). Healthcare professionals need proper education and training to provide quality care for patients. As a result there are more students interested in kinesiology as a major, and the need to provide these students with coursework based in rehabilitation and preventative care, including therapeutic exercise.

One of the highlights of the Department of Kinesiology at California State University, Northridge is the Center of Achievement (COA) through Adapted Physical Activity. The COA offers both land- and aquatic-based therapeutic exercise programs for individuals with physical disabilities. Clients are assisted by university students and professionals in health- and rehabilitation-related fields. The COA affords students the opportunity to explore and apply the benefits of therapeutic exercise in a clinical setting. To this end, instructors are able to integrate evidence-based theory and hands-on learning experiences for teaching adapted aquatic-based therapeutic exercise (AATE). However, teaching AATE presents challenges because of the complex movement techniques. These techniques require students to experience hands-on practice and observation. Currently, resources for students enrolled in AATE include information and experiences obtained in
lectures, labs, and through a hardcopy Manual for Adapted Aquatic Therapeutic Exercise (Dinay et al., 2008). Including an instructional video of AATE techniques would provide additional opportunities to learn through observational practice and may enhance the learning experience for students trying to grasp the complex concepts and movements.

Numerous research studies examined the effect of observational learning on motor skill acquisition. For example, researchers have found that observational practice can be just as effective for learning a physical skill as physical practice, and that when observational and physical practice are combined, their effectiveness is even stronger (Shea et al., 2000). A growing body of evidence supports a neurophysiological explanation for the effectiveness of observational learning. Researchers hypothesize when we observe the actions of others we activate the same neural circuitry responsible for planning and executing our own actions (Mattar & Gribble, 2005; Cross et al., 2009). Understanding a neurophysiological explanation about observational learning will aid in developing an effective method of creating an instructional video using current technology and not cognitively overloading the observer during skill acquisition.

Technology offers unlimited teaching opportunities to transform student learning (Resta & Laferrière, 2007). When teaching in today’s technology infused world, it is important to design instructional methods and materials that serve the various learning styles and cognitive needs of students. In fact, achieving success in education is dependent on the ability to adapt teaching to individual differences in students (Corno & Snow, 1986). Instructors may also try to integrate technological techniques to increase student engagement and achievement (Pemberton et al., 2006). Research in student engagement helps educators understand how to facilitate students accountability, interest,
and involvement in their own education. Increasing student engagement in the classroom with technology infused resources has many potential benefits. Students who are more engaged in coursework have higher grades, develop stronger critical thinking skills, are more satisfied, and have lower dropout rates (Carini et al., 2006; Chio & Johnson, 2007; Kuh et al., 2008).

This thesis project focused on the creation of an AATE instructional video for faculty to use to encourage kinesiology students’ engagement in the classroom which may subsequently improve academic achievement and skill acquisition of AATE techniques. The second goal of this project is to integrate technology into the classroom through the use of the instructional video in digital format that can be uploaded to instructors’ class websites. This will be congruent with the needs of technologically savvy students in today’s society.

Background

As part of this project, AATE instructional video was created during the summer of 2011 as a supplemental resource for use in the Department of Kinesiology at California State University, Northridge. The video was designed to help engage students in AATE coursework and prepare students to apply techniques with clients as part of coursework in a clinical setting. The video consists of three AATE techniques: Watsu, Bad Ragaz, and Ai Chi. These techniques were chosen because of their complex movements that require intricate coordination and timing sequences. Each technique was presented in part method (individual movements) so that students practice and study each
component of the AATE techniques. This video may have potential benefits for students’ education.

This project is intended to assist to incorporate effective teaching strategies and connect with students of varying learning styles. Through the creation and implementation of the video in this project it is intended that students will be better prepared to use AATE techniques on clients and peers in real-life settings, while developing their skills in a safe classroom environment. By providing students with a means to engage themselves in the coursework they may be more successful and perhaps better satisfied with their degree and clinical skill progress.

Statement of the Problem

In the Department of Kinesiology at California State University, Northridge students have the opportunity to take courses in AATE. Currently, students enrolled in Kinesiology 313 or 451 are presented information and required to master AATE techniques through lectures and lab exercises. While a hard copy manual currently exists to supplement lecture and lab experiences, it is unable to depict the fluidity, timing, and complex movements of AATE techniques.

For example, almost all exercises taught in AATE courses occur underwater or at the water’s surface however, pictures in the current manual were taken from above the water. This makes it especially difficult to visualize what exercises look like from their true underwater perspective. Hand placement and transitions from one movement to the next is another important aspect of AATE that students are routinely tested on. The
manual does not have pictures of hand placement and cannot demonstrate the transition periods between movements.

Finally, because AATE is practiced in a pool with various floatation devices and other equipment it makes it extremely difficult for students to practice and study outside of their scheduled lecture or lab times. In the AATE courses if students wish to practice outside of their scheduled lecture or lab time, they must consult with pool staff and find a time when there is enough space in the therapy pool, extra equipment to use, and a lifeguard on duty. This makes it almost impossible for students to practice or study if they feel they need additional hands-on experience or observation.

Statement of the Purpose

The purpose of this project was to create a supplemental instructional video to be used in adapted aquatic therapeutic exercise courses. The video contained 3 techniques (Watsu, Bad Ragaz, Ai Chi), consisting of 50 individual movements, and 24 still images of proper hand placement. This project was intended for use by undergraduate and graduate students and faculty in the Department of Kinesiology at California State University, Northridge. The video has the potential to affect classroom engagement and academic success. Research shows that students with higher levels of engagement in activities within their field of study, through research, internships, or other creative activities, were better prepared academically and socially (ASHE, 2008).
Research Questions

This project was guided by several research questions:

1. What factors influence the acquisition of learning complex motor tasks through observational learning?

2. What learning styles do kinesiology students prefer?

3. What elements of technology can be used to create a video to improve classroom engagement and academic success in AATE courses in the Department of Kinesiology at California State University, Northridge?

Definition of Terms

For this study the following terms are defined as follows:

1. Adapted aquatic therapeutic exercise: the use of water and specifically designed activity by qualified personnel to aid in the restoration, extension, maintenance and quality of function for persons with acute, transient, or chronic disabilities, syndromes or diseases (Sova, 2006).

2. Supplemental instructional resource: any form of instructional material (PowerPoint presentation, pictures, manuals, videos, simulators, voice recordings, books, etc) that is used in conjunction with lecture information to enhance the learning experience.

3. Engagement: the ability to put forth effort towards learning a subject through active participation and formation of meaningful connections.
4. Student success: the ability of students to receive passing grades in their coursework, obtain educational objectives, and apply them to other aspects of their professional or educational career.

5. Learning: a relatively permanent change in behavior, cognition, or action.

6. Skill acquisition: the ability to learn and perform a new task with relative accuracy and confidence.

7. Retention: the ability to remember material at some time later in a similar way it was presented during instruction (Mayer & Wittrock, 1996).

8. Transfer: the ability to use what was learned to solve novel problems, answer new questions, or facilitate learning new subject matter (Mayer & Wittrock, 1996).

9. Satisfaction: the general feeling of enjoyment with one’s educational experience.

Assumptions

For the purposes of conducting this project, the researcher assumed the following:

1. Models were chosen specifically to fit the scene, perform in some or all filming sessions, and be available for filming.

2. The therapy pool was available for at least one hour to conduct filming.

3. Video equipment was available and in working condition for filming sessions.

4. Media production staff was available to edit video files.

5. Video equipment and files were compatible with editing software.

Limitations
For the purposes of conducting this project, the research accepted the following limitations:

1. The availability of appropriate models for each AATE technique during the specific time of filming.
2. Filming equipment was more difficult to use in an aquatic environment than originally anticipated.
3. The therapy pool was not always available during convenient times for film crew and models.
4. The schedule for film editing was dependent on the availability and work load of media production staff.
5. The final video product design was limited by the editing software available through the media production department.

Delimitations

For the purposes of conducting this project, the research encumbered the project with the following restrictions:

1. Limited filming to Watsu, Bad Ragaz, and Ai Chi techniques.
2. The application of this project, due to its content, may only be generalized to AATE specific courses taught in the Department of Kinesiology at California State University, Northridge and not other programs or universities.
Significance of the Study

With proper support this project may be used in the assistance of faculty and students in the Department of Kinesiology at California State University, Northridge in the following manner:

1. Faculty: a DVD and digital file will be created to assist in student engagement for the use in Kinesiology 313 and 451 courses at California State University, Northridge.
2. Faculty: Use of technology in the classroom may also increase instructor satisfaction with available teaching resources.
3. Students: Will be provided with an opportunity to practice techniques without fear of harming clients or personal embarrassment.
4. Students: May be able to increase retention, transfer, skill acquisition, engagement, and satisfaction.
5. Department of Kinesiology: Use of an AATE instructional video targets Student Learning Outcome 2 (apply evidence-based practices to enhance the study of human movement) and Student Learning Outcome 4 (demonstrate knowledge of kinesthetic forms, processes and structures as they apply to the personal expression and culture of human movement).

Chapter Summary
This chapter was an introduction to the topic of motor behavior and neurophysiological theory pertaining to learning skills through observation. Brief backgrounds on integration of technology in the classroom and student engagement were provided. A description of the instructional video component and its function was described as well as the benefits it would bring to the Department of Kinesiology. The purpose of this project and statement of the problem were presented. The following questions were used to help guide this study: What factors influence the acquisition of learning complex motor tasks through observational learning? What learning styles do kinesiology students prefer? What elements of technology can be used to create a video to improve classroom engagement and academic success in AATE courses in the Department of Kinesiology at California State University, Northridge? Relevant terms were defined so that readers of this study would be able to understand ambiguous terms or terms which could be used in multiple contexts. The assumptions for this project were listed and the limitations and delimitations outlined. Lastly, the significance of this project and how it would be beneficial to students, faculty, and the Department of Kinesiology at California State University, Northridge were provided. In chapter two a review of the literature is conducted on the topics of AATE, motor learning, learning styles, student engagement, and technology and teaching.
CHAPTER TWO

REVIEW OF THE LITERATURE

Introduction

Technology offers unlimited teaching opportunities to transform student learning (Resta & Laferrière, 2007). Instructors may also try to integrate technological techniques to increase student engagement and achievement (Pemberton et al., 2006). When teaching in today’s technology infused world, it is important to design instructional methods and materials that serve the various learning styles and cognitive needs of students. This project focused on the creation of an AATE instructional video for the use of faculty and students in the Department of Kinesiology at California State University, Northridge, to encourage student engagement in the classroom, improved academic achievement and skill acquisition. While a hard copy manual currently exists to supplement lecture and lab experiences, it is unable to depict the fluidity, timing, and complex movements of AATE techniques. The purpose of this project was to create a supplemental instructional resource that stimulates classroom engagement. The study was guided by several research questions: What factors influence the acquisition of learning complex motor tasks through observational learning? What learning styles do kinesiology students prefer? What elements of technology can be used to create a video to improve classroom engagement and academic success in AATE courses in the Department of Kinesiology at California State University, Northridge?

Research on the topics of AATE, technology enhanced instructional resources, motor behavior, motor learning, motor control, and motor development was conducted
beginning in the fall of 2011 through the spring of 2013. Computer-based searches on the
topics were conducted through OneSearch online database at California State University,
Northridge to search for books, articles, videos, and other resources within one search
format. More specific databases were used to narrow down the subject such as: Academic
Search Elite, PubMed, SPORTDiscus, Physical Education Index, CINAHL Plus,
MEDLINE, Ovid Journals, ScienceDirect, OmniFile, Education Resource Information
Center (ERIC), JSTOR, PsychINFO, and Cochrane Library. Key terms of interest
included a combination and variation of the following keywords but not limited to:
aquatic therapy, rehabilitation, Watsu, Bad Ragaz, Ai Chi, therapeutic exercise, motor
learning, motor behavior, learning theory, engagement, student engagement, classroom
engagement, technology, learning styles, constructivism, video instruction, knowledge
transfer, and retention. The search produced journal articles, books, websites, and other
documents dating from 1967 through 2012, using approximately 70 resources to be
included in the following review of literature, separated into five sections and presented
in to following order: (a) Adapted Aquatic Therapeutic Exercise, (b) Motor Learning, (c)
Learning Styles, (d) Student Engagement, and (e) Technology and Teaching.

Adapted Aquatic Therapeutic Exercise

Ancient civilizations have used water as a therapeutic tool to heal and soothe
those with physical ailments for centuries (DeVierville, 2004). Though the use of
therapeutic aquatic activities can be traced back to ancient times, its use in mainstream
society is somewhat of a modern practice. Until recently, United States society
discouraged individuals with disabilities to participate in community aquatic programs due to multiple barriers, including public fear and ignorance (Lepore et al., 2007). Aquatic therapeutic exercise (ATE) programs grew out of a need to treat and rehabilitate disabled veterans returning from World War II and individuals stricken with polio. Gradually, it became integrated into the rehabilitation field with the help of organizations such as the American Red Cross, Young Men’s Christian Association, Special Olympics, National Multiple Sclerosis Society, Arthritis Foundation, and American Alliance for Health, Physical Education, Recreation, and Dance (Lepore et al., 2007).

Therapeutic exercise interventions are commonly used to treat, maintain, and rehabilitate people with physical impairments. An aquatic environment is a favorable option for achieving maximal exercise levels in those with or without disabilities. Aquatic therapeutic exercise takes advantage of water properties such as fluid mechanics, viscosity, buoyancy, and hydrostatic pressure. It has been used as a therapeutic tool in various populations such as arthritis, neuromuscular diseases, stroke, and cerebral palsy (Foley et al., 2003; Melton-Rogers et al., 2003; Saltskar-Jentoft et al., 2001; Mannerkorpi et al., 2000; Willen et al., 2001; Getz et al., 2006; Kelly et al., 2005; Vogtle et al., 1998; Hutzler et al., 1998; Chon et al., 2009). Furthermore, ATE can promote physical, social, emotional, cognitive, and leisure skill development. Immersion in warm water has positive biological effects that include pain relief and relaxation due to thermal energy transfer, weightlessness effects, body support and fluid resistance, lymphatic compression, venous compression, increased central blood and cardiac volume, increased atrial pressure, increased stroke volume, increased muscle blood flow, off-loading of body weight, decreased joint compression, higher pain threshold, improved edema,
suppression of sympathetic nervous system, and promotion of excretion of metabolic waste (Vargas, 2004; Becker 2004). Increased freedom of movement in an aquatic environment increases morale and given individuals with disabilities motivation to maximize their potential in other aspects of rehabilitation (Skinner & Thompson, 1983). Other social and emotional benefits gained by participation in ATE include a sense of well-being, temporary stress and tension relief, improved body image and self-image, and increased social interactions (Lepore et al., 2007).

Adapted aquatic therapeutic exercise (AATE) has been defined as the use of water and specifically designed activity by qualified personnel to aid in the restoration, extension, maintenance and quality of function for persons with acute, transient, or chronic disabilities, syndromes or diseases (Sova, 2006). Though there are various physical, emotional, and social benefits of AATE, there are also precautions and contraindications that should be considered prior to participation in an AATE program. Informing individuals of precautions and contraindications ensure a safe environment for both clients and assistants. Prior to starting an AATE program, clients should consult with a doctor and obtain medical release documents. Precautions for participation in AATE program include: fever over 100° F, hypertension/hypotension, low vital capacity (<1000mL), cardiac disease, epilepsy, absence of a cough reflex, ear problems, contagious infections or disease, hydrophobia, severe impulsivity, current radiation or severe burns, thermal regulation instabilities, vestibular stimulation sensitivity, use of psychotic drugs, HIV, and use of a catheter. Contraindication that would exclude participation in an AATE program include: open wounds, unpredictable bowel incontinence, sensitivity to pool chemicals, skin infection, airborne and waterborne
infection, vomiting, gastrointestinal infection, and urinary tract infection. Knowledge of and vigilance to these conditions is important when performing any AATE technique. The following section will focus on the historical, clinical, and scientific aspects of three specific AATE techniques: Watsu, Bad Ragaz, and Ai Chi.

Watsu was developed by Harold Dull at Harbin Hot Springs in 1980. It was based on Zen Shiatsu theories of meridians and energy flow, constant support, and client as teacher. Proper flow of “chi” can relax the body and allow the fluid movements to stretch and relieve tension in the spine and musculature. Simply defined, Watsu involves and stretches done to the breath while being held and floated in warm water (Dull, 2004). It incorporates static passive stretching and a structured sequence of passive limb, head, and neck movements against the resistance of the water’s surface. Watsu’s main benefits are in the areas of improving relaxation and flexibility. Chon et al. (2009) conducted a study to identify specific effects of Watsu on spasticity and ambulation in three patients with hemiparesis caused by stroke. Measurements were taken before and after the Watsu session. Spasticity and muscle tone were measured via the tone assessment scale (TAS). Ambulation was measured using the Rivermead Visual Gait Assessment (RVGA). Intervention consisted of a total of 40 sessions, 40 minutes each, five times per week, for eight weeks. Results showed decreased scores on the TAS and RVGA indicating an increase in ambulatory function and improvements in spasticity. This study demonstrated the importance and effectiveness of Watsu as a rehabilitation technique for individuals with neurological and functional impairments.

The healing power of thermal water was first discovered in 1238 in Tamina Gorge near Bad Ragaz, Switzerland. Monks would lower patients into the flowing warm waters
to relieve pain and induce relaxation. Eventually, the water was channeled by a canal into the town of Bad Ragaz where a health resort with a mineral spring boasted of its curative powers (Meno, 2002). In the 1950s and 1960s through the work of Dr. Kneptter and Nele Ipsen, floatation support and integration of proprioceptive neuromuscular facilitation (PNF) strategies were incorporated to provide client support and neuromuscular gross motor patterns. Bad Ragaz Ring Method (BRRM) was copyrighted in 1967 and continues to evolve. Brody and Geigel (2009) stated that understanding BBRM relies upon an understanding of biomechanical, hydrodynamic, and neurophysiological knowledge. For example, the resistance to movement in water is 14 times what it is in air. Additionally, faster movements increase resistance due to turbulent flow. BRRM uses these principles to strengthen and reeducate the gross motor patterns of affected limbs. Common goals for BRRM include improved strength, increased coordination, joint stability, range of motion, and endurance, decreased muscular tone and pain, and preparing lower extremities for weight bearing activities such as walking (Brody & Geigle, 2009).

Ai Chi was developed in Japan by Jun Konno in the mid 1980s. Like Watsu, it is based on the Asian theory of “chi,” cultivating life force energy and continuous, fluid movements (Archer, 2005). Ai Chi incorporates breathing techniques and mindfulness while clients move through the progressive movements (Sova, 2002). The main goals of participation in an Ai Chi program include relaxation, flexibility, and balance. It has been proven to increase postural balance, knee strength, autonomy, and decrease pain, spasms, disability, fatigue, depression, and cortisol levels that lead to stress responses in the body (Noh et al., 2008; Kelley & Loy, 2008; Castro-Sanchez et al., 2012). In a randomized control study, Noh et al. (2008) compared the effects of an eight-week aquatic exercise
program based on Ai Chi methods against a conventional land-based gym program in individuals post-stroke. Physical impairment was measured with the Chedoke-McMaster Stroke Assessment, balance outcomes were measured using the Berg Balance Scale, and muscle strength and gait ability were measured using the Modified Motor Assessment Scale. Aquatic exercise groups participated in an intense one-hour program, three days a week, for eight weeks. The conventional therapy group met the same amount of time, but completed gym-base exercises and stretches such as bicycling, hamstring stretches, and upper-body ergometer. Results showed both groups exhibited improvements in gait ability, muscle strength, and balance outcomes. However, the aquatic exercise group showed statistically significant differences in balance outcomes and knee flexor strength compared to the conventional gym program. This demonstrated the added benefits of participating in an aquatic based exercise program versus land based programs.

Castro-Sanchez et al. (2012) conducted a randomized control study to investigate the effectiveness of an Ai Chi aquatic program against pain and other symptoms in a Multiple Sclerosis population. Seventy-three participants were randomly assigned to a control group that completed contraction-relaxation and breathing techniques or an experimental group that completed an Ai Chi aquatic exercise program. Both groups met two days a week, for 20 weeks. Participants were assessed at baseline and immediately, four and 10 weeks post-intervention. Measurement variables were pain, disability, spasms, fatigue, and depression. Results showed that the Ai Chi group had significantly reduced pain levels, and improved fatigue, spasms, depression, and quality of life with no adverse effects. Additionally, reduced pain levels were maintained 10-weeks post intervention. Clinical implications of these studies demonstrated the vast range and long-
lasting benefits that participation in an AATE program can have on a range of disabilities and diseases.

**Motor Learning**

The field of motor learning has had a broad influence from other specialties such as physiology, neuroscience, biomechanics, sport psychology, and pedagogy. To define motor learning, one must also define its related subdisciplines of motor control and motor development, as there is much common ground and scientific overlap. Ulrich and Reeve (2005) argue that “motor development, motor learning, and motor control have converged into a field best described as motor behavior. This argument is based on the fact that theories, fundamental issues, methods and analytical tools are common to all three areas.” And so the follow section on motor learning will combine theories and research based in motor behavior.

Motor control is the study of how the neuromuscular system functions to activate and coordinate the muscles and limbs involved in the performance of motor skills, both new skills, and those already acquired (Magill, 2007). Studies in motor control usually focus on the central nervous system and the interactions between it and the sensory information we take in from our environment.

Motor development is the study of change in motor behavior over time, including typical trajectories of behavior across the lifespan, the processes that underlie the changes we see, and factors that influence motor behavior (Ulrich, 2007). Studies in motor development focus on typical and atypical changes that occur at various stages of life,
especially qualitative changes of the same skill. For example, a motor development study might focus on the development of a walking skill throughout a person’s life. These studies and observations tend to serve as references of typical development, and therefore help medical professionals determine when abnormality or atypical development occurs.

Motor learning has been defined as a change in the capability of a person to perform a skill that must be inferred from a relatively permanent improvement in performance as a result of practice or experience (Ulrich, 2007). Motor learning tends to focus its studies on skill acquisition and the influence of practice and experience to performance outcomes. There are multiple theories that contribute to the modern definition of motor learning.

Much skill acquisition research that exists in the field of motor behavior focuses on practice variables and the acquisition of simple tasks. This is because motor behavior experts believe that simple skills form the basis of more complex skills. In regards to practice variables several important conclusions have been made that are relevant to this project and its purpose. One of the most important factors in learning a motor skill is the amount of practice. Many researchers including Schmidt and Lee (2005) demonstrated that more practice results in greater skill acquisition, but that the rate of improvement is linearly related to the amount left to improve. Early on, performance of a new task will improve rapidly, but after much practice performance improvements are seen at a slower rate. Thus, we would expect that the more kinesiology students are exposed to practice conditions, the greater the amount of improvement in their ability to perform AATE techniques.
Understanding learning theories is important because it helps instructors determine what aspects of learning and practice can be manipulated to guide novice students to expert performers. Schmidt’s Schema Theory proposed that motor programs contain generalized rules, or schemas, for a class of actions. According to this theory, as we experience and execute movements we are continually updating our mental representation of that action, altering generalized motor programs, consequently learning the movement (Schmidt, 2011). Increased exposure to AATE techniques via physical or observational practice should result in an increasingly more accurate representation and performance of a skill. As students are able to observe more instances of experts performing a task, Karl Newell’s model of constraints proposes that during practice, our brains search for optimal strategies to solve the task. Movement patterns are influenced by the interaction of a variety of constraints related to the task, individual, and environment (Haywood & Getchell, 2008). Building on Newell’s work, the dynamical systems theory suggests that the body is comprised of a highly intricate network of co-dependent subsystems that are capable of forming highly ordered consistent movement patterns that are task specific (Glazier et al., 2003). The coordination of these subsystems is important when a subject is learning to complete complex movement patterns and sequencing needed for AATE techniques. Stage-based theories provide background knowledge of how students learn new skills.

A three-stage model was developed by Fitts and Posner (1967). In the first stage, called the “cognitive stage of learning” the learner tries to understand the nature of the task. They may have much performance variability, but improvements tend to be large. In the second stage, called “the associative stage” there is less performance variability and
improvement occur more slowly as the person begins to refine the skill. The third stage known as “the autonomous stage” is characterized by almost unconscious ability to perform the skill. This stage-based theory helps validate the need to incorporate background information and lecture material with physical and observational practice. This exposure to information can aid in the novice understanding the nature of the task. Other areas of research with concentrations in practice levels, types of feedback, and practice conditions can assist instructors with determining how to structure teaching and practice environments.

Being able to generalize and apply learning to new situations is another important aspect of motor learning. Using variable practice is most necessary when learning tasks that are likely to be performed in variable conditions (Shumway-Cook & Woollacott, 2012). Working in a clinical setting has much variability. A student might work with a new client, the client’s physical conditions could change at any time, the client might request new exercises. The variability in these types of situations support the need to practice AATE in a variety of ways.

Random practice is most effective when used with skills that use different patterns of coordination and underlying motor programs (Magill & Hall, 1990). Students enrolled in AATE courses are required to learn and perform multiple techniques. Additionally, a client’s exercise program might integrate individual moves from several AATE techniques. It would be beneficial to practice and observe AATE in a random order. Some AATE techniques are composed of multiple movements that combine to a full session. Mastering this many movements can be an overwhelming endeavor to novice performers.
One method of learning a new task is to break it down into smaller steps, with the idea that the performer will be able to master each step prior to learning the entire task. Research has shown that this is only effective if the task itself can be naturally broken down into units that reflect the goal of the task (Schmidt, 1991; Winstein, 1991). Many AATE techniques combine a variety of movements to create a full session. For example, a full Watsu session consists of 11 individual movements. Teaching Watsu, as 11 individual movements would be helpful for students who are expected to learn the entire session.

Finally, there is a wealth of motor learning research that investigates the effect of observational practice compared to physical practical. Bandura’s Social Cognitive Theory has had a tremendous influence on motor behavior, particularly observational learning. One of Bandura’s most renowned experiments established that visual demonstration is one of the most powerful agencies of transmitting patterns of behavior and thought (Bandura & Ross, 1961). Furthermore, Bandura, Jefferey, and Bachicha (1974) suggested that when an individual observes a model they extract generalized rules about the performance of the task. Those rules form a cognitive representation that provide an approximation of the task and eventually, after prolonged exposure to the model, develop an error detection and correction mechanism that is used to evaluate their own performance. There have been a considerable amount of studies that further demonstrate the influence of observational learning.

Shea et al. (2000) conducted a study, comprised of two experiments, that further demonstrates the effectiveness of physical and observational practice in the learning of a videogame/keyboard task. In the first experiment thirty university students were
randomly assigned to a physical practice, observational practice, or control group. Students in the physical practice group were given 20 practice trials that were 15 seconds each in duration. Students in the observational practice group each observed one student completing the physical practice trial. The control group had no practice or information about the task. One day later students returned for a retention and transfer test. The results of the retention test showed that physical practice was better than observational practice, but that observational practice was better than no practice at all. Interestingly, on transfer tests the observational practice group had scores equivalent to the physical practice group, and both were superior to the control group. This demonstrated that observational practice is as effective as physical practice for transfer performance.

In a second experiment, Shea et al. took their results one step further and compared the effect of combining physical and observational practice on learning with the effect of physical practice alone. Students were randomly assigned to a physical practice, combined practice, or control group. Practice conditions were identical to the first experiment, except for the combined practice group which observed another student and then had a physical practice trial of their own. Results on the retention test showed similar learning scores for the combined and physical practice groups. However, on the transfer test the performance of the combined group was superior to that of the physical practice group. The authors concluded that learning requires some form of adaptable behavior, and exposure to observational and physical practice afforded students the opportunity to engage in processing that might be occupied due to the cognitive and motor demands of physical practice. These results validate the potential usefulness of an instructional video as a supplementary resource for students learning AATE techniques.
A recent study by Grierson et al. (2012) investigated how manipulation of feedback levels and collaboration impacts the learning benefits of observing a video-based instructional resource. Twenty-six nursing students viewed an instructional video that demonstrated the proper technique for ventrogluteal injection. Students then performed a warm-up injection trial on a simulator. Students then performed a pre-test trial on the simulator immediately after their warm-up trial, but this time students’ performance was video recorded. Following the pre-test, each student was randomly assigned to one of three experimental groups. The first group, expert observation (EO), observed trained professionals performing the injection task with the instructional video from the introductory learning session. The second group, expert and self observation (ESO), viewed the instructional video and observed their own performance from the recorded trial from the pre-test. Students in the ESO assessed their own performance using a checklist and global rating scale. The third group, expert, self, and peer observation (ESPO), viewed the instructional video, their own performance, and a peer’s performance from the recorded trial during the pre-test. Students in the ESPO group were also required to observe and assess the performance using the checklist and global rating scale. The intervention period lasted for 14 days. A post-test and transfer test were then administered to students to test their knowledge. Results indicated that the ESPO group performed better than the ESO and EO groups, and suggest that increasing the amount of interaction with observational learning has a positive benefit and allows learners to apply their knowledge to novel, attention demanding situations. In a similar manner kinesiology students interact with, observe, and informally assess their peers’ performance during laboratory experiences in AATE courses. The addition of an instructional video gives
It is equally important to understand the neurophysiological basis of why observation can serve as an effective form of practice. A new theory in neuroscience states that when we observe the actions of others, we activate the same neural circuitry responsible for planning and executing our own actions (Mattar & Gribble, 2005). This idea referred to as the “mirror neuron system” or more broadly the “action observation network” (AON) has a growing body of evidence to back up their claims. Cross et al. (2009) evaluated the similarities and differences in neural activity and behavioral performance induced by physical training compared with passive observation. Sixteen university students were recruited to participate in one week of dance training and two functional magnetic resonance imaging (fMRI) brain scans. Subjects underwent fMRI during the first day. During this scan subjects watched a video with 18 tracks of models performing a dance sequence with superimposed direction arrows. Next, subjects went through five days of behavioral training where they danced six sequences (three human tracks, three arrow tracks) and watched six sequences (three human tracks, three arrow tracks). On the seventh day subjects underwent a second fMRI and watched the same 18 track video. Pre-training imaging results showed activation of parietal, premotor, supplementary motor, and superior temporal areas. Post-training imaging results showed activation of right premotor and primary motor areas and several regions of right prefrontal cortex. These results demonstrate that there are several areas in the AON that show strong activity when responding to observational and physical learning indicating
that it is possible for participants to learn new actions from passive observation, even without direct instructions to learn the movements they are watching.

Learning Styles

Learning style is another popular topic in the educational field. It refers to the complex manner and conditions under which learners most efficiently and effectively perceive process, store, and recall what they are attempting to learn (James & Gardner, 1995). Just as students are shaped by their unique experiences, cultures, and backgrounds, their individual method of learning tends to vary. Not every student will benefit from one teaching style. In fact, achieving success in education is dependent on the ability to adapt teaching to individual differences in students (Corno & Snow, 1986). Identifying the learning style preferences of students is the first step to developing effective modes of teaching that may result in meaningful learning and knowledge transfer. One of the most popular instruments used to determine learning styles is the VARK. The VARK was developed by Fleming and Mills (1992) and its validity, simplicity, ease of use and abundance of accompanying learning materials make it a popular choice amongst educators and students alike. The VARK measures four different perceptual preferences for the input of information; visual (V), aural (A), read/write (R), and kinesthetic (K) (Fleming, 2001). Visual learners prefer to learn from charts, graphs, and other symbolic strategies, aural learners prefer to process auditory information from spoken lessons and group discussion, read/write learners prefer to learn from printed text, and kinesthetic learners prefers to learn by doing through direct practice.
Lujan and DiCarlo (2006) conducted a study using the VARK inventory to
determine the preferred mode of information presentation of 166 students in their first
year of medical school. Most students (64%) preferred multiple modes of information
presentation. Of those students, 43.4% preferred all four modes of information
presentation. In a similar study conducted by Breckler et al. (2009) the VARK inventory
was used to determine the learning styles of students enrolled in physiology courses.
Over a two year period, a total of 218 students filled out the survey. Results showed that
60% of students preferred a multimodal learning preference, and 40% had one strong
learning preference. Finally, Horton et al. (2012) examined the correlation between
lecture attendance and student performance in an advanced physiology course.
Attendance was not required and subject matter was available in person, online as a
recorded downloadable format, and as typed notes. Student performance was measured
with assessment scores in a variety of tasks such as exams, tutorials, and practicals. The
VARK inventory was also completed by 95 students enrolled in the course. Results
showed that there was no direct correlation between lecture attendance and student
performance. When the date was examined more closely, the authors found several
trends. First, students who attended fewer lectures, but passed the exam reported
significantly greater use of lecture records than students who had a similar attendance but
failed the exam. Similar to the last two studies mentioned, students in this study were
identified as overwhelmingly having multimodal learning styles. These results indicated
that educators can best teach a diversity of students by applying a variety of teaching
methods in the classroom. Introducing learning styles and giving students the opportunity
to identify their learning preference early on, could be help students choose the best
format for gaining knowledge in classroom and self study environments. Using a variety of methods ensures that students have the opportunity to connect with at least one or more of their preferential learning styles. Additionally, using various teaching methods helps maintain students’ interest and meet their individual needs (Gunawardena & Boverie, 1993).

During the last 15 years there has been much interest in Constructivism and designing learning environments that incorporate aspects of this theory. Constructivism has origins in philosophy, psychology, and cybernetics and tries to explain how people know the world (von Glaserfeld, 1989). Though there are competing theories, a common idea of all constructivism is that individuals create meaning out of the world based on their own personal and subjective experiences. Von Glaserfeld (1995) described four basic principles that describe the development, nature, function, and purpose of knowledge. First, knowledge is accumulated from within by a thinking person. It is not inertly received through the senses or by any form of communication. Second, he emphasized that social interactions between learners are key to building knowledge. Third, the nature of cognition produces knowledge that is a sophisticated biological adaptation. Fourth, the purpose of cognition is to organize an individual’s experiential world. This theory gives us significant insight into how students experience meaningful learning and how we should design teaching methods to best meet their needs.

Mayer et al. (1999) pulled from constructivist learning theory’s idea that meaningful learning occurs when learners mentally select relevant information, organize it into coherent representations, and integrate it with other knowledge. Mayer suggests that when using multimedia as a facility for teaching, learners are able to simultaneously
build a verbal and visual representation in their working memory (Mayer & Moreno, 2002). As educators our goal is not to have students memorize facts, figures, and information, but rather to promote meaningful learning and a transfer of knowledge and skill acquisition to new problems, questions, and subjects. For it is only when information becomes meaningful that information truly turns into learning. A study by Deakin and Proteau (2000) tested the interaction effects of observational and physical practice. In the experiment 60 subjects were tested on their ability to complete a puzzle task. Subjects were randomly assigned to one of five groups that each had varying amounts of observational and physical practice; 100% physical, 100% observational, 50% observational, 75% observational, and control. Results showed that participants who received any amount of physical practice in addition to observational practice attained higher performance scores than participants who only received observational practice. Once participants physically interacted with the task, the full benefit of observational practice appeared. The functional significance of the cognitive representation, formed during observational practice, remained inaccessible until after the subject had physically interacted with the task. These results in conjunction with constructivist learning theory suggest that learning becomes meaningful when participants are able to form multiple cognitive representations from the task situation.

**Student Engagement**

Educators focus much of their time on developing teaching methods and a classroom environment that fosters student success. Ultimately success is not measured by grades or passage rate, but by the ability of students to take information, create a
meaningful interpretation of it, and apply it to their individual educational and career goals. Kuh et al. (2011) suggested that student success should be broadly define to include aspects such as academic achievement, engagement in educationally purposeful activities, satisfaction, knowledge acquisition, skills and competencies, post college performance, persistence, and attainment of educational objectives. Defining engagement is perhaps, as complex as the feat itself. Handlesman et al. (2005) identified four factors that play a strong role in student engagement: skills engagement, emotional engagement, participation/interaction engagement, and performance engagement. The four factors were described as follows: skills engagement is the ability to excel and put forth effort toward an assignment or activity; emotional engagement is virtually invisible but consists of students investing on a personal level by taking information and making it meaningful and purposeful to his or her educational and professional goals; participation engagement is the participation and interaction of the student with peers and educators; lastly, performance engagement is gauged on final grades and overall academic success. Student engagement has a direct and powerful effect on student learning and success. If students are not engaged in the university experience it is likely to affect their academics and the likelihood of returning the following year (Kuh et al., 2008). Students who reported being engaged in their academics not only had higher grades, but were more likely to return during the second and last years of college. Student engagement is also positively correlated with higher degrees of critical thinking and academic success (Carini et al., 2006). Then again, engagement is not the sole responsibility of the student; educators ultimately set the example of engagement and accountability for learning. As educators it is important to think about the needs and preferences of our students.
Students are more likely to engage if they feel supported by teaching staff who engage with students, the subject, and with the teaching process (Bryson & Hand, 2007). Additionally, student engagement is fostered when students are provided with opportunities to demonstrate their learning beyond the classroom in research, internships, service learning, and learning communities (Miller et al., 2011).

Kuh et al. (2008) conducted a study to determine the relationships between student behaviors and conditions that foster student success. The National Survey of Student Engagement (NSSE) is an instrument that measures student participation in educationally purposeful activities. Researchers combined NSSE results from 18 universities to student demographic and academic data. They found a strong positive correlation between student engagement levels, grade point average, and persistence to return the following year. When students are required to take responsibility for activities that require daily decisions and tasks, they become invested in the activity and more committed to the college and their studies (Kuh et al., 2008). When kinesiology students are provided with the opportunity to apply AATE techniques taught in lecture to clients in a clinical setting they consequently accept responsibility for the wellbeing of another person. This experience not only makes their learning experience more meaningful, but keeps the student engaged in their academics and college.

Another study by Laird and Kuh (2005) examined the effect of information technology (IT) on effective educational practices such as class presentations, community-based projects, and faculty collaboration. Additionally, their second objective was to determine if IT was its own form of engagement, or rather a mechanism that students use to reach other engaging activities. Data sources came from approximately
60,000 university student responses to the NSSE. Another survey, The College Student Report, was used to identify how much time students spend in effective educational practices and how students characterize their relationships with people on campus. Results found that 73% of freshman and 69% of seniors spent more than five hours per week online for any reason, and 38% of freshman and 39% of seniors used IT for academic purposes. Over half of all students combined frequently used IT to communicate with peers to complete academic work. Another interesting finding from this study found that when instructors used IT in class students were 18% more likely to work in groups outside of class compared to students whose instructors did not use IT in the class. These results indicate that when educators use IT in their classroom as an instructional method it has an influence not only on how students use IT, but more importantly on their engagement levels, active and collaborative learning.

Technology and Teaching

Integration of technology in the teaching environment has gained significant popularity in today’s technology infused world. As previously discussed, research in learning styles has shown that students prefer multimodal forms of teaching. Students with visual learning style preferences show a positive association with aural and kinesthetic styles as well (Drago & Wagner, 2004). When educators integrate technology and video into their instruction, students perceive this as an enhancement to their learning and a more effective medium than text. Additionally, students report more confidence in their ability to transfer the learning to new contexts (Choi, 2007). Incorporating
technology to enhance teaching environments is proving to be a beneficial option for educators who want to reach and engage more students, and for students who require multiple formats of information to construct meaningful interpretations of information.

Choi and Johnson (2007) conducted a study to identify the effects of video instruction on student satisfaction, comprehension, and retention. One hundred forty seven (147) students were randomly assigned to a problem based video instruction group (PBVI), a problem based text instruction group (PBTI), or a PBVI group without discussion. Students were given a problem based question in a text or video format and instructed to collaborate with peers to solve real life problems. One group was not instructed to collaborate with peers. This allowed researchers to isolate the individual components of each group during data analysis. Student satisfaction was measured with a survey questionnaire with a 5-point Likert scale. A quiz was given at two different times to measure comprehension and retention. Students in the PBVI group had higher scores for learner satisfaction, comprehension, and retention compared to the PBTI group. This study indicates that students benefit from video instruction in both subjective and objective measurements.

Carle et al. (2009) conducted a quasi-experimental pilot study to examine the effect of a technology enhanced classroom (TEC) and a control classroom on student engagement and academic achievement. Twenty-five (25) students were evenly distributed between two sections of an undergraduate psychology course. Class content consisted of short lectures, class discussions, writing assignments, midterms, and final exams. Students enrolled in the TEC were given access to recorded lectures and group discussion that could be listened to on portable audio devices. Achievement was
objectively measured by average grades on assignments, papers, exams, and final grades. Engagement was measured using an anonymous 4-point Likert scale survey of classroom engagement at the end of the semester. The TEC was more engaged in the course as evidenced by increased note taking, participation in class discussions and reviewing of notes prior to class meetings. The TEC also had 18% higher grades on assignments compared to the control classroom.

Technology has proven to be a beneficial tool to increase student engagement and academic achievement in the classroom, but how technology is designed also plays a role in the ability of students to process and understand information. Richard Mayer has done much work in the field of teaching and multimedia integration and created a cognitive theory of multimedia learning (Mayer & Moreno, 2002). The cognitive theory of multimedia learning is based off of ideas from dual coding theory, cognitive load theory, and constructivist learning theory. The main premise of cognitive theory of multimedia learning is that meaningful learning occurs when learners select relevant words and images, organize them into coherent visual and verbal representations, and connect it with existing mental representations. Mayer has tested and has identified several interesting factors that can help educators design effective multimedia instructional materials. Through a series of randomized control studies Mayer and colleagues have found that learners are able to retain and transfer knowledge best when animation and narration are presented simultaneously rather than in a successive manner (Mayer & Anderson, 1991, 1992). Adding additional words or sounds, with the purpose of making a presentation more interesting, was found to be less effective than multimedia designed with concise animation and narration (Mayer et al., 2001; Moreno & Mayer, 2000).
Students in the concise group generated more solutions on problem-solving transfer test than students in the embellished group. During video animation, presenting information as a narrative was more effective than on-screen text (Mayer & Moreno, 1998; Moreno & Mayer, 1999). However, including on-screen text should be considered as an optional feature for students with hearing loss or learning disabilities who might not be able to effectively process aural information. Finally, findings by Mayer et al. (2001) found that presenting too many forms of information can be overwhelming to the cognitive system. Students who learned from animation and narration only generated more solutions to problem-solving transfer tests than students who learned from animation, narration, and on-screen text. These findings are important and should be considered when instructors are designing multimedia instructional materials. Furthermore, when this AATE instructional video reached post-production stage, captions were not added in an attempt to create the most effective learning experience for students.

Chapter Summary

In this second chapter, a review of the literature was conducted on several topics that validate the need to develop an instructional video for AATE. A brief history of several AATE techniques was presented, as well as several studies that prove the importance of AATE techniques in the rehabilitation of people with disabilities. Within the main idea of motor behavior, several sub-sections were researched. Topics of interest included: motor learning theories, learning style research, student engagement, and use of technology in teaching.
CHAPTER THREE

METHODS

Introduction

Use of technology in the classroom has many beneficial effects including, improved learner satisfaction, comprehension, retention, and academic success (Choi & Johnson, 2007). In particular, video instruction provides a less stressful, consistent, cost effective form of instruction that allows students to practice complex skills without the risk of failing or harming real clients (Overbaugh, 1996). The opportunity to observe and interact with a video resource could decrease feeling of performance anxiety and allow a student to become comfortable and confident with their skills before actually performing them on clients. This project focused on the creation of an adapted aquatic therapeutic exercise (AATE) instructional video for the use of faculty and students in the Department of Kinesiology at California State University, Northridge, to encourage student engagement in the classroom, improved academic achievement and skill acquisition. Instructors currently use the combination of lectures, lab experiences and a hard copy manual to teach AATE techniques. While the hard copy manual is helpful in some ways, it is unable to depict the fluidity, timing, and complex movements of AATE techniques. The purpose of this project was to create a supplemental instructional resource that stimulates classroom engagement. The study was guided by several research questions: What factors influence the acquisition of learning complex motor tasks through observational learning? What learning styles do kinesiology students prefer? What elements of technology can be used to create a video to improve classroom engagement.
and academic success in AATE courses in the Department of Kinesiology at California State University, Northridge?

This chapter explains the methods used in the creation of this project in the following sections: (a) Population and Sample, (b) Instrumentation, (c) Procedures, and (d) Collection of the Materials and Conditions for Inclusion.

Population and Sample

When this video was created in August 2011, the intended audience was students enrolled in Kinesiology 313 or 451 courses at California State University, Northridge. Prior to this project, students were utilizing information given to them through class lectures, hands-on laboratory experience, and a printed manual of AATE. The purpose of creating an instructional video of AATE techniques was to better engage students in their course material so that they succeed in their class and ultimately their program. Using an instructional video to supplement teaching procedures already in place would provide students with a multimodal method of gaining information, and being able to retain and apply that knowledge in laboratory and clinical settings. To create this video, models were specifically selected to demonstrate AATE techniques to be included in the DVD. Models were chosen based on their prior educational knowledge and clinical experience in AATE. Individuals from the COA staff and/or graduate students enrolled in the Adapted Physical Activity program were asked to participate in filming. Models of differing genders and ethnicities were chosen to represent the diversity that exists on the
California State University, Northridge campus. All models were volunteers and were not compensated for their time. Later, each model was given a copy of the finished product.

Instrumentation

Filming for this project began on August 9, 2011 and concluded on August 18, 2011. Prior to beginning filming, pools and equipment needed to be obtained. The main therapy pool at the COA was reserved around clinical service times, as to not disturb clients’ therapy schedules. The main therapy pool was chosen for its water depth and physical structures for which filming equipment could be attached. The video camera and equipment used was purchased by the author prior to filming. A Fujifilm XP20 camera (Figure 1) was chosen for its ability to record high-definition underwater images, ease of use, and affordability. A Joby Gorillapod Flexible Tripod (Figure 2) was purchase by the author and used to create a stable filming base for the camera in a non-gravitational aquatic environment. Video files and pictures were recorded on a 4GB SD card and transferred to a notebook computer after each filming session.

The three techniques being filmed for this project were Watsu, Bad Ragaz, and Ai Chi as they tend to have the greatest degree of difficulty and complexity of all the AATE taught in the Kinesiology 313 and 451 courses. Video clips were categorized by individual movements within each technique. Video and still images were edited and converted to a DVD and uploadable format to be able to post on online web–enhanced classroom forums such as Moodle. This provides instructors the option to choose when to release or post sections of the video. Some students may become overwhelmed when they
watch the video clips if they have not had any prior instruction or background on the techniques.

Procedures

Models were recruited through the COA and Department of Kinesiology at California State University, Northridge. Individuals were eligible to participate in the project if they were 18 years of age or older, had worked or volunteered at the Center of Achievement and/or current graduate students in the Department of Kinesiology, had been trained in and taken AATE courses, and were physically able and available to participate in a 60 minute filming session 2-3 times a week. Individuals were excluded to participate in this project if they were not able to sign a release form for the use of their images, or had any medical conditions that precluded participation in an AATE program. Models signed a video/audio image release form (Appendix A), authorizing the use of their image and their scene for this project prior to the filming procedure. Based on suggestions by Lim et al. (2009), five stages were followed in order to maximize organizational and production efficiency and effectiveness: (1) development, (2) preproduction, (3) production, (4) post-production, and (5) distribution.

Development consisted of setting goals for the final product, selecting AATE techniques, organizing a production team, meeting with information technology personnel to discuss editing and production, and script development. Watsu, Bad Ragaz, and Ai Chi were selected to be filmed based on their complexity, degree of difficulty, and usefulness in the clinical setting. To minimize risk and safety hazards a certified lifeguard
was scheduled to be present during all film sessions and models were required to wear safety equipment (flotation devices, water shoes, etc.) when necessary. A meeting was arranged with Media Production Specialist in the Academic Technology Department to discuss details concerning filming and editing video scenes. All equipment was approved for formatting and editing purposes.

During preproduction a filming schedule was created and verified with personnel in the COA to confirm that there would not be scheduling conflicts with class or lifeguard schedules. All models and members of film production also verified their availability with the filming schedule. A rehearsal day was scheduled to test filming equipment and to practice all AATE techniques that would be filmed over the following two weeks.

The production stage started on August 9, 2011 and concluded on August 18, 2011. A lifeguard was present for all rehearsal and filming sessions. Filming was kept to 60 minute increments, 2-3 days a week. Models were allowed to take rest and water breaks as needed. Since there were multiple AATE techniques being filmed during this period, filming was kept organized by using a video log of all scenes that had been filmed.

Collection of the Materials and Conditions for Inclusion

Video clips were routinely transferred to a notebook computer, given titles, and reviewed to check for quality. After filming had concluded all models attended a film review session to approve all images and minimize the risk of potentially embarrassing images. After team approval, all pictures and video clips were given to the Media
Production team in the Information Technology Department to be edited. A meeting was set up with Media Production team to discuss the editing and production goals of the project. Project goals for the DVD were revisited. Each scene was examined and the best clip was chosen for the final product. Clips were selected based on the following criteria: fluidity, video quality, and the lack of errors. It was agreed upon that all media clips would be stripped of sound and cut to two full range of motion movements. Narration of directions for movements and breathing were recorded and matched up to their associated video clip. An option to show on-screen text or captioning was added to enhance the learning experience and meet the needs of potential students with impaired hearing or learning disabilities (Mayer & Moreno, 2002). Video clips were organized by AATE technique: Watsu, Bad Ragaz, Ai Chi, and then by picture or video files. Videos of individual movements of each technique were then listed as chapters under the video files. The video included the ability to pause, stop, and replay any clips. A credits chapter was created introducing the author, editor, and supervising members on the project committee. The university affiliation and title were also included in this section. The final portion consisted of the ending credits. This section acknowledged all the models and those who participated and helped in the planning, filming, and production of the project. The final video project was then exported to a DVD and shown to the academic thesis committee for approval. Once approved the file was exported to a DVD and web format.

Finally, the distribution stage consisted of giving faculty access to the file to use in their AATE courses. The option of a DVD and digital format allows instructors to control the amount of information they wish to expose their students to at one time. Individual techniques could be uploaded to their class website or Moodle page. This
option also allows instructors to keep track of the frequency and duration that student actually access the video. Conversely, a DVD format would provide students with a comprehensive reference to refer back to at their discretion once they have mastered the techniques.

Chapter Summary

This chapter discussed the methodology, a step-by-step process of the creation of this project. First, the audience and sample of whom this project would be targeted towards and how participants were selected. Next, the instrumentation and equipment used during filming were listed. The procedures address conditions for inclusion and detailed the five stages of digital video creation: development, preproduction, production post-production, and distribution. Chapter four includes the presentation of the DVD/web-component of this project.
CHAPTER FOUR

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The rising rate of disability and obesity in the United States has boosted public interest in the importance of health, wellness, and fitness and the need for preventative and interventive care. Departments and professors have the responsibility of teaching and preparing students to go out into the work field as professionals who can use their knowledge, expertise, and experience to combat and treat these epidemics. Furthermore, one of the major focuses in higher education has been on the integration of evidence based theory and hands-on learning experiences into classrooms.

The Department of Kinesiology at California State University, Northridge offers courses in land and aquatic based adapted therapeutic exercise. These courses offer an invaluable combination of instruction and hands-on experience; however, the learning experience could be enhanced further by providing professors with an instructional video to be used in collaboration with resources that already exist. Integration of technology in the classroom has been shown to increase student confidence, satisfaction, academic achievement, and engagement (Choi, 2007; Choi & Johnson, 2007). Motor learning research supports observational learning as an effective means for skill acquisition. Early work by Bandura and Ross (1961) established that visual demonstration is one of the most powerful agencies of transmitting patterns of behavior and thought. Furthermore, the use of video instruction has proven to be more effective than text-based instruction methods (Choi & Johnson, 2007). The use of an instructional video allows instructors to
connect information with a variety of learning styles. The majority of students in medical and science based fields are multimodal learners and require a variety of teaching styles to facilitate meaningful learning (Breckler et al., 2006; Lujan & DiCarlo, 2006). It is important to design instructional methods and materials that serve the various learning styles and cognitive needs of students. An objective to this project was also to incorporate elements of technology to create a supplemental instructional video to be used in adapted aquatic therapeutic exercise courses. The study was guided by the research questions: What factors influence the acquisition of learning complex motor tasks through observational learning? What learning styles do kinesiology students prefer? What elements of technology can be used to create a video to improve classroom engagement and academic success in AATE courses in the Department of Kinesiology at California State University, Northridge?

Summary

As a part of this project, the previous three chapters discussed the different aspects of AATE, motor learning, teaching styles, student engagement, technology and teaching and the creation of an instructional video for Kinesiology 313 and 451 courses at California State University, Northridge. Chapter One consisted of an introduction to AATE and concepts based in motor learning theories. The role of technology and its connection to student engagement was provided. Next, the DVD component and its function were described along with the benefits it would bring to AATE courses. The statement of the problem and purpose of the project were presented. The research
questions were then listed. Relevant terms were defined so readers could understand ambiguous terms or those which could be used in multiple contexts. The assumptions for this project were listed, and the limitations and delimitations were outlined. Lastly, the significance of this study and how it would be useful to students, faculty, and the Department of Kinesiology were provided.

In Chapter Two, a review of the literature was conducted on several relevant topics including AATE, motor learning, learning styles, student engagement, and technology in teaching. Each section included a general overview of associated theories and several detailed examples of individual studies related to the subtopic. Chapter Three focused on the methodology, a step-by-step process from start to finish of the creation of this project. Included in this chapter was the population and sample, and how models were selected. Next, the instrumentation and equipment used in the creation process were provided. Procedures of creating the video followed a five-stage model to maximize organizational and production efficiency. The stages were: (1) development, (2) preproduction, (3) production, (4) post-production, and (5) distribution. Finally, collection of the materials and conditions for inclusion of video clips used in the project were discussed.

**Conclusions**

The final stage for completion of this project is the dissemination of the new instructional video. The video will be made available in DVD and digital file formats. This will allow faculty to post sections of the instructional video online as they discuss
and practice each technique in class. The hope for this instructional video is that it will be used as a supplemental instructional resource, in addition to lecture and lab components. There are some situations such as illness, open wounds, and family or personal emergencies, where students are not able to participate in the lab portion of class. Having access to a video of techniques could stand-in for the missed experience, as well as serve as a study tool. The use of technology will provide students with a modernized version of the manual for practicing and learning AATE techniques.

**Recommendations**

For future versions of this project, the techniques filmed could be expanded to include arthritis program, Halliwick, deep water, BackHab, and proprioceptive neuromuscular facilitation. Watsu, Bad Ragaz, and Ai Chi were chosen for this project because they tend to be the most complex and involved techniques. Time constraints and availability of the therapy pool also had an effect on the amount of filming the author was able to complete.

Another possible recommendation for future versions would be to create a set of unlabeled and incorrect movements to be used as testing resources. Instructors could ask students to view and identify the movement being completed, or identify which movement would come next in the sequence. Students could also view and evaluate improper techniques and identify what aspects of the movement was incorrect and why.

Depending on available filming equipment, pool availability, technology competency level, and AATE skill level, students could potentially create their own
instructional video of AATE techniques. This would provide students with a hands-on opportunity to solidify their knowledge and develop problem-solving and planning skills.

The editing phase of this thesis project did not always go as planned. Video design and layout was dependent upon the software available in the media production department. I recommend that people interested in creating their own instructional video meet with media production staff and thoroughly discuss their vision. Editing equipment and software may not always be able to create a product identical to one’s vision.

Finally, I propose the initiation of a research study to examine the effects of implementing this instructional video in AATE courses on student confidence, satisfaction, classroom engagement, academic achievement, and skill acquisition. Information of instructor opinion of the instructional video could also provide important insight into faculty attitudes of integrating technology in the classroom. A quasi-experimental design is suggested, where two AATE courses receive traditional instruction, and the other two courses receives traditional instruction with the instructional video. A research study could validate the hypothesis that implementation of this project was beneficial to student engagement, confidence, satisfaction, academic success, and skill acquisition.

Chapter Summary

In this final chapter, a summary was provided of the details and process required to create this project. Summaries of the previous three chapters were given which included: Introduction, Review of the Literature, and Methodology. A section on the
conclusions was included. Lastly, recommendations were made that included suggestions for future expansion of this project and a subsequent research study using the instructional video.
REFERENCES


APPENDICES

Appendix A - Audio/Visual Release Statements

Appendix B - Figures
Visual/Audio Image Release Form

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I am at least 18 years of age and competent to sign this release. I have read this release before signing, I understand its contents, meaning and impact and I freely accept the terms.

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Printed Name                                                Date

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Signature                                                  Telephone or email address

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Parent or Guardian if under 18 years of age                  Address (optional)

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APPENDIX B