University of Alberta

The Use of Mental Imagery by Physical Education Teachers

by

Nathan Derek Hall

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DEDICATION

To my wife, Sarah,

and my parents, Craig and Dianne

ABSTRACT

Researchers have reported that people in many professions (e.g., professional athletes, coaches, law enforcement officers, family physicians and surgeons) commonly employ mental imagery and find it to be a useful aid when completing the behaviours common to their profession (Hall, 2001; Jedlic, Hall, Munroe-Chandler, & Hall, 2007; Edwards, Sadoski, & Burdenski, 2005). Recently researchers have encouraged the investigation of mental imagery use among physical educators (Hall & Fishburne, 2010). However, there has been no research to date on mental imagery use by physical education teachers. Therefore, the purpose of the present study was to investigate the use of mental imagery by those who teach physical education.

Bandura's (1986) Social Cognitive Theory and Paivio's Analytic Framework of Mental Imagery (1985) were used as a foundation for this research. Consequently, this research focused on the teaching behaviours and self-regulatory behaviours of physical educators, and the possible use of the cognitive and motivational functions of mental imagery to aid in these behaviours. A basic qualitative study methodology (Merriam, 2009) was employed as a means of completing this investigation.

Fifteen teachers who specialized in teaching physical education at the middle or secondary school grade level participated in this research. A convenience sample of participants was recruited from schools in both Alberta and Ontario using the snowball sampling effect (Patton, 1990). The participants varied in gender, age, years of teaching experience, grade(s) presently taught, and

gender of students taught. Each physical education teacher who participated in the study completed a one-on-one semi-structured interview, as well as, a short demographic questionnaire. Following data collection thematic coding of the data was completed.

The results demonstrated that the physical education teachers in the present study were employing mental imagery to aid in many of the teaching behaviours and self-regulatory behaviours that are common in their profession. In addition, the participants indicated that they used the cognitive function of mental imagery more commonly than the motivational function of mental imagery. Furthermore, most of the participants perceived mental imagery to be a beneficial skill, and yet the use of mental imagery by the participants was completely unstructured (i.e., never planned). These results have potential implications for both present physical education teachers and also physical education teacher education programs.

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CHAPTER ONE – INTRODUCTION TO THE STUDY

One of the key components to any physical education program is the physical education teacher. Teaching physical education is different from teaching most other subjects because physical education focuses on students' acquisition and development of motor skills rather than verbal-academic skills (Tan, Schempp, & Schwager, 1996). Teaching requires individuals to complete many different tasks as part of their day-to-day professional responsibilities. Rink (2006) refers to several teacher functions or behaviours that a physical educator usually completes as part of their every day work. Some key examples include assessing student learning, developing and sequencing content, and providing instruction. To aid in the effective performance of these teaching behaviours there are many skills that a teacher can employ and improve upon (Mawer, 1995). One skill that teachers may be using to help effectively perform some of the behaviours associated with teaching physical education is mental imagery (Hall & Fishburne, 2010), and consequently mental imagery is the focus of the present research.

There is growing concern about the many health problems (e.g., type 2 diabetes, cardio vascular disease, and hepatic steatosis) associated with increased obesity and physical inactivity among children and adolescents (Canadian Fitness and Lifestyle Research Institute, 2008; National Center for Health Statistics, 2005), and consequently attention directed towards school-based physical education programs has been on the rise over the past decade. This is because school-based physical education programs can act as one of the principle methods

for promoting youth physical activity (Sallis & McKenzie, 1991). Increasing knowledge with respect to all aspects of physical education programs has become very important as this may help to improve physical education programs, and in turn hopefully help battle the youth inactivity trend. One of the key components to any physical education program is the physical education teacher. Thus, understanding what physical education teachers do to help make themselves more effective in their profession is an important step in improving the overall understanding of physical education and ways in which it might be improved.

Some skills performed by physical education teachers are fairly easy to identify (e.g., communication skills when providing instruction) while others, especially cognitive skills such as goal setting, focusing attention and mental imagery may be less obvious. Identifying these less obvious skills and increasing our knowledge of how they are used could prove very beneficial to both researchers and practitioners. Mental imagery, investigated in the present research, is a volitional process where an individual creates or recreates an experience in his/her mind through use of one or any combination of all the senses (White & Hardy, 1998). Enhancing the understanding of the use of this skill by physical education teachers will inform present and future physical education teachers of how they can most effectively employ mental imagery to aid their own teaching.

Purpose of the Research

Researchers have found that mental imagery is employed in many different professions to help with the performance of job related behaviours.

Specifically, it has been reported that mental imagery is being used in coaching (Overby, Hall, & Haslam, 1997), law enforcement (Whetstone, 1996), professional athletics (Morris, Spittle, & Watt, 2005), merchandise product design (Dahl, Chattopadhyay, & Gorn , 1999), computer programming (Petre & Blackwell, 1999), music (Gregg, Clark, & Hall, 2008), and medicine (Edwards, Sadoski, & Burdenski, 2005) to help some of the individuals in those professions perform the specific tasks that are part of their day-to-day professional responsibilities. However, there has been no research to date that has specifically examined the use of mental imagery to help physical educators perform the behaviours required as part of their profession. Hall and Fishburne (2010) proposed that mental imagery is a skill that could be used by those in the physical education teaching profession to aid in the effective performance of several teaching related behaviors and they promoted future research that would help create an understanding of this phenomenon.

Therefore, the overall purpose of this study was to develop a theoretical and practical understanding of mental imagery use by physical education teachers. Hence, this research explored (a) the teaching behaviours for which physical education teachers use mental imagery and their perceptions of why they use mental imagery for those teaching behaviours; and (b) the specific characteristics of physical education teachers' mental imagery use (e.g., when they use mental imagery, the type of mental imagery they use, and the content of their mental images).

By completing this detailed exploration of mental imagery use by physical education teachers, this research provides a foundation for future studies into this phenomenon. At a time when considerable attention has been given to physical education and those who teach it, this research will help to inform physical education teachers, teacher educators, and pre-service teachers about the role that mental imagery can play for those who teach physical education.

Research Questions

The overall specific research question and the resulting sub-questions for this study were developed to coincide with the purpose of the study. That said, these questions evolved over time from communication with other researchers in the field of physical education, my previous research as a Masters student and as a research assistant on mental imagery studies, ongoing professional reading, and from my own lived experiences as a physical education teacher and as a physical education teacher educator. Additionally, several of the specific sub-questions have evolved from the theories and literature used as a foundation for this research (see Chapter 3).

The overarching research question for this study was: "What role does mental imagery play for those who teach physical education?" To specifically address this research question in explicit detail the following sub-questions were developed.

1. For what functions (i.e., cognitive, motivational) do physical education teachers use mental imagery?

2. How is mental imagery used by physical education teachers with regards to the specific behaviours involved in their profession and what are the characteristics of this mental imagery use?
3. How is mental imagery used by physical education teachers with regards to any of the self-regulatory behaviours that are undertaken when teaching physical education and what are the characteristics of this mental imagery use?
4. How structured (i.e., is it scheduled or not) is the use of mental imagery by those who teach physical education?
5. What are physical education teachers' perceptions with regards to the benefits of using mental imagery for the behaviours and self-regulatory behaviours involved with teaching physical education?

The Researcher

Creswell (2009) suggested that an individual conducting qualitative research typically identifies their biases and personal background, as these may shape the researchers' interpretations that are formed over the course of the study. Thus, in this section I describe my personal background and biases that are specifically related to this research on the use of mental imagery by physical education teachers.

I have been interested in mental imagery ever since I was completing my Bachelors of Arts in Kinesiology at the University of Western Ontario. At that time, I was introduced to mental imagery through my participation in undergraduate sport psychology courses. Furthermore, as a member of the varsity

track and field team I also worked with a sport psychologist who encouraged me to use mental imagery in training and competition. As a result of these experiences I developed a strong belief in the benefits of using mental imagery, especially with regards to using it for improving performance on a physical task and for motivational and relaxation purposes.

In my lived experiences as a physical educator, I often have found myself using mental imagery to help me teach. Whether it was using mental imagery to help me visualize what a physical skill should look like before I taught it or how to set up the gymnasium for a specific activity, I regularly found mental imagery to be useful. I personally believe that mental imagery has helped me to be more organized as a teacher and allowed me to provide better planned lessons and physical skill instruction to my students. However, through discussions with other physical educators and during my instruction of pre-service physical education teachers I came to the belief that not all individuals use mental imagery for these purposes and some do not use it at all. Specifically, I came to believe that one of the reasons some individuals may have difficulty with certain parts of teaching physical education (e.g., providing instruction on specific physical skills, planning an effective activity that will work in a specific space, preparing for safety issues in a lesson, etc.) is that they struggle with using mental imagery or simply do not use mental imagery for these purposes.

I personally believe that the best way to improve the quality of physical education programs is to improve the quality of those teaching physical education classes. Therefore, I feel that present and future physical education teachers can

benefit from better understanding of all the possible skills that assist them in becoming more effective teachers. Based on my own positive personal experiences with using mental imagery and my experiences with pre-service physical education teachers that seem to struggle due to a lack of mental imagery, I believe that mental imagery is a skill that needs to be clearly understood as it pertains to those teaching physical education. This is what led me to focus my dissertation on the concept of mental imagery use by physical education teachers

Definitions

For the reader to have a better understanding of this research there were several terms that needed to be defined clearly. Specifically, in the context of this research the following definitions were applied:

Mental Imagery: White and Hardy (1998) comprehensively defined imagery as a volitional process where an individual creates or recreates an experience that imitates a real experience, and that we can be conscious of 'seeing' an image of smell, tastes, or sounds without actually experiencing the real thing. In addition, White and Hardy suggested that an image differs from a dream in the sense that we are awake and conscious when we create an image. Furthermore, White and Hardy suggest that mental imagery differs from mental rehearsal in the sense that mental imagery is a process, whereas mental rehearsal is the technique of utilizing imagery to mentally practice an act (p. 28). For the purposes of this research, White and Hardy's definition of mental imagery was applied.

Teaching Behaviours: Bandura (1997) suggested that behaviour refers to the actions of a person, usually in relation to his or her environment. Based on this

definition or understanding, in the present research "teaching behaviours" were contextualized as the actions completed by a physical education teacher that are completed as part of teaching students physical education.

Self-Regulatory Behaviours: Self-regulation is a multidimensional concept that involves controlling or aiding in one's own behaviour (Bandura, 1997). Therefore, in this research the term self-regulatory behaviours was used to describe actions that were undertaken by physical education teachers to help them control or better perform the specific behaviours they personally completed as part of teaching physical education.

Instructional Episode: Branch (2008) described an instructional episode as:

> "A set of events which form a discrete teaching-learning session (instruction). The instructional episode is a complete entity onto itself, yet, part of a larger scheme. The instructional episode is predicated on specific, negotiated expectations of the learner"
> (p. 22).

Positive Learning Environment: Graham (2001) discussed creating a positive learning environment as opposed to the term "Classroom management". Mawer (1995) suggested that maintaining a positive learning environment in physical education includes finding ways to keep students motivated towards learning, minimizing off task behaviour, dealing with inappropriate behaviour, and managing the environment to optimize time spent there. Thus, based on Graham (2001) and Mawer (1995) the term positive learning environment was used in this study as an overriding term that includes issues of ensuring active student involvement, discipline, controlling the learning environment to maximize learning and participation, and motivating students to learn and participate.

Assessment and evaluation: The terms assessment and evaluation, are often used interchangeably (e.g., Fishburne, 2005; Rink, 1993), and thus have been used interchangeably in the present research. Therefore, throughout this research, assessment was conceptualized as the collection and distribution of reliable information to help improve performance, as well as judgements that are made about the merit of a performance (Siedentop & Tannehill, 2000).

Reflection: The reflection process in teaching physical education has often been endorsed in the literature (e.g., Fishburne, 2005; Rink, 1993). Throughout the present research, reflection has been viewed as a process undertaken by teachers which involves a thoughtful personal examination of what occurred while teaching, why these things occurred, what were the benefits or drawbacks of these occurrences, and how might they influence future teaching.

Themes and Sub-Themes: This study employed both the terms themes and sub-themes. Creswell (2009) uses the terms theme and category interchangeably and basically suggests that these are groupings of similar meaning units and represent an overall major finding. The smaller and more specific groupings within the themes have been termed sub-themes.

Meaning Unit: When coding data from interviews the researcher often goes through the transcripts and identifies important parts of the text, which in the present study have been termed meaning units. For the purposes of the present study, the following definition of meaning unit was utilized.

> These are coherent and distinct meanings embedded within the protocol. They can be composed of any number of words. One word may constitute a meaning unit. Several sentences may also constitute a unit. A meaning unit may contain a complex idea. It simply must be coherent and

> distinctive from other ideas. The meaning unit must preserve the integrity of the idea being expressed. It must neither fragment the idea into meaningless, truncated segments nor confuse it with other ideas that express different themes. (Ratner, 2002, p. 169).

Contribution of the Research

Although Hall and Fishburne (2010) have proposed a need for mental imagery research in the physical education teacher profession and there is research regarding the use of mental imagery in many other professions (e.g., Dahl et al., 1999; Edwards et al., 2005; Overby et al., 1999; Whetstone, 1996), there is no specific research existing on mental imagery use among physical educators. Consequently, the present research was intended to address this lack of information and create a foundational body of knowledge for future studies regarding the use of mental imagery by physical education teachers.

Graham (2001) has suggested that a "Good Teacher" acquires a range of skills that will help the teacher develop and deliver lessons that are meaningful and worthwhile for students. Furthermore, he suggested that our understanding of these skills and how they can be used is always continuing to grow. The present research will contribute to this growth by creating a better understanding of using mental imagery as a skill involved with teaching physical education. This research will help to inform physical education teachers, teacher educators, and pre-service teachers about the role that mental imagery can play in the behaviours related to teaching physical education.

In addition, it was hoped that this research would promote dialogue and interest in the possible uses of imagery in the area of physical education in general and especially with respect to its use by physical education teachers. Specifically,

this study may provide possible ideas regarding how physical education teachers can employ mental imagery to aid in the performance of the behaviours and self-regulatory behaviours that are completed by physical educators and thus improve their overall teaching effectiveness.

Organization of the Thesis

The rest of this thesis document has been divided into seven chapters. Chapter Two is a review of the relevant literature important to the present research. Specifically, Chapter Two reviews the literature on teaching physical education, the general development of the concept of mental imagery, the prevalence of mental imagery use in professions other than teaching, and mental imagery research and applications in education. Following this, Chapter Three describes the development of a model upon which the foundation for the present research was built. This includes a detailed description of the theories upon which this model was based (i.e., Social Cognitive Theory and Imagery Theory) and also the physical education literature used to support the model. The methodology for this research is presented in Chapter Four. In particular, this chapter describes the philosophical position from which this research was conducted, the study participants and procedures, steps taken to ensure trustworthiness, and also the limitations of this study. Subsequent to this is Chapter Five, in which the results of the study are presented. Here the themes and sub-themes that emerged while coding the data, as well as the corresponding coding tree, are presented. Next, Chapter Six is a discussion of the results. Specifically, examples from the interviews and existing literature are used to help

support my personal interpretations of the results. The final chapter (Chapter Seven) is a concluding chapter that summarizes the study. It includes discussion related to the importance of the findings, practical applications of the findings, and possibilities for future research related to mental imagery use by physical education teachers.

CHAPTER TWO – REVIEW OF THE LITERATURE

Once the topic of mental imagery use by physical education teachers was selected, it became important for me to complete a review of the literature that related to this topic (Creswell, 2009). The reasons for completing this review of the literature were (a) to increase my own knowledge with respect to the major areas being studied (i.e, skills involved in teaching physical education, mental imagery use); (b) to allow the reader to relate the present research to the larger ongoing dialogue in the literature; (c) to help fill in a gap and extend previous literature; and (d) to build the foundation for the present research and create a benchmark for comparisons to be made to other studies. These reasons coincide with the suggestions made by Miller (1991) regarding the purposes for completing a scholarly literature review in any study.

To best address reasons (a) and (b) discussed in the previous paragraph this chapter was divided into the two major areas of literature that were examined. More specifically, this chapter examines the literature focusing on the teaching of physical education and the literature focusing on mental imagery that related to the present research topic.

Teaching Physical Education

To conduct research regarding physical education teachers it was important to understand what a physical education teacher is and what actions they do as part of their profession. A teacher is defined as someone who imparts knowledge or skill and provides instruction to others (Merriam-Webster, 2010). Physical education is a learning process which focuses on knowledge, attitudes,

and behaviours that are related to physical activity (Darst & Pangrazi, 2009). Hence, a physical education teacher would be someone who imparts students with knowledge and skill related to all aspects of physical activity. These could include such areas as physical movement, growth and development, health benefits, cooperation, and healthy active living.

Being a successful teacher of any subject is by no means easy. However, there are those who have suggested that teaching physical education is one of the most challenging school teaching positions (Graham, 2001). There are many possible reasons for the existence of such beliefs. One of the reasons could be the types of learning environments in which physical education is commonly taught (e.g., a gymnasium, playing field, ice rink, dance studio, etc.). As opposed to a teacher who consistently teaches in the same space (e.g., a common classroom with students seated at desks/tables), a physical educator must be able to organize, teach, and manage lessons in a wide variety of different spaces. This can be challenging because the teacher may have to adapt teaching strategies or their teaching styles to suit the learning environment that they are teaching in. Another challenge facing physical education teachers is the issue of safety. Making considerations for safety and being prepared for injuries that can occur while students are participating in a variety of physical activities in a multitude of learning environments can be extremely challenging and is something that all physical educators must be constantly considering. Finally, physical education teachers must also deal with the challenge of students who are not only moving within the learning environment but also accessing and using a wide variety of

equipment. Maintaining control and a positive learning environment, as well as, monitoring student learning can be very difficult when students are constantly moving as opposed to sitting in desks.

There is a strong base of literature focusing on the teaching of physical education. Over the years and right up until the present day a large amount of this literature has been composed of books focusing on how to teach physical education and what behaviours and skills are involved with being an effective physical education teacher (e.g., Capel & Whitehead, 2010; Graham, 2008; Mawer, 1995; Siedentop, 1983; Silverman & Ennis, 2003). The following sections discuss the main behaviours, (i.e., the specific teaching behaviours and self-regulatory behaviours) identified in the physical education literature and the skills that teachers use to assist in these behaviours. These behaviours include providing instruction, management of the classroom environment, planning, carrying out assessment, and completing teacher reflection. As a researcher, I acknowledged that physical education teachers might partake in other behaviours as part of their teaching, however due to the exploratory nature of this research it was decided that the most common behaviours should be focused on. This was because the more often a behavior is completed the more opportunities that exist for a skill (e.g., mental imagery) to be employed with those behaviours.

Physical Education Teacher Behaviours

The actions that physical education teachers do as part of their profession have been referred to through a variety of terms over the years such as strategies (e.g., Hastie & Martin, 2006) or skills (e.g., Siedentop & Tannehill, 2000).

However, in the present research the terminology used for these actions was "behaviours" (see Definitions in Chapter 1) and this terminology was selected due to its theoretical foundation in social cognitive theory, as discussed in Chapter 4. The following behaviours are the ones that have been most commonly identified in the existing literature on physical educators. Developing an understanding of these behaviours was important for this research because skills that people use, such as mental imagery, are employed to help individuals act or behave effectively and efficiently.

Providing instruction. Student's development of knowledge and physical skills related to a healthy active lifestyle are a major part of many physical education curricula. For example, in the Alberta Physical Education Program of Studies, skill development has been highlighted as one of the principal benefits of physical education:

> Physical education develops physical skills that allow for enjoyable and successful participation in movement activities. Students' perceived competence is a key determinant for future involvement in physical activity (Alberta Learning, 2000, p. 2)

Furthermore, one of the four general outcomes included in the Alberta physical education program of studies is that students will understand, experience and appreciate the health benefits that result from physical activity (Alberta Learning, 2000). Consequently, physical education teachers' instruction to provide knowledge related to physical health and facilitate physical skill development is of vital importance.

Instruction while teaching involves the dissemination of information to students primarily, but not exclusively, by talking (Graham, 2001). Instructions

on how to perform motor skills and explanations of how an activity (i.e., a sport, game, or drill) is properly participated in is one of the central behaviours undertaken by physical educators (Fishburne, 2005). For example, a physical educator may instruct students on the proper method for throwing a specific object (e.g., Frisbee, football), or they may need to give detailed instructions, including rules, with regards to how a specific activity (e.g., a tag game, a soccer dribbling relay) is to be completed. This type of instruction has been referred to as informational instruction (Graham, 2008). These instructions can often be given verbally by the teacher, however written and visual instructions can also be used when in the physical education setting (e.g., task cards; physical demonstrations).

The amount of time a physical education teacher spends providing instruction can really vary depending on the teacher, the students, and the task being taught. However, research has examined the typical amount of time that physical education teachers spend providing instruction during an average physical education class (McKenzie, Marshall, Sallis, & Conway, 2000). McKenzie and colleagues (2000) reported that physical education teachers spend, on average, 23.5% of their physical education lessons providing instruction. This is a fairly large proportion of the physical education lesson and there have been some in the field of physical education who have suggested that physical education teachers are spending too much time on instruction (Graham, 2008). The specific argument being that student time spent listening to instruction takes away from student time spent practicing skills and being physically active enough

to garner the potential health benefits. Hence, providing effective and efficient instruction in physical education is vital and consequently the skills used to aid in instruction are important to all physical education teachers.

Management of the learning environment. Another one of the main behaviors undertaken by physical education teachers during the physical education instructional episode is the management and maintenance of a positive learning environment, also sometimes referred to as classroom management (Darst & Pangrazi, 2009; Mawer, 1995; Siedentop & Tannehill, 2000). This teaching behavior involves those activities that are completed by the teacher to ensure optimum use of instructional episode time, facilities, and equipment (Fishburne, 2005, p. 210). This includes such activities as grouping students, maintaining and promoting positive student behaviour, passing out and collecting equipment, ensuring flow to the lesson, and using facility space effectively.

As was found with teacher instruction, research has shown that management of the classroom environment is a teaching behavior that takes up a large amount of the physical education teacher's time during the instructional episode (Mackenzie et al., 2000). In fact, Mackenzie and colleagues reported that managing the classroom environment was the physical education teacher behavior that takes up the largest percent (44.6%) of the average physical education instructional episode. Just as with the time spent providing instruction to students, it has been argued that the time spent on management tasks should be kept to a minimum as a means of increasing time that students are physically active and learning (Silverman & Ennis, 2003). Consequently, it is clear that this

teaching behavior is of extreme significance with respect to teaching physical education. Specifically, it has been suggested that physical education teachers who struggle with this behaviour will experience problems with student discipline in their classes, will limit themselves with respect to the teaching strategies they can employ, and will have trouble achieving high levels of student interest and learning (Silverman & Ennis, 2003). Based on the identified implications of this behavior and the large amount of time physical educations teachers reportedly spend doing it, management of the classroom environment should be examined in any research that is related to the behaviours of physical education teachers.

Assessment. Although assessment and evaluation are sometimes defined as two different but related behaviours in the realm of physical education (e.g., Darst and Pangrazi, 2009), most of the physical education literature refers to these two terms interchangeably (e.g., Fishburne, 2005; Rink, 1993, Siedentop & Tannehill, 2000). Hence, in the present research the two have been considered all part of one behaviour referred to as assessment (see Definitions in Chapter 1).

Researchers have suggested that assessment should be ongoing and integrated with instruction so that we cannot "tell where instruction ends and assessment begins" (Lambert, 1999, p. 12). Assessment is a regular behaviour for all educators, and physical education teachers are no exception. It is a central part of teaching and learning in general (Grout & Long, 2009), and you would be hard pressed to find any physical education teacher education program that does not address the issue of assessment. The perceived importance of this behaviour has been demonstrated by the fact that it is regularly the focus of entire chapters in

physical education teacher education text books (e.g., Newton & Bowler, 2010; Fishburne, 2005; Siedentop & Tannehill, 2000), and furthermore there are entire text books dedicated to this specific behaviour and its use in teaching physical education (e.g., Carroll, 1994; Schiemer, 2000).

Assessment in physical education is a behavior that has commonly been separated into two categories, formative assessment and summative assessment. Formative assessments by physical education teachers refers to assessments used during interaction with students to help assess if the students are progressing towards the lesson goals, and can include diagnosis, feedback, and confirmation or correction (Carroll, 1994; Fishburne, 2005). This type of assessment is very useful when it comes to improving student performance, but it is also of particular value to teachers themselves. This is because formative assessment plays a major role in allowing teachers to modify their teaching and lesson objectives to meet the needs of the students (Rink, 2010). Alternatively, summative assessments by physical education teachers refers to assessments that sum up a student's performance(s) or individual level of achievement at the end of an instructional activity (Carroll, 1994; Fishburne, 2005). The information collected as summative assessment is typically used to appraise achievement and to compare students to established standards or to other students. As physical education teachers' accountability for student success has increased, summative assessment has become an important part of establishing the degree to which physical education programs are doing what they are intended to do for students (Rink, 2010).

Although assessment has been identified in the literature as one of the main behaviours that physical education teachers must complete, it has often been a behavior that teachers do not complete effectively. Over the years, literature directed towards physical education assessment has continuously pointed out a lack of performance based assessment by physical education teachers (Imwold, Rider, & Johnson, 1982; Lund, 1992). Hence, the problem being suggested was that physical education teachers' assessment has often not been focused on student performance but instead has been based on student compliance. Specifically, researchers have reported that traditionally, assessment in physical education has been directed toward things such as student participation, attendance, dress, and attitude (Doolittle, 1996; Lund, 1992). However, as Rink (2010) suggested there is an increasing focus on the importance of teachers' assessment in physical education. Therefore, teachers need to be effective in their use of all the skills available to them to ensure that what they are assessing is indicative of stated learning outcomes. Therefore, assessment was one of the main teaching behaviours that needed to be focused on in the present research.

Planning. Planning is another behaviour that is very common among all teachers and has often been recognized as an important part of teaching physical education. Hastie & Martin (2006) stated that "without planning success simply occurs by chance – if at all" (p. 62). Furthermore, the National Association for Sport and Physical Education (2003) listed planning as one of the nine key components for beginning physical education teachers.

Although this behaviour does have an influence on the students, the underlying reason teachers partake in this behaviour is to help themselves be more effective during the instructional episode (Partin, 2009). Therefore, based on the definition provided in Chapter 1, planning was defined as a self regulatory behaviour in the present research.

Planning has been defined as the preparation and decision-making teachers do outside the context of classroom interaction (Clark & Peterson, 1986). The five main reasons for teachers to plan have been identified (Clark & Yinger, 1979; Stroot & Morton, 1989) as the following:

1. To meet immediate personal needs such as reducing anxiety and building confidence
2. To help learn subject matter and collect and organize materials
3. To assure that a progression is followed both within and between lessons
4. To fulfill a specific school or district policy
5. To help teacher use time as planned and remain focused on the goals of the lesson

In physical education, having a solid plan is also important for safety reasons and especially to help prevent possible injuries. Furthermore, Graham (2008) suggested that another reason planning by physical education teachers is critical is because it allows teachers to optimize the use of class time, which for physical education is often extremely short due to a lack of gym or facility space. All of

these reasons indicate that planning is an important behaviour for physical education teachers and many of the different types of planning are of great value.

There are lots of types of planning that teachers can complete (Butler, 2002) however the most common ones are yearly planning, unit planning, and lesson planning. Yearly planning involves considering the curriculum and establishing how it will be delivered over the course of the year. Specifically, this type of planning involves decisions regarding whether activities will be grouped together in solid blocks for specific activities (e.g., two weeks of gymnastics), themes (e.g., balance, striking), or in some other format (Graham, 2008). Unit planning in physical education is the sequencing of learning experiences planned around a specific activity or idea (Dauer & Pangrazi, 1989). They offer scope and sequence for the many different activities that are taught in a school year, as well as, provide teachers with a clear plan of how instruction should proceed, what facilities and equipment will be required, culminating activities to be reached, and assessment strategies to employ. Finally, lesson plans are the specific guidelines physical education teachers follow to deliver a lesson. They are developed from the units and should be based on the goals of the curriculum. Lesson plans outline a prepared scope and progression of learning experiences based on the overall goals of the unit and the specific performance objective(s) of the lesson (Shimon, 2011). The specificity and detail in each type of plan (i.e., yearly plan, unit plan, lesson plan) differs according to the "length" of the plan. Specifically, daily plans are far more detailed and specific than yearly plans.

Planning by physical education teachers should occur regularly (Graham, 2001), and research has reported that physical education teachers do their planning in a great variety of locations, including at their desk, while driving to work, before sleep at night, and even in the shower (Graham, Hopple, Manross, & Sitzmen, 1993; Placek, 1984). Planning is also a diverse behaviour that is greatly influenced by the individual teacher doing the planning, and planning tends to reflect the teacher's personality and instructional style (Wilen, Ishler, Hutchinson, & Kindsvatter, 2000). There are many factors that have been found to influence teacher planning, such as teacher experience (Sardo, 1982), equipment and resources (Blumenfeld, Hicks, & Krajcik, 1996), the demands of administrators (McCutcheon, 1980), students' age (Berk, 1997), students' interests and experiences (Eggan & Kauchak, 2003), the content (Eggan & Kauchak), and time (White & Williams, 1996).

Although planning is influenced by many factors and is a behaviour that is very much dependent on the individual it is useful for instructional effectiveness in the classroom regardless of these factors (Clark & Dunn, 1991). The literature regarding the benefits of planning by physical education teachers has demonstrated that teachers who planned their work made greater use of facilities, were better at keeping students on task, timed their lessons better, organized their classes more effectively, and used a greater variety of activities in their teaching (Byra & Coulon, 1994; Imwold et al., 1984). Additionally, planning is essential to teaching because it is the process by which teachers link curriculum to learning

(Clark & Yinger, 1987). Hence, it was a behavior that needed to be included in the present research.

Teacher reflection. Another self-regulatory behaviour that is a key component of teaching physical education is teacher reflection. Although it is not as prevalent in the literature as the preceding behaviours that have been discussed, it has often been cited in the literature as a vital teaching behaviour (e.g., Rink, 2010; Whitehead & Pack, 2010). Teacher reflection is the active process of examining one's own teaching experiences and actions (Downey, Steffy, Poston, & English, 2009). As with reflection on any activity, reflecting on your teaching is a great way to evaluate what was done/not done or went well/poorly within a lesson. Reflection can also help lead to better planning for teachers as it is the primary starting point for decisions made about future lessons.

It has been suggested that teacher reflection can be broken down into three different categories: (1) reflection in action, (2) reflection on action, and (3) reflection for action (Argyris & Schon, 1974; Schon, 1987). Reflection in action occurs during the instructional episode as the teacher surveys the class (Zwozdiak-Myers, 2010). A common example of this form of reflection in physical education teaching would be surveying a game or activity that students are participating in and modifying it on the fly. It has been suggested that use of reflection in action improves over time as physical education teachers improve their observation skills and accrue a range of experiences that can be used to inform decisions made (Zwozdiak-Myers, 2010). Reflection on action occurs after the instructional episode is over and involves looking back at the

instructional episode and considering specific things that occurred. This process often involves careful consideration of student behaviour, as well as, whether the learning outcomes for the lesson were achieved (Zwozdiak-Myers, 2010). To effectively reflect on action some academics have encouraged the use of written journals regarding the instructional episode, making video or audio tapes to observe one's own lessons, having a colleague observe teaching and provide feedback, or asking students to provide feedback about a lesson (Darst & Pangrazi, 2009; Rink, 2010). Reflection for action is different from the other two because it is proactive in nature. This type of reflection involves the review of what has been accomplished in the past and the identification of constructive guidelines that can be followed to succeed in a future task (Killion & Todnem, 1991). It is often a way for physical educators to prepare themselves for upcoming challenges (Lynn, Castelli, Cone, & Werner, 2007).

Reflection has often been promoted in the literature as a valuable behaviour when it comes to effective teaching (Darst & Pangrazi, 2009; Downey et al., 2009; Rink, 2010). Furthermore, there has been some research to support this notion (Harris, 1998). However, much of the literature on the importance of reflection has been anecdotal in nature. In a recent detailed review of the literature related to teacher reflection, Marcos and colleagues (2011) reported that over 90% of the propositions made in the articles they reviewed did not have substantive foundations in empirical research. Additionally, the research by Marcos et al. (2011) reported that most attention in the articles reviewed was given to the critical attributes of a 'good' reflecting teacher, and minimal attention

or advice was provided on specific skills to employ and ways to complete the process of reflection. A part of the reflection process could be mental imagery. Although they don't use the term "mental imagery", Schon (1987), Rink (2010), and Zwozdiak-Myers (2010) discuss visualizing or thinking in your head about lessons after they are completed as part of reflection. Thus, it would seem that mental imagery can be a part of reflection (in action, on action, and for action), however this has not been established in any of the existing empirical research.

Because of the promotion in the literature of reflection as a physical education teaching behaviour and the suggestions that there exists a lack of attention on how reflection is completed, this behaviour was important to consider in the present research.

Skills Physical Education Teachers use to Assist with Teaching Behaviours

For all of the behaviours discussed it is important to realize that there are specific skills that might be employed to aid in the performance of those behaviors. When used as a verb, skill means to help or make a difference (Merriam-Webster.com, 2011). Thus, for the present research the term "skills" was used to describe activities undertaken by physical education teachers to help or aid them with the behaviours they complete as part of their profession. Graham (2001) proposed that good physical education teachers acquire an assortment of skills that they use to help plan and teach lessons that are evocative and meaningful. Furthermore, he suggested that these skills can be learned consciously or subconsciously and can be improved through practice and use. It has been reported that as teacher skills improve, so do measurements of student

engagement (Randall & Imwold, 1989). Researchers have also posited that overall student performance in physical education is influenced by effectiveness of teaching skills (Siedentop & Tannehill, 2000). Thus, development and identification of skills that can be used to aid in physical education teacher behaviours is important. There are many skills that a physical education teacher could be using.

Communication skills. Communication skills are crucial in all teaching and are of particular importance when it comes to physical education instruction of skills and activities (Fishburne, 2005), as well as, for maintaining a positive learning environment and providing verbal feedback on physical skill performance. Communication skills are possibly the most highly discussed teaching skills in the literature related to providing instruction in physical education. Siedentop and Tannehill (2000) suggested that when physical education teachers are communicating task and skill related instruction to their students it should be done effectively and efficiently. Effective task communication means that students will attend to and understand the presented information and that information will be sufficient enough for students to start doing the task that was described; whereas efficient task communication means that teachers will employ the minimal amount of time required to ensure effective communication (Siedentop & Tannehill, 2000, p. 265). To be both effective and efficient when providing skill or task instruction in physical education teachers should not over complicate their communication. Researchers have argued that to improve effectiveness of teaching physical educators task or activity instruction

should only focus on one thought, point, or direction at a time (Rosenshine & Stevens, 1986) and communication of activity instructions should be clear, explicit, and highlight the desired performance outcome (Silvermann, Kulinna, & Crull, 1995).

Communication skills are not only important for the teaching behaviour of providing skill and activity instruction, but are also valuable when it comes to assessment. More specifically, communication skills are needed when physical education teachers are providing feedback. When communicating feedback to students, teachers need to consider the nature of the feedback that is communicated (i.e., is it positive, negative, or neutral). Positive and neutral feedback have typically been advocated in the physical education teacher literature whereas negative feedback has often been discouraged (Newton & Bowler, 2010; Rink, 2010). Effective communication of feedback in physical education is also related to the specificity of the feedback (Mawer, 1995). If just trying to motivate students, physical education teachers can employ general feedback type communication, for example saying "excellent!" to a student after they perform a skill (Graham, 2008). However, to help students know exactly how they are doing or what they need to practice, more specific feedback should be used (Silverman, Tyson, & Krampitz, 1992). For example, saying to a student "Great. That time you really kept your eye on the ball" after hitting a tennis serve. Finally, "when" feedback is communicated is also important in physical education. The sooner a physical education teacher can provide feedback to students the better (Hastie & Martin, 2006; Mawer, 1995; Rink, 2010).

Another behaviour that communication skills are important for in teaching physical education is the management and maintenance of the positive learning environment. Very similar to communication in task or skill instruction, communication of management instructions such as grouping of students or selecting of equipment needs to be clear and explicit (Darst & Pangarzi, 2009). Effective communication of management instructions by physical education teachers helps improve the flow of the class, reduces length of transitions, and helps avoid possible safety and behavioural problems (Darst & Pangarzi, 2009). Additionally, communication regarding management should be separated from skill instruction so that the two are not confused. Communication skills for managing and maintaining a positive learning environment in physical education are particularly important when it comes to dealing with misbehaviour. Darst and Pangarzi (2009) suggested that communicating to students the consequences of misbehavior is valuable for building trust and respect between students and the physical education teacher. Moreover, when a physical education teacher is communicating with a student about a behaviour issue or conflict, a teacher should remain calm in their communication, communicate individually with students having the behavioural conflict, be sure to ask for and listen to student's reasons for the behavioural conflict, and make clear the actions the student will need to follow as a result of the misbehavior (Lavay, French, & Henderson, 2006).

To make sure that communication is effective and efficient in all their behaviours, physical education teachers must consider certain specific aspects of

their communication. Listening carefully to students is one aspect of communication of extreme significance. Having a loud voice or what is often referred to as a "Gym Voice" has been considered an important part of effective verbal communication skills in teaching physical education (Buck, Lund, Harrison, & Blakemore, 2006). This is because the spaces and locations in which physical education is typically taught (e.g., gymnasium, playing fields, swimming pools) are often much larger than a classroom and therefore physical education teachers must always be aware of the volume of their voice so that students can hear instructions being communicated (Rink, 2010; Zwodziak-Myers, 2010). In addition to a loud voice, consideration of the tone, pitch, speed and inflection of a physical educators' voice is valuable when discussing communication of instructions in physical education. Darst & Pangrazi (2009) have suggested that the chance of effective communication to students in physical education can be improved by making sure a teacher has a stimulating teaching voice that makes themselves interesting to listen to. Finally, the literature consistently encourages physical education teachers to consider whether or not students understand what has been communicated when providing skill or management instructions, and feedback (Graham, 2008; Hastie & Martin, 2006; Siedentop & Tannehill, 2000).

Beyond aspects of verbal communication, physical education teachers should also be aware of their non-verbal communication. Specifically, physical education teachers must consider their body language and how it can influence the attitudes and perceptions of students. Furthermore, teachers must consider non-verbal cues that they can utilize in the physical education setting to grab student

attention, help with instruction, and aid in management of the environment (e.g., a whistle, hand clap, raised hand), as well as to provide praise (e.g., high five, thumbs up) (Darst & Pangarzi, 2009; Fishburne, 2005).

Based on the discussion herein, it is evident that developing communication skills can be very valuable for physical education teachers because these skills can help teachers perform several different teaching behaviours.

Demonstration skills. The adage "a picture is worth a thousand words" holds true in physical education. Being able to provide effective physical demonstrations is a vital skill for physical education teachers. Specifically, this is a skill that is mostly associated with the behaviour of providing activity and motor skill instruction. The importance of demonstrations in physical education comes from research in motor learning that has reported when learning physical skills, as students do in a physical education class, learners benefit from having an image of the physical movement as it may help the learner remember and reproduce the movement (McCullagh, 1993). Demonstrations can help illustrate variety or depth of a movement, identify technique or approach, illustrate varying styles that are acceptable, and display that a skill is not impossible (Darst & Pangarzi, 2009). Demonstrations of physical skills have been found to be most effective for students who are just being introduced to a skill or activity, and are best when they identify the critical elements for performing a skill or activity (Pollack & Lee, 1992).

When considering demonstration skills for teaching physical education, it is also important to discuss organization of the demonstration. Mawer (1996, p. 174) proposed the following three possible implications for the organization of demonstrations in physical education:

1) Students need to be able to see clearly the demonstration and hear/understand the learning cures.
2) Students need to have the opportunity for immediate rehearsal or practice following the demonstration.
3) Teachers need to monitor that students do practice the task as demonstrated immediately following the demonstration.

The need for students to be able to clearly see all demonstrations is based on the idea that if a student cannot see what has been demonstrated it can be more difficult for them to properly perform the movement or activity. Because students watch a demonstration and store the information they collect from that demonstration in their short term memory it is important that they are able to practice and do practice the activity immediately so that the visual provided in the demonstration is fresh and clear in their minds (Mawer, 1995).

As part of developing effective demonstration skills to aid with instruction, physical education teachers must strive to make sure that demonstrations are accurate (Rink, 2010). Additionally, physical education teachers must consider the speed of a demonstration and whether they demonstrate a motor skill or activity/drill as a whole or in smaller parts. Some students will need to see a motor skill or activity/drill done at a normal speed so

that they can understand how it should look when it is done properly (Graham, 2008). However, sometimes when a normal speed demonstration is used everything can happen to quickly for students to fully understand. Thus, sometimes students will need to see a motor skill or activity/drill performed at a slower speed so that they can identify subtle movements and focus on key parts of the movement that lead to better performance (Graham, 2008). With respect to using whole or partial movement demonstrations, researchers have suggested that students need to see the whole movement demonstrated so that they can form a complete mental picture of what the entire skill looks like (Darden, 1997). However, effective demonstration skills also require the physical education teacher to demonstrate specific key parts of the movement that are important for students to focus on (Graham, 2008). For example, when teaching a student how to pass a soccer ball, a physical education teacher might demonstrate the part of the foot to contact the ball with and not the entire skill, thus bringing student attention to a key part of the overall movement or skill.

Another component of effective demonstration skills for physical education teachers is the use of verbal cues to support a demonstration. When providing a demonstration to students the physical education teacher should verbally inform the students what they should be focusing on and where to look during the demonstration (Graham, 2008). This concept was endorsed by Burwitz (1975) who noted that learners often have trouble attending to the key points contained in a demonstration, and therefore require assistance through verbal identification of what is most important in the demonstration for the learner to pay

attention to. It has been found that accuracy of the cues provided by a physical education teacher during demonstrations is critical for student learning and performance (Werner, Rink, & Hinricks, 1984).

Observation skills. Observation is involved in several of the teaching behaviours commonly completed by physical education teachers, such as assessment, maintaining a positive environment, and reflection. Consequently, the development and use of observational skills has been regularly endorsed in the physical education teacher literature (e.g., Marsden, 2010; Siedentop & Tannehill, 2000). As with demonstration skills, where the teacher locates themselves and what the teacher specifically focuses on, is important for observation (Graham, 2008).

The physical educator teaching behaviour that observation has most commonly been associated with is assessment. This is likely because so much of the assessment completed in physical education classes is done through direct teacher observation of student performance. Specifically, assessment in physical education is often focused on physical movement (Lund & Kirk, 2010), and consequently the teacher needs to observe students completing those movements to complete assessment. First of all, physical education teachers can benefit from good observational skills when it comes to formative assessment, and more specifically providing effective feedback within a lesson (Barrett, 1983). For a teacher to provide any feedback regarding student performance of a motor skill or activity they must observe the student. To offer the best and most useful feedback, a physical education teacher must identify what is most important for

them to observe with regards to a student's performance of a particular motor skill or activity. This requires knowledge of the motor skill or activity being performed and can be influenced by experience and practice of student observation (Mawer, 1995). The better a physical education teacher becomes at observing student performance, the better the teacher will be at identifying appropriate feedback that should be provided. Next, observational skills are also needed for many of the summative assessments completed by physical education teachers. This is particularly evident when it comes to assigning grades. If a physical education teacher wants to complete assessment on student's physical performance of motor skills and activities, cooperation, participation, effort, or behaviour; the teacher will need to observe the students. Therefore, developing effective observational skills for the purposes of summative assessment is valuable to physical education teachers.

Physical education teachers' observational skills are not only related to assessment but also to management and maintenance of a positive classroom environment. As a managerial skill, observation of the entire class is vital to ensure that students are following teacher directions and meeting the teacher's expectations (Mawer, 1995). Marland (1975) described how effective teachers are constantly observing and monitoring all corners of the instructional environment and referred to this as "the lighthouse effect". This observation of the classroom helps not only to keep students accountable for their work and on task, but can also help teachers with preventative class management (Kounin, 1970). Specifically, this observation can help teachers prevent possible

misbehavior and injury, as well as, help them to identify possible safety hazards (e.g., noticing that a protective mat used in gymnastics has moved out of position).

Finally, observation skills are inherently employed by physical education teachers in their reflection. The observations a physical education teacher makes during a lesson become the basis for any reflection the teacher completes. Thus, it would seem that the more a physical education teacher observes the more they have to reflect on. Marsden (2010) suggested that the key to effective reflection which occurs during the lesson (i.e., reflection in action) is observation. For example, if an activity is not working properly (e.g., a game of volleyball has become problematic because the students cannot control the ball enough to have a rally) a physical education teacher relies on their observational skills to reflect on why the activity is not working and then based on those observations modify the activity to make it work better. Additionally, the observations made during a lesson regarding student behaviour, student involvement, effectiveness of teaching strategies, and achievement of learning outcomes are all useful and necessary for reflection done following the lesson (i.e., reflection on action) that is completed to identify strengths, weaknesses, and possible future lesson directions and changes.

Organization skills. Another set of skills that has often been recognized as important in the teaching of physical education is organizational skills (Lawrence & Whitehead, 2010). Having good organizational skills is especially relevant to physical education teachers planning and management behaviours. To effectively

plan a lesson, unit, or an entire year requires organization. When planning for a lesson a physical education teacher must organize learning activities so that they follow a logical progression and lead to student attainment of lesson objectives (Tyler, 1950). Effectively organizing activities ahead of time as part of lesson planning will help make the lesson flow smoothly and may help to reduce transition times between activities. Organizational skills are also involved with lesson planning when it comes to utilization of space. In the physical education literature on lesson plans, teachers have often been encouraged to plan how they will organize the space in which they teach (e.g., where they will set up stations; how will students be spread within the space) (Fishburne, 2005; Hastie & Martin, 2006). Finally, it has been proposed that organization of equipment for lesson planning is essential (Fishburne, 2005). This involves organizing the equipment that is needed to effectively deliver the lesson and determining how it will distributed/set-up and collected/taken down such as gymnastics apparatus.

When it comes to unit and yearly planning for physical education, organizational skills are employed for a variety of reasons. First of all, when developing a unit or yearly plan a physical education teacher must consider content and organize what will be covered and when (Taylor, 1970). For example, a physical education teacher in Edmonton might decide when creating a yearly plan that they will do a unit on skiing in January because that is when the weather will be appropriate. Also, as with lesson planning, a physical education must organize the equipment they plan to use for the year and for specific units. If a teacher does not readily have access to proper equipment for a specific

activity he/she must find a way to get the equipment or opt not to do that activity. Moreover, part of organizing equipment for a unit often involves making sure the equipment available is in proper working order and is safe.

Physical education teachers can also employ organizational skills to help manage and maintain a positive classroom environment. One organizational strategy for learning environment management that has been endorsed in the physical education teacher literature is the development of routines in the physical education learning environment (Fishburne, 2005; Lawrence & Whitehead, 2010). Having organized routines can help to reduce behaviour problems and student time spent being inactive (Siedentop & Tannehill, 2000). Also, organization of the actual students can be critical to the development and maintenance of a positive learning environment. Organizing where students are located when instructions are provided and how students are grouped together are both important considerations for maintaining a positive physical education environment.

Other skills that could be useful. Mawer (1995) suggested that good teachers are always looking for and developing the skills that can help them be a better teacher. There are many skills that physical education teachers can use to help complete the behaviours that are part of their profession. The ones that have been described in detail here are those that have received considerable attention in the physical education teacher literature. They are skills that have been identified as valuable for aiding in the performance of physical education teaching behaviours. However, there are other physical education teacher skills which

could also be important to consider. One such skill is mental imagery. This is a skill that has been found to be beneficial for individuals in many other professions, but has seen little, if any, investigation for its use in teaching physical education.

Mental Imagery

Defining Mental Imagery

Defining mental imagery has proven to be a difficult task. Over the years many definitions have been put forth and there has been dispute between and within the different fields of psychology with respect to the characteristics and qualities of mental imagery. One of the early definitions of mental imagery in the cognitive sciences can be found in the general psychology literature from Richardson (1969), who stated:

> Mental imagery refers to (1) all those quasi-sensory and quasi-perceptual experiences of which (2) we are self-consciously aware and which (3) exist for us in the absence of those stimulus conditions that are known to produce their genuine sensory or perceptual counterparts, and which (4) may be expected to have different consequences from their sensory or perceptual counterparts (pp.2-3).

Since this definition was put forth, it has been regularly referred to in discussion of mental imagery. However, there has been argument for definitions that focus more on the dynamic and creative properties of images, such as the definition presented in the sport psychology literature by Denis (1985):

> Imagery is a psychological activity which evokes the physical characteristics of an absent object (either permanently or temporarily absent from our perceptual field). It is worth emphasizing here that imagery is not restricted to recollection of the appearance of static objects, but extends to moving objects, objects undergoing transformations, in

> other words to dynamic events. The scope of imagery is not limited to recalling objects or events that have been perceived in the past (recent or distant past), but imagery also refers to objects or events that have not yet been accomplished. Imagery allows for people to anticipate future (or even purely theoretical) events. (pp. 4S-5S)

More recently, researchers have argued that imagery should be differentiated from daydreaming by describing imagery as an experience that is under the volitional control of the individual that is imaging (Perry & Morris, 1995). White and Hardy (1998) comprehensively defined imagery as a volitional process where an individual creates or recreates an experience that imitates a real experience, and that we can be conscious of "seeing" an image of smell, tastes, or sounds without actually experiencing the real thing. In addition, White and Hardy suggested that an image differs from a dream in the sense that we are awake and conscious when we create an image. Furthermore, White and Hardy suggest that mental imagery differs from mental rehearsal in the sense that mental imagery is a process, whereas mental rehearsal is the technique of utilizing imagery to mentally practice an act (p. 28). As can be seen from the definitions proposed by Denis (1985) or White and Hardy (1998), the terms "mental imagery" and "imagery" are often used interchangeably, however throughout the present research the term mental imagery was used.

Several of the early theories of mental imagery and how it relates to different aspects of human cognition and behaviour were focused strictly in the motor development domain (e.g., Jacobson, 1930; Sackett, 1934). It has since been argued that mental imagery has a vast array of applications beyond motor

learning (Murphy, 1990; Martin, Moritz, & Hall, 1999) and research related to the use of mental imagery has been conducted in many areas, including education.

Mental Imagery Research in Education

In the broad spectrum of education related research there has been a variety of studies which have investigated mental imagery. Much of this research has focused on mental imagery use among students as opposed to teachers. For example, Pressley (1976) examined 86 third grade children on whether the use of mental imagery could improve students' memory of prose they read. He found that students who did use mental imagery were more successful at remembering facts about the prose they read. Another study by Gambrell and Bales (1976) reported findings that supported the use of mental imagery as a comprehension-monitoring strategy for elementary school students that have poor reading skills. Wheatley (1991) argues for the use of mental imagery to enhance the learning of mathematics. Findings from a broader study conducted by Galyean (1983) on 150 educators who had their students use visual mental imagery over a one year period, suggested that visualization and guided mental imagery activities can help to facilitate highly desirable growth in the cognitive areas of academic skill acquisition and proficiency, as well as affective areas of attention, creativity, initiative, listening, and self-esteem.

Mental imagery research in education has also been completed on different types of learners. Lowenthal (1986) reported that students with a learning disability can use visualization to reinforce a more positive self-concept. Furthermore, Mountain (1986) found that students with a learning disability could

use mental imagery to enhance academic performance of remedial readers. For students that are gifted mental imagery has been used to enhance their ability to write poetry (Rebbeck, 1989). More recently, Iglesia, Buceta, and Campos (2005) found that mental imagery could be an efficient strategy for improving recall of prose for children with Down syndrome.

This helps to demonstrate that mental imagery research has been conducted and found to be relevant in the area of education. Yet, the research discussed here was not specifically related to physical education and the implications for physical education could be minimal. There is, however, another area of research where the literature related to mental imagery use may be more closely related to physical education. For example, Short, Afremow, & Overby, (2001) suggested that much of mental imagery research found in the sport psychology literature can be applied to physical education.

Mental Imagery Research in Motor Learning and Sport

Mental imagery has received considerable attention in the motor skill and sport psychology literature over the years (e.g., Blair, Hall, & Leyshon, 1993; Denis, 1985; Feltz & Landers, 1983; McBride & Rothstein, 1979; Start & Richardson, 1964). Most of the earlier studies in the sport psychology and motor learning literature investigated how mental imagery helps athletes acquire motor skills and how mental imagery affects performance of motor skills (e.g., Denis, 1985; Driskell, Copper, & Moran, 1994; Feltz & Landers, 1983; McBride & Rothstein, 1979). Since then there has been a plethora of research related to mental imagery use in sport and motor skill performance.

One way to consider the mental imagery literature in sport comes from the work of Munroe, Giacobbi, Hall, and Weinberg (2000). They qualitatively examined four fundamental questions of mental imagery in sport: *Why* is mental imagery used? *Where* is mental imagery used? *When* is mental imagery used? and *What* is being imagined? They referred to these four questions as the "four W's of mental imagery use".

Why mental imagery is used in sport can be attributed to two basic functions. Paivio (1985) proposed a basic analytical framework to explain how these functions operate. He suggested that mental imagery serves a cognitive and motivational function and each one operates either at a specific or general level. The cognitive-specific (CS) function of mental imagery involves the imaging of sport specific skills and is an effective adjunct to physical practice. It has also been found to be a possible alternate or replacement (i.e., can be used without adversely affecting learning or performance) for some physical practice (Durand, Hall, & Haslam, 1997). Therefore, use of mental imagery can be beneficial when physically practicing an activity is a challenge (e.g., lack of time to physically practice) or when in a location where physical practice is not possible but mental practice is (e.g., during travel walk/plane/car).

The cognitive-general (CG) function of mental imagery involves the imagery of game plans, strategies of play, and routines. Research into this function of mental imagery has been relatively limited. It has been reported that athletes use CG imagery for the same basic reasons they employ CS imagery (Munroe et al., 2000). More specifically, athletes employ CG mental imagery as a

means of developing and carrying out game plans, creating strategies of play, and creating and rehearsing routines. The motivational specific (MS) function of mental imagery involves imagining particular goals and the activities that must be completed for the realization of those goals.

The final function of mental imagery is motivational general (MG). This function of mental imagery is associated with physiological arousal and affect. Hall, Mack, Paivio, and Hausenblas (1998) further subdivided MG into two components: arousal (MG-A) and mastery (MG-M). MG-A mental imagery is related to the regulation of arousal and stress levels, while MG-M mental imagery is associated with mental toughness, focus, confidence, and positivism. It has been suggested that MG-A mental imagery accounts for significant variance in self-reported levels of competitive anxiety (Vadocz, Hall, & Moritz, 1997). Furthermore, research on MG-M has indicated that athletes use it more than any other function of mental imagery and that it is especially effective for enhancing performance in competitions (Munroe et al., 1998).

In regards to where athletes use mental imagery, the two most common places are in practice or competition (Hall, 2001). However, studies have also found that athletes report using mental imagery outside of practice and competition (Salmon, Hall, & Haslam, 1994). Salmon and colleagues found that athletes report the use of mental imagery at work, home, and school. Overall, studies have indicated that athletes utilize mental imagery in conjunction with competition the most, and to a lesser extent in conjunction with practice (Hall, Rodgers, & Barr, 1990; Salmon et al., 1994). This would suggest athletes are

using mental imagery more as a means to enhance performance and create more effective skill execution than for the purposes of developing or learning a skill.

There are many different times when an athlete can utilize mental imagery. Overall, athletes have been found to make the most substantial use of mental imagery immediately prior to competition, to a lesser extent during competition, and the least immediately following competition (Hall et al., 1990; Munroe et al., 1998). As for practice, Salmon et al. (1994) found that athletes use it more during practice than before or after practice. In addition to competition and practice, athletes also have been found to use mental imagery during breaks in daily activities and especially at night immediately prior to sleeping (Hall et al., 1990; Rodgers, Hall, & Buckolz, 1991). Furthermore, research has also suggested that athletes should use mental imagery when they are recovering from injury (Green, 1992).

Munroe and colleagues' (2000) final "W" is based on the question, "what makes up the content of athletes' images"? This has been investigated from many different approaches (see Hall, 2001 for a review). Munroe and colleagues (2000) completed one of the most exhaustive investigations into athletes' mental imagery content and proposed the following five mental imagery content categories based on their findings: sessions (i.e., the length of time and frequency of athletes' mental imagery sessions); effectiveness (facilitative or debilitative); surroundings (i.e., environment, other competitors); nature (e.g., positive vs. negative); and type (e.g., visual, kinesthetic, auditory, olfactory, and speed). Mental imagery content has also been considered in regards to the visual perspective (internal or external)

athletes employ. Research has argued that task differences can have an influence on which visual perspective an athlete decides to utilize (Hardy, 1997). Hardy has suggested that when learning skills for a sport that depends greatly on form (e.g., gymnastics) an external visual perspective is better than an internal visual perspective.

Much of this research in the motor learning and sport psychology literature may have applications in physical education due to the emphasis on physical movement that is common in both fields. Support for this argument can be found in the work of Anderson (1997), which discusses the use of mental imagery to assist student learning in physical education; or in the work of Short and colleagues (2001) where arguments are made for the use of mental imagery beyond the competitive sport context and into the context of recreation and physical education. However, these researchers focus mostly on using the imagery literature related to athletes and applying it to physical education students, but what about physical education teacher professionals? Is there any research in the sport psychology literature that could be more closely related to physical education teachers? A possible answer to this question would be to examine the sport psychology research regarding coaches and mental imagery.

Coaching and mental imagery. Although many differences do exist between coaches and physical education teachers there also would seem to be some underlying similarities (e.g., planning practices or physical education lessons, teaching and development of motor skills, motivating athletes or students, etc.). Thus, examining the research related to mental imagery use by coaches may

be valuable. Mental imagery use by coaches as part of their instruction of athletes has received limited attention to date. Jedlic, Hall, Munroe-Chandler, & Hall (2007) examined coaches' encouragement of mental imagery use to their athletes. However, this study focused strictly on how coaches encourage their athletes to use mental imagery and not on the actual use of mental imagery by the coach. Overby and colleagues (1997) performed one of the only studies that specifically investigated how coaches themselves use mental imagery. In this study they investigated the use of mental imagery in a sample (49 participants) composed of soccer coaches (28.8 % of the sample), figure skating coaches (34.6 % of the sample), and dance instructors (36.5 % of the sample). They utilized a survey that was composed of five sections that focused on: demographics; types of mental imagery (e.g., kinesthetic, visual, internal view, external view) used by the coaches during instruction; mental imagery use during planning and evaluating the teaching process; types and extent of mental imagery training that coaches provided to athletes; and unstructured responses regarding coaches mental imagery use. They found that all three groups of coaches reported using mental imagery to help with instruction of skills (dance instructors used it the most). Furthermore, they found coaches use metaphorical imagery (imagining something not specifically related to the task being performed, but that involves similar characteristics) while instructing (e.g., imagine spinning like a top) and that it was less likely to be used by soccer coaches compared with the other coaches. Finally, coaches also reported using mental imagery in planning. For example, one coach stated "In preparation for a coaching session, I use imagery to run

through my plans as a means of evaluating whether they will work" (Overby et al., 1997, pp. 334).

More recently Thelwell, Weston, Greenlees, and Hutchings (2008) provided some qualitative data regarding the use of mental imagery by coaches. In this study, they interviewed 13 elite-level coaches about their use of different psychological skills, one of which was mental imagery. The coaches reported using mental imagery before, during, and following both practice and competition for many different reasons. Some of the main findings were that coaches consistently reported using mental imagery before both competition and practice to foresee difficulties that might occur and to facilitate appropriate focus. Coaches also reported using mental imagery to help plan training sessions, to help them visualize a skill so that they could translate it into words during a training session or competition, and to evaluate either a training session or a competition after it was finished.

The fact that mental imagery is being used to help perform job related tasks in this profession which has similarities to teaching physical education helps to support the idea that mental imagery could be useful for physical educators.

Mental Imagery Use in Professions Unrelated to Physical Education

Although there has been limited research regarding physical education teacher's use of mental imagery in their profession, there has been research conducted on mental imagery use by individuals in professions unrelated to physical education. Specifically, this research has focused on using mental

imagery as a strategy to help in the performance of the day-to-day tasks required in specific professions.

Personal characteristics may be of value in particular professions, however the level of performance a person exhibits on specific job related tasks typically is considered to be equally important too. Thus, strategies that can help improve the performance of these tasks are often considered useful. Mental imagery is one strategy that has received considerable attention with respect to assisting in the performance of the day-to-day tasks in many different professions.

Medical professionals. One field of work in which mental imagery use has been researched has been the field of medicine. Researchers have reported that family physicians and surgeons both commonly employ mental imagery and find it useful in examining and treating/operating on patients (Edwards et al., 2005). Edwards and colleagues examined a random sample of 163 family physicians and 169 surgeons. Participants responded to questionnaire items regarding the usefulness of different mental imagery modalities (i.e., visual, auditory, olfactory, kinesthetic) in treatment or surgery, as well as, the frequency with which these modalities were used. The results from this study indicate that both physicians and surgeons report using mental images of various modalities to examine, treat, or operate on patients. Overall, the visual and kinesthetic modalities were rated as the most useful forms of mental imagery. It was found that gender and years of practice did not significantly influence the frequency of mental imagery use. However, the surgeons did report using significantly more

mental imagery than the family physicians, especially when performing operations.

Rogers (2006) lends support to the importance of mental imagery use among medical practitioners. Rogers reports on the use of mental imagery by medical residents in the urogynecology division at the University of New Mexico. She reports that for the past five years mental imagery has been a part of the resident's preoperative preparation of cases. All of the 30 residents who participated in this program have ranked the mental imagery sessions as one of the most beneficial components of their training during their 8-week rotation.

Research in the medical field has also investigated the use of mental imagery by medical students in the learning of basic surgical skills (Sanders et al., 2004, 2008). Sanders and colleagues (2004) examined the effects of varying the amount of physical practice and mental imagery on learning basic surgical procedures. They concluded that following initial instruction and a session of physical practice, there was no significant difference between mental imagery and physical practice in the learning of basic surgical skills by medical students. Sanders et al (2008) examined mental imagery compared to textbook studying in the performance of basic surgery. They concluded that following initial instruction and a session of physical practice, mental imagery of a surgical procedure was superior to textbook studying in the context of future live surgery.

Law enforcement agents. Mental imagery has been researched in Law Enforcement with respect to using mental imagery to enhance acquisition of certain essential psychomotor skills such as marksmanship. Whetstone (1996)

examined 72 police recruits over a three week fire arms training course. Participants were put into either a control group that completed the basic police recruit classes which consist of classroom sessions and physical firearm target practice; or a treatment group that received mental imagery training and guided mental imagery practice sessions on top of the basic police recruit classes. Participants completed a marksmanship test prior to and following the treatment phase. The results from a two-tailed *t*-test on performance gain scores indicated that the treatment group improved their marksmanship skills significantly more (at the .05 level) than the control group. From these findings, Whetstone concluded that police officers required to shoot a firearm should use mental imagery as part of their training to help improve performance accuracy, especially since in this occupation, this skill could mean the difference between life and death.

Marketing: product designers. When it comes to developing new products to market toward consumers, visual mental imagery has been touted as one of the central cognitive inputs for the product design process (Roozenberg & Eekels, 1995). Dahl, Chattopadhyay and Gorn (1999) interviewed ten consumer product designers from ten different design firms. All ten designers indicated that using visual mental imagery was important part of the product design process. Dahl and colleagues followed this up by conducting a study that involved 148 undergraduate engineering students that were asked to design a car jack to be used by seniors (60 years and older). They divided the students into groups: the first group was encouraged to use imagery of what the product design should look like

and other similar products to assist in their design; the second group was encouraged to use the same mental imagery as the first group, but to also image the customers using their designed product; and finally there was a control group that were not encouraged to use mental imagery of any form. The results indicated that the products designed by participants encouraged to use mental imagery were more appealing to customers and deemed as more useful than those products designed by participants from the control group. In addition, it was reported that imaging the consumer using the product also had a positive influence on the consumer's ratings of appeal and usefulness.

Computer programmers. Computer programming is another profession where mental imagery is being used. Anecdotal evidence for mental imagery use by computer programmers is fairly widespread (e.g., Lammers, 1986), however some of the best evidence comes from research conducted by Petre and Blackwell (1999). They conducted two studies into mental imagery use by computer programmers. In the first study, ten expert programmers were interviewed about their use of imagery for a specific programming task. All of the participants suggested the use of mental imagery, such as "seeing lines of code in their head". Furthermore, the different programmers described the use of different modalities of mental imagery during the task (e.g., visual mental imagery, auditory mental imagery). In the second study, Petre and Blackwell (1999) used a questionnaire with open ended items addressing the use of mental imagery by programmers. The participants this time were 34 expert programmers. Again support was found

for the use of mental imagery by computer programmers to help design computer programs and utilize computer programming software.

Professional musicians. While the use of mental imagery by musicians has received limited attention, there is evidence to suggest that mental imagery serves similar functions for musicians as it does for athletes (e.g., Gregg, Clark, & Hall, 2008; Talbot-Honeck & Orlick, 1998). Early research by Ross (1985) indicated that combined mental imagery practice with physical practice was as effective as just physical practice when rehearsing for an instrumental performance. More recently, Gregg and colleagues (2008) conducted a detailed quantitative investigation into the use of mental imagery by classical musicians. Using a questionnaire specifically designed for this study (based upon the Sport Imagery Questionnaire [SIQ]; Hall et al., 1998) 159 classical musicians responded to items related to their use of mental imagery. The results found that musicians do use mental imagery. In particular, the musicians were using mental imagery the mostly to help themselves remain focused, positive, and confident. Furthermore, the musicians reported very little use of mental imagery related to their personal goals.

Based on the previously discussed research it appears that imagery is being used by individuals in many different professions. Therefore, it is possible that mental imagery may be successfully applied in other professions as well, including teaching physical education.

Potential Use of Mental Imagery by Physical Education Teachers

As mentioned previously, there is a lack of information specifically related to mental imagery use by physical educators. Hall (2001) states that "everyone has the ability to generate and use mental imagery. However, people choose sometimes not to use it even in situations where it could be beneficial" (p. 529). Based on this it could be argued that physical educators have the ability to use mental imagery in their profession, but whether or not they do use mental imagery to assist with their professional tasks is up to the teachers themselves.

Based on the literature reviewed here, my personal experience as a physical educator and discussions with other physical educators it would appear that mental imagery can and may be used by physical educators for certain work related behaviours. Researchers have indicated some support for this assertion. Mawer (1995) suggested that physical education teachers may be able to improve their observation and motor skill assessment by developing clear mental images of physical activities or skills. Livingston and Borko (1989) also supported this assertion when they reported findings that teachers create extensive mental plans when preparing lessons. Finally, Hall and Fishburne (2010) put forth several arguments for possible uses of mental imagery by physical education teachers and encouraged detailed future research on this subject. Gaining a deeper understanding of how, where, when, and why mental imagery is used by those who teach physical education could provide valuable information regarding the use of mental imagery to help physical education teachers perform the common behaviours of their profession. Specifically, research on this topic could help

inform physical educators and those who teach future physical educators about the possible ways in which they can use mental imagery. The present research was therefore designed to investigate this topic and serve as a foundation for understanding the use of mental imagery by those who teach physical education.

CHAPTER THREE – THEORETICAL FOUNDATION FOR RESEARCH

Miller (1991) suggested that the literature review should increase the researcher's personal knowledge of the major areas being studied (i.e., behaviours and skills involved in teaching physical education; and mental imagery use), as well as provide the reader with the opportunity to relate the present research to the ongoing dialogue in the literature. The previous chapter accomplished both of these suggestions. However, Miller (1991) also posited that a literature review can build the foundation for the research. This was not fully accomplished in Chapter Two because a foundational theory was not considered. Creswell (2009) suggested that researchers should investigate what theories could be utilized to help investigate scholarly questions. Therefore, this chapter discusses theory and describes the theories that were found to be helpful and suitable as a foundation for the present research.

Investigating Theory

Kerlinger (1979) provided the following definition of what a theory is. He posited that "a theory is a set of interrelated constructs (variables), definitions, and propositions that present a systematic view of phenomena by specifying relations among variables, with the purpose of explaining natural phenomena" (p. 64). When it comes to conducting research of any type, the use of a theoretical perspective is commonly endorsed (e.g., Hoy, 2009; Merriam, 2009). This would seem especially beneficial to researchers exploring a question where very little is presently known, because theory may offer a possible basis to help guide the research. However, it should be noted that some scholars in research

methodology have cautioned against pre-occupation with placing one's qualitative research in a single, specific, and clearly defined theoretical perspective (e.g., Patton, 2002; Schwandt, 2000). Consequently, during my examination of theories that would be suitable for the present study, I tried to avoid becoming too focused on one theory where I could situate my research but instead sought theories that would possibly be helpful as a research foundation.

Creswell (2009) proposed that a theory could be included in a research study as an argument, a discussion, or a rationale. In addition, he suggested that a theory can help to predict (or explain) phenomena that occur in the world. Based on these suggestions, it seemed pertinent to explore possible theories that might help form a basis for the present research. Specifically, the present study was concerned with investigating the phenomena of mental imagery use in the teaching of physical education. Therefore, a search was conducted for theories that could possibly be used as a rational or to help explain the use of mental imagery by physical education teachers.

Some theories that were considered while searching for ones that might help facilitate my research on the role of mental imagery in teaching physical education were: self determination theory, goal theory, protection motivation theory, expectancy theory, dual coding theory, analytic framework of mental imagery, social cognitive theory, and self-efficacy theory. After some consideration, Paivio's (1985) general analytic framework regarding the functions of mental imagery (stemming from dual coding theory) and Bandura's (1977, 1986) social cognitive theory were judged to be best suited for aiding in the

present research. These two were deemed to be the most appropriate for my research due to the fact that they both had specific components that were already related to mental imagery and behaviour, as will be further discussed in the following two sections.

Analytic Framework of Mental Imagery

Because the present research had a major focus on mental imagery it was deemed appropriate for this research to have some foundation in a theory directly related to mental imagery. One of the most highly cited theories related to mental imagery use in physical activity contexts is Paivio's (1985) general analytic framework of mental imagery. This framework was developed to describe the functions mental imagery can serve in sport and related settings. Because of the central role of sport and physical activity in teaching physical education programs it was reasoned that this theory could be useful in conducting the present research.

Paivio (1985) proposed that mental imagery serves two functions and developed his framework to explain how these functions operate. He suggested that mental imagery serves a cognitive and a motivational function and each one operates either at a specific or a general level. Paivio suggested that the cognitive-specific (CS) function of mental imagery involves the imaging of specific physical skills. The cognitive-general (CG) function of mental imagery involves the mental imagery of game plans, strategies of play, and routines. The motivational specific (MS) function of mental imagery involves imagining particular goals and the activities that must be completed for the realization of those goals. Finally, the motivational general (MG) function of mental imagery is

associated with physiological arousal and affect. Hall et al., (1998) further subdivided the MG function into two components; arousal (MG-A) and mastery (MG-M). MG-A mental imagery is related to regulation of arousal and stress levels, while MG-M mental imagery is associated with mental toughness, focus, confidence, and positivism (Munroe et al., 2000). Figure 1 illustrates Paivio's (1985) general analytic framework.

Paivio's General Analytic Framework

	Cognitive	Motivational
General	CG	MG-A
		MG-M
Specific	CS	MS

Figure 1.

Paivio's (1985) analytical framework appeared to be well suited for the present research because the functions of mental imagery suggested within his framework could clearly be linked to the behaviours commonly completed by physical education teachers. First of all, Paivio suggested that the cognitive function of mental imagery includes mentally imaging how to perform physical skills (CS mental imagery). Physical education teachers are regularly demonstrating and explaining how to perform physical skills and thus the use of CS function of mental imagery would appear possible. For example, mentally

imaging what a motor skill looks like before providing instruction would be a use of the CS function of mental imagery. Next, Paivio suggested that another one of the cognitive functions of mental imagery (CG mental imagery) was related to the imagining of plans, strategies, and routines. This fits well with research on teachers of physical education because as discussed in Chapter 2 planning is of considerable value for those who teach physical education. For example, a physical education teacher could mentally image how they will set up and organize gymnastics equipment while creating a gymnastics lesson plan.

The motivational functions of imagery also seemed to have potential uses in the teaching of physical education. Teachers' motivation is a well researched topic. In particular, the importance of motivation to avoid burnout among teachers has been heavily researched and well documented (Anderson & Iwanicki, 1984; Carson & Chase, 2009). Additionally, teachers' motivation has also been found to have an influence on student engagement (Demir, 2011). Therefore, because motivation has been identified as an important part of teaching, the inclusion of motivation in Paivio's (1985) analytic framework helps to make this framework suitable as a foundation for the present research. Specifically, MG-M mental imagery could possibly be used to help physical education teachers be confident about teaching a specific unit. Also, MG-A mental imagery might be used by a physical education teacher to help themselves stay calm when students are misbehaving.

Social Cognitive Theory

Since the present study examined mental imagery use and how it is utilized by physical education teachers, it was decided that theories related to human behaviour should be considered. Social cognitive theory was thought to be one such theory that could be useful in the present research.

Social cognitive theory was developed by Albert Bandura (1986) as a framework for understanding, predicting, and changing human behaviour. Specifically, social cognitive theory identifies human behaviour as an interaction of personal factors, behaviour, and the environment (Bandura 1977; 1986). From this theoretical perspective, human functioning is observed as the result of a dynamic interplay of behavioural, personal, and environmental influences. For example, how people interpret the outcomes of their own behaviour informs and alters their environments and the personal factors they possess which, in turn, inform and alter subsequent behaviour (Pajares, 2002). This is the foundation of Bandura's (1986) conception of *reciprocal determinism*, the view that (a) personal factors, (b) behaviour, and (c) environmental influences create interactions that result in a *triadic reciprocality* (See Figure 2). This theory was initially used in clinical psychology, but over time it has been expanded and applied to many other areas, some of which include: career selection and development (e.g., Betz & Hackett, 1997, 2006), education (e.g., Lawrance & McLeroy, 1986; Pajares, 1996; Schunk, 1991), health and exercise behaviour (e.g., Cramp & Brawley, 2009; McAuley and Mihalko, 1998), and sport performance (Feltz, 2007).

Social Cognitive Theory: Triadic Reciprocality

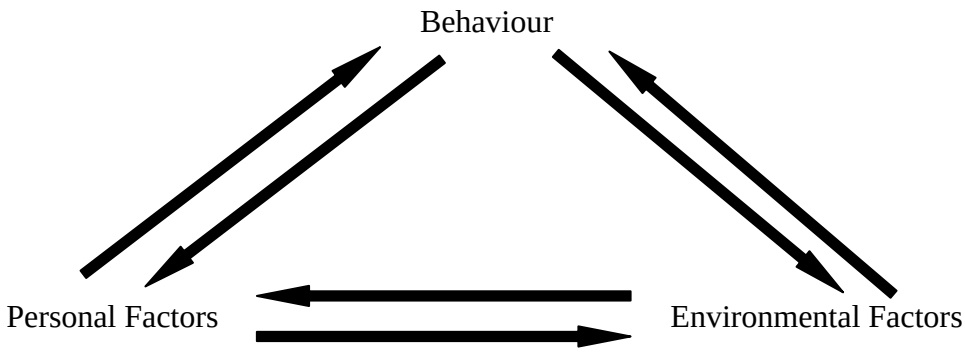

Figure 2.

There were several reasons that social cognitive theory was judged to be apposite for the present research. First of all, social cognitive theory was selected because it has been a widely utilized and accepted theory. The common consensus reached by numerous investigators is that "evidence for the validity of social cognitive theory is very strong" (Locke, 1991, p. 293). Furthermore, this theory has frequently been utilized and successfully applied in other research on physical education (e.g., Grim & Pazmino-Cevallos, 2008; Martin, McCaughtry, & Kulinna, 2009) and so it was perceived that it may therefore also be useful in the present research on physical education. Another reason that social cognitive theory was deemed suitable as a foundational support for the present research was because behaviours susceptible to change are a central part of this theory (Brawley, 1993) and the present study was interested in teaching behaviours. Specifically, a central focus was how physical education teachers use mental imagery to influence the behaviours common to teaching physical education.

Finally, and most notably, social cognitive theory was selected because of the specific way in which it classifies behaviours. Within social cognitive theory, Bandura (1977, 1986, 1997) suggested that along with the behaviours that individuals complete (e.g., physical education teacher providing motor skill instruction during the instructional episode), individuals also partake in self-regulatory behaviours. These are actions undertaken by a person to control or aid in their own behaviours (e.g., goal setting, planning) (Bandura, 1986). Self-regulatory behaviours have often been identified and examined in other research areas such as exercise psychology (Brawley, Rejeski, & King, 2003). One of the self-regulatory behaviours considered in such research has been planning. As discussed in Chapter 2, planning is an integral part of teaching physical education. Thus, the existence of self-regulatory behaviours in the teaching of physical education fit well into social cognitive theory.

Based on social cognitive theory, the behaviours that physical education teachers typically complete, as identified in Chapter 2, were separated into "teaching behaviours" and "self-regulatory behaviours for teaching" (see Figure 3).

Common Behaviours and Self-Regulatory Behaviours Associated with Teaching Physical Education

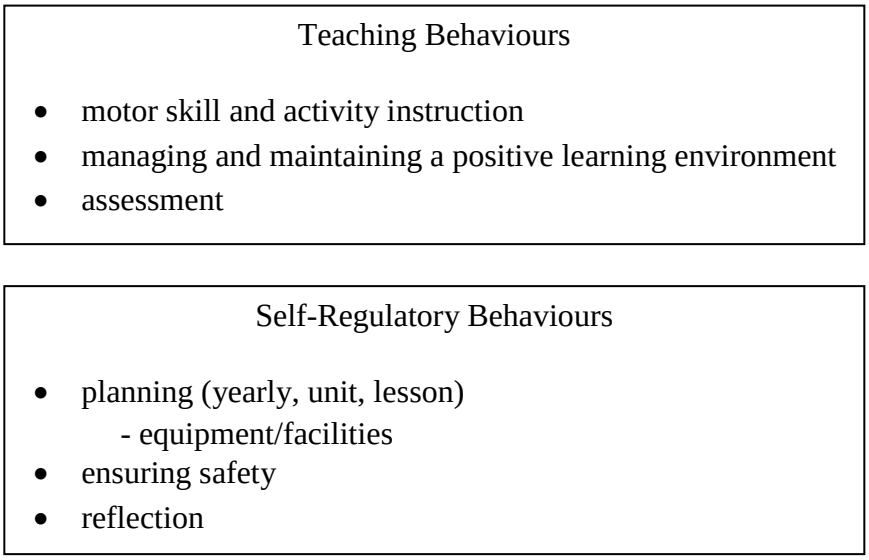

Figure 3.

Combining the Analytic Framework of Mental Imagery and Social Cognitive Theory

As it has been discussed in the preceding sections, both Paivio's (1985) analytic framework of mental imagery and Bandura's (1986) social cognitive theory were found to have useful relationships to the present research. However, because the purpose of the present research was to investigate mental imagery use by physical education teachers and was not intended to examine mental imagery use or physical education teachers' behaviours in isolation of each other it was important to connect the two theories. To this end a model was created to demonstrate how these two theories were connected and could be used as a foundation for my investigation into the use of mental imagery by physical education teachers (see Figure 4).

Model for Investigating Mental Imagery Use in Teaching Physical Education

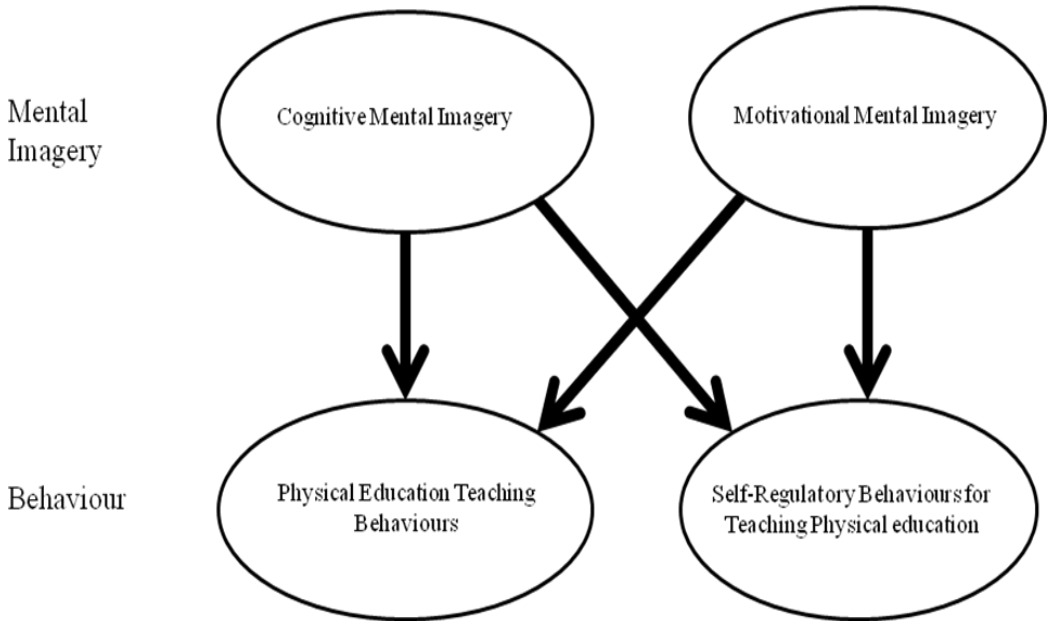

Figure 4.

Paivio's (1985) analytical framework suggested that mental imagery serves both cognitive and a motivational functions. As a result, the present research needed to investigate the use of both these functions of mental imagery by teachers of physical education. However, the present research proposed to examine what physical education teachers use mental imagery for, and so the use of the two imagery functions needed to be examined with regards to how they might be employed to aid with the common behaviours completed by physical education teachers. Research in other areas has reported that individuals use the cognitive functions of mental imagery to help them perform physical behaviours (e.g., motor skills) and also self-regulatory behaviours (e.g., goal setting, planning) (Munroe et al., 2000). Other research has also indicated that the

motivational function of mental imagery is commonly used in association with behaviours such as the instruction of physical skills (Jedlic et al., 2007). Thus, the proposed connections made in the model between the functions of imagery and both teaching behaviours and self-regulatory teaching behaviours of physical education teachers appear to be well justified. This is why the arrows exist in the model between the functions of mental imagery and the behaviours of physical education teachers.

Chapter Summary

Creswell (2009) suggested that when reviewing the literature researchers should take the time to investigate what theories could be utilized to help investigate the scholarly question. After completing an investigation of several different theories it was decided that Paivio's (1985) analytic framework of mental imagery and Bandura's (1986) social cognitive theory could both be used to help develop a solid foundation to base the present research on. These two theories were deemed suitable because they already incorporated major aspects of the present research (i.e., mental imagery and behaviour). Furthermore, the two theories complemented each other and combined easily in the development of a foundational model that my present investigation could follow.

CHAPTER FOUR – METHODOLOGY

In this chapter the philosophical position from which this research has been conducted and the methodological suppositions that acted as a foundation for this study are outlined. This description is followed by a detailed account of the methods used in the study, including the sample selection process, the sample description, the measures and data sources, the procedures followed in collecting the data and the data analysis process. Trustworthiness of the research is then discussed, including the steps taken to meet trustworthiness criteria for credibility, transferability, dependability, and confirmability. The chapter concludes with an examination of the limitations that were a part of this specific study.

Philosophical Position: Research and Methodology

Creswell (2009) argued that when preparing a research proposal an individual should clearly state the larger philosophical ideas they espouse in order to help explain why they selected a specific research design and method. Thus, a researcher's beliefs regarding ontology (i.e., the nature of reality) and epistemology (i.e., the nature of knowledge) must be considered to philosophically position one's research. This is important because these beliefs help to shape how an individual sees the world and how an individual acts within the world (Lincoln & Guba, 1985). In the case of the present research, my beliefs were influenced by an interpretive ontology (i.e., there is no single, observable reality but instead multiple realities, or interpretations of an event/occurrence) and a social constructivist epistemology (i.e., researchers do not find knowledge they

construct it through interaction with others and through historical and cultural norms) (Merriam, 2009).

To select an appropriate research design it has been recommended that a researcher must make this decision based on "how the problem is shaped, what questions are raised, and the type of end product desired" (p. 6) (Merriam, 1988). The overall research question in this study focused on a concept that had received no specific attention by previous researchers. Consequently, the questions raised were descriptive and exploratory in nature, and the desired end product was a deeper understanding of how physical education teachers are using mental imagery in their teaching of physical education. Thus, an overall qualitative approach was selected because Creswell (2009) asserted that when a research problem focuses on "a concept or phenomenon that needs to be understood due to little existing research, then a qualitative approach is merited" (p. 18). In addition, although this study (as described previously) has its foundations in theory and a prescribed model (see Chapter 3), it is qualitative and not experimental in nature. Unlike experimental research that often tests a theoretical framework or model, the present study is designed instead to inform the theoretical framework as a result of what is learned in the field (Merriam, 2009).

The interpretive social constructivist view was deemed most appropriate because unlike a positivist that would assume that narrow meanings and absolute truth or reality exists with regards to the uses of mental imagery in teaching physical education (Patton, 2002), I believed that physical education teachers are diverse in nature and work in a constantly changing and evolving environment

where each individual teacher will have created their own subjective and complex meanings based on the world they are interpreting (i.e., experiences using mental imagery in their teaching) (Crotty, 1998). Further support for applying an interpretivist view was found in the desired outcome for this research which was founded upon developing a greater understanding of the use of mental imagery by physical educators and an aspiration to bring this understanding to light. It has been argued by Scott and Usher (1996) that one of the major assets to the interpretivist view is that knowledge is not based on prediction, control and generalizations, but is concerned with implication and better understanding.

Social constructivist researchers realize that their own backgrounds shape their interpretations (Creswell, 2009). My roles as a teacher, a teacher educator, and a researcher in sport psychology focusing on mental imagery are the basis for the overall research problem in this study and have influenced the foundations upon which this study was created. In addition, due to the minimal existing research specific to this topic it was essential that my own experiences were used to help frame the study questions and the data interpretation.

Being aware of the descriptive and exploratory nature of the research problem, as well as the aforementioned philosophical view helped to guide the selection of appropriate methodologies to create a body of knowledge regarding mental imagery use by physical education teachers. Keeping in mind the need for researcher flexibility in qualitative research and the possibility that methodology changes may be needed based on interactions and interpretations in the field (Denzin & Lincoln, 2005), I decided that the most suitable type of qualitative

research methodology for this study would be to conduct what Merriam (2009) calls a "basic qualitative study". Merriam suggests that a basic qualitative study is one of the most common types of qualitative research and she suggests that:

> Researchers conducting a basic qualitative study would be interested in (1) how people interpret their experiences, (2) how they construct their worlds, and (3) what meaning they attribute to their experiences. The overall purpose being to *understand* how people make sense of their lives and their experiences. (Merriam, 2009, p. 23)

Other types of qualitative research had additional dimensions to them which did not appropriately fit with my research problem or desired end product (e.g., narrative uses stories people tell to reveal ideas held in the stories; grounded theory seeks to build a theory about the phenomenon) (Cresswell, 2009). Consequently, following a basic qualitative study methodology was appropriate since I wanted to focus on developing a general understanding of how the teachers interpreted their experiences with using mental imagery in their teaching and what meaning they put to these.

Methods

Sample Selection

Sample selection criteria for this study were based on the research questions being investigated, the researcher's philosophical view and the method of data collection (semi-structured interviews). The aim of these criteria was to encourage a sample that would provide detailed information and represent a variety of perspectives from the diverse and multifaceted world within which physical educators function. This meant that a purposive sample was sought in which potential participants were identified by set criteria designed to obtain an

information rich sample with the ability to provide data from which a great deal can be learned (Patton, 2002). The criteria used to select the physical education teachers were:

1. Must be presently teaching physical education or have taught it in their most recent term. This criterion was selected to hopefully increase the accuracy of participant's recollections (i.e., having taught physical education recently they would be more likely to accurately remember specific examples and experiences).
2. Must have been teaching physical education for at least one full year. This criterion was selected to help ensure that the participants in the study would have a breadth of experiences upon which to reflect upon. Livingtson and Borko (1989) supported this idea as they suggested that experienced teachers have larger, better-integrated stores of facts, principles, and experiences to draw upon as they engage in reflection.
3. Must be someone with a specialist background in teaching physical education. As this research study was directed towards mental imagery use in teaching physical education, it was decided that investigating those teachers who specialize in the area of physical education would be appropriate. In many Canadian teacher education programs that prepare pre-service teachers for working with high school students, grades 7-12, pre-service teachers are required to identify an area of specialization or what is sometimes referred to as a "Major area of study" (e.g., University of Alberta, University of Calgary, University of Western Ontario). Thus, in Canada, upon completion of an

education degree in Grades 7-12 education, teachers are typically classified as a specialist in a specific area (e.g., physical education). Therefore, this specialist background in the subject of physical education was used to identify potential participants.

4. Teach physical education to students in a grade between 7 and 12. Again, part of this was because these individuals were more likely to have a specialist background, but also because a "a common rendering of the differences between elementary and non-elementary teachers is that the former teach kids and the latter teach content" (Koeppen, 2003, p. 261). Thus, because this study was focused on the use of mental imagery in relation to the content being taught and not the specific students being taught, teachers of non-elementary grades were purposefully sought.
5. Additionally, teachers were purposefully selected to create a sample that was diverse in the social and demographical contexts which are representative of the variation and diversity that exists in teacher and school characteristics (i.e., participant gender, grades they were teaching, gender(s) of students taught, school districts, coaching responsibilities) (Mertens, 2005).

The snowball effect (Patton, 1990; Trochim, 2001) was used to generate the sample. This strategy involved identifying a few key participants who could meet the criteria that had been established for participation and then asking these people to refer others that would be suitable participants (Patton, 2002).

As qualitative methodology was utilized, there was no formal calculation for sample size. In qualitative research, researchers have argued that a sufficiently

large sample exists when theoretical saturation is reached (Patton, 2002). This means that the results obtained are not further refined with the data from additional participants. Guest, Bunce, and Johnson (2006) concluded that when investigating a relatively homogenous purposive sample, after twelve interviews 97% of the possible themes are attained. Whereas, Kuzel (1992) recommended that twelve to twenty data sources are required when trying to achieve maximum variation. Finally, Bertaux (1981) argued that fifteen is the smallest acceptable sample size in qualitative research. Based on these sources, the present research was designed to satisfy each of these arguments and thus a minimum proposed number of fifteen participants was decided upon (even if saturation was perceived to be reached before this number). However, if it was deemed by the researcher that theoretical saturation had not been reached with this number of interviews, then more participants would be recruited until theoretical saturation was met and the standards argued by Patton (2002) were satisfied. As suggested by Guest et al. (2006), saturation was likely attained in this study after twelve interviews. Subsequent to this point no new themes emerged from the continuing data collection (i.e., during interviews 13, 14, & 15).

Sample Description

The final sample included a total of fifteen physical education teachers, all of whom were presently teaching physical education courses and had a specialist background in physical education. Seven male and eight females were the participants in the study. They ranged in years of experience from 2 – 32. Teachers from four different school districts (i.e., Edmonton Public, Edmonton

Catholic, Elk Island Public, and Thames Valley Public) and two different provinces, Alberta and Ontario, participated in the study. The sample varied in the gender they taught, with most teaching a combination of mixed and single gender classes. Seven of the participants were presently teaching physical education to students in Grades 7 – 9, and the other eight participants were teaching physical education to students in Grades 10 – 12. Of the fifteen participants only four of them indicated that they were not also coaching a school sport.

Measures and Data Sources

The primary source of data for this research came from the physical education teachers' perspectives shared with the researcher during one-on-one semi-structured interviews (see Appendix A for Interview Guide). In addition, all participants completed a short demographic questionnaire (Appendix B). The final source of data came from my researcher notes that I completed throughout the research process. Data collection occurred over four months from August 2010 to November 2010.

Interviews. For this study, the qualitative method used to collect data was individual semi-structured interviews. Interviews were employed because they can provide vast amounts of detailed data and an opportunity for a deep investigation of an issue through follow-up and probing questions (Wilkinson & Birmingham, 2003). Thanks to this depth and detail, interviews were consequently well suited for the descriptive nature of the research problem and the basic qualitative research methodology that was selected for this study.

Furthermore, Patton (2002) posited that we interview individuals to find out information regarding things that we cannot personally observe. Mental imagery use by physical educators was not something that could be observed by the researcher and thus interviews were deemed the most acceptable method to collect information regarding physical educators' mental imagery use.

The interviews were semi-structured, conversational in nature and followed a general interview guide (See Appendix A). The semi-structured interview approach that was utilized involved having a set guide of questions; however, the order in which they were asked was flexible (Patton, 2002). Semi-structured interviews were selected because they offered flexibility to me as a researcher, provided an opening to further probe or check my emerging interpretation, and they gave the participants the opportunity to elaborate and clarify beyond the scope of the predetermined questions (Creswell, 2009). Additionally, using semi-structured interviews provided opportunity for the addition of questions that arose from previous interviews or from any ongoing data analysis (Creswell, 2009). Interview questions were based on the model designed for this study (See Figure 4) that had its foundations in social cognitive theory, imagery theory, and physical educator teaching literature. Initial questions were general in nature (e.g., Why do you like teaching physical education?) to create participant comfort and to help me develop a rapport with the participant (Kvale, 1996). Several of the questions asked during the early part of the interviews were designed to help understand the participant's personal background, beliefs, and confidence in teaching physical education. They were

also intended to get the participant thinking more deeply about the many things involved with teaching physical education. Much of the data collected from these questions, although interesting, was not considered in this study because it was not specifically related to the purposes of the study.

Following these introductory and rapport building questions, the participants were asked more specific questions regarding their understanding of mental imagery and their use of mental imagery in teaching physical education. In particular, the questions examined participant's perceptions regarding their use of mental imagery to complete common behaviours and self-regulatory behaviours completed by those who teach physical education. Probing questions (see Appendix A for examples) were posed to clarify and seek elaboration of participants' responses as suggested by Patton (2002). The specific probes were designed to help develop a deeper understanding of physical education teachers' perceptions regarding why they used mental imagery, and their specific experiences relating to what they image, when they use mental imagery, and where they are when they use mental imagery. They were also intended to help clarify my understanding and interpretation of what the interviewee had discussed.

Much of the interview guide designed for this research was adapted from a similar one used in a pilot study that I conducted. The pilot study was conducted in order to help establish and confirm some of the common behaviours and self-regulatory behaviours for which physical educators use mental imagery. It was also undertaken to gain feedback on the initial interview guide (e.g., approximate

time to complete interviews, suitability and wording of questions, best order of questions, etc.), my interview style, as well as, to provide me with interview practice using a semi-structured interview guide and the chosen voice recording device. The pilot study consisted of two interviews conducted with University of Alberta Faculty of Education physical education course instructors. Changes were made to the interview guide based on the pilot study and also the recommendations of the thesis committee following completion of Candidacy. These changes included reducing the number of probing questions in the interview guide, restructuring the wording of certain probing questions to encourage participant discussion and avoid yes/no responses, and modifying the questions to be suitable for physical educators as opposed to teacher educators.

Demographic questionnaire. The demographic questionnaire used in this study was designed specifically for this research (See Appendix B). Rich description is often advocated as one of the most important components of qualitative research (Merriam, 2009) Therefore, this questionnaire was included and structured so that a detailed and clear description of the participants could be ascertained. In addition, because a purposive sampling strategy was used in this study having this demographic information allowed me to continuously examine my participant list to make sure it was a good representation of my target population. More specifically, this allowed me to have a clear idea of the teachers I had talked to and helped me identify any specific characteristics (e.g., gender, experience) that were possibly underrepresented in my sample and thus influenced subsequent participant recruitment efforts.

Researcher notes. I developed informal research notes ever since the original ideas underlying this research were developed. This practice evolved from my own personal habits and from knowing that actively keeping and using research notes in qualitative research has been advocated by other scholars (Bogdan & Biklen, 1992). The initial written notes and many of those created in while developing the basis for this research study contained my own personal thoughts and experiential insights regarding mental imagery use as a physical education teacher. Specifically, these notes included emerging questions I had regarding mental imagery use, my personal use of mental imagery as a physical education teacher, and examples of mental imagery use that I had gathered from other physical educators and pre-service physical educators. During or following meetings with my supervisory committee, notes were written regarding new or evolving ideas and hypotheses. While completing the data collection process I followed up each interview by writing notes about that particular interview. These typically included my initial thoughts and interpretations of what was discussed, possible themes that I saw emerging from the data, and potential lines of questioning that I might want to use in subsequent interviews. These notes were used during data analysis as an analytical tool that helped to establish themes and categories used in the coding process.

Kouritzin (2002) suggested that the qualitative researcher does not simply impose interpretation on the text after creating it, but also make interpretations in their selection of what to write about and how they write about it. Therefore, my research notes were not to be seen as impartial renderings of my research and

data, but instead as important insights and valuable ideas that helped to structure and mould interpretation.

Procedures

Ethics approval was obtained from the University of Alberta Ethics Review Board. The purposive sample of physical education teachers was recruited from various schools in Alberta and Ontario school districts. I directly contacted potential participants via e-mail. Personal contacts and the resulting snowball effect were used as the method of finding possible participants and acquiring their e-mail address to establish contact. All potential participants were provided with the same recruitment e-mail (See Appendix C). Along with the recruitment e-mail, participants were also provided with a copy of a Letter of Information and Consent Form (See Appendix D). All participants contacted through e-mail were asked to contact me (contact information was provided in the recruitment e-mail) to arrange a time to conduct a one-on-one interview. Each participant was asked to suggest a quiet location where they could meet me and that would be suitable for recording the interview. At the beginning of each interview, I reviewed the study purpose and procedure and provided the participant with another copy of the Letter of Information and Consent form (see Appendix D). Only those participants who signed the consent form were able to participate in an interview.

Once the consent form was signed the participant was provided with the demographic questionnaire (See Appendix B) to gather information regarding gender, present and previous grade(s) taught, years of experience teaching

physical education, coaching responsibilities, whether he/she uses mental imagery outside of his/her teaching, and gender of students in classes which he/she presently teaches physical education. This information was collected to provide a detailed background of the participants to be used during the interview, data analysis and written discussion of the results.

For confidentiality reasons, the semi-structured interviews were conducted with only myself and the participant present and followed the semi-structured interview guide (See Appendix A). Participants were informed that their identity would remain confidential, that they would not have to answer any question they did not want to, and that they were free to withdraw from the study at any time. Participants were also asked to confirm that they were comfortable with having their voices recorded. All interviews were audio recorded using an Olympus DS-5000 Digital Voice Recorder. On average the interviews took approximately 60 minutes to complete.

Following the completion of an interview, a verbatim transcript of the interview was created. I also developed a one page report that summarized my personal interpretation of some of the major ideas and points that were made by the participant during the interview. Once each transcript and the corresponding one page summary were completed they were sent to the corresponding participant as an attachment to a common e-mail. The common e-mail sent to each participant thanked the teacher for their participation, asked the participant to review the transcript and the one page summary to ensure that it accurately reflected their thoughts and feelings expressed during the interview, and requested

the participant make any changes or additions to the transcript that they felt were necessary. The participants were also notified in this e-mail that this was the last point at which they could withdraw from the study and that once they returned the modified transcripts or sent a confirmation e-mail that the transcripts and summary were accurate withdrawal was not possible. Once participants had reviewed the transcript and summary they replied to the researcher through e-mail and confirmed the accuracy of the documents or suggested modifications/ inaccuracies that needed attention. In the case that a participant had any further questions or opinions with regards to the documents provided by the researcher, they were asked to inform the researcher of these and provide a phone number that the researcher could reach them at so they could further discuss these issues. None of the participants in the study requested further discussion with the researcher regarding the documents, but a few did suggest a few minor modifications or changes (e.g., how something was worded in the transcript; a slightly different meaning to the way something was interpreted). These steps were followed as a member checking process designed to make sure that what was being written and my understandings of the data were as accurate as possible in relation to the intents of the participants (Wolcott, 1994).

All information provided remained confidential and was only used for the purposes of this study (as stated in the Letter of Information and Consent Form, Appendix D). To adhere to ethical protocols and maintain confidentiality, all of the possible personal identifiers were removed from the data once the researcher had received the confirmation e-mail from the participants regarding the transcript

and summary. The participants were then randomly given a number from 1 – 15 and for the remainder of the research were referred to by that number (e.g., Particpant 12). Furthermore, all voice recordings were erased to ensure confidentiality.

Data Analysis Process

For the purposes of this study both inductive and deductive methods were employed. For inductive analysis, patterns emerge from the data; whereas for deductive analysis, the data are analyzed according to a pre-established framework (Patton, 2002). The analysis was deductive because the research model I designed specifically for this study (See Figure 4) and used to help create the interview guide, caused responses to fall into the behaviours or self-regulatory behaviours outlined in the model. As well, the analysis was inductive because the participant's perceptions, experiences, and personal practices with respect to mental imagery use were not pre-established by the investigator (i.e., me) but instead emerged from the interview data.

In a basic qualitative study of this nature, analysis of the data involves identification of recurring patterns that characterize the data and are supported by the data from which they are derived (Merriam, 2009). Early data analysis and generation of themes was performed even before all the data was collected (Bogdan & Biklen, 2007; Mertens, 2010). Writing research notes and reflecting on each interview, as well as transcribing the interviews helped me build up an overall sense of the data and the potential themes that were emerging. Developing a familiarity with the data and a strong sense of the general ideas and

meaning is an important step in the analysis process (Cresswell, 2009). Next, general themes and sub-themes were produced to organize meaning units (specific quotes) and then short descriptions for each of the emerging sub-themes were generated to explain what each sub-theme represented (Strauss & Corbin, 1998). The general themes separated the data into the broad categories of specific behaviours and self-regulatory behaviours, and the sub-themes were developed inductively to help group meaning units.

Transcripts were imported into the NVivo 8 data management computer program (QSR International Pty Ltd, 2007). This program stores data, allows an individual to code qualitative data and also aids in the analysis of qualitative data. The coding categorization process was conducted independently by both myself and a critical friend. This was done as a form of triangulation used to increase credibility of the research (Patton, 2002). The critical friend was a colleague from another university who had a familiarity with the research area. This individual assisted with the analysis and will be referred to as "the assistant" for the remainder of this document. The assistant was provided with copies of the interview guide and the proposed model used in the research to help her become more familiar with the foundations from which the data was obtained. After confirmation of accuracy from participants was obtained, a copy of each transcript was sent to the assistant for analysis. To ensure the anonymity of the participants, all identifiers had been removed from the transcripts before the assistant viewed them.

The first form of coding used to analyze the data was open coding (Strauss & Corbin, 1998). Following suggestions from Patton (1990), this process involved going through the transcripts and dividing them into meaning units, by identifying words, phrases, or blocks of text that identified distinct ideas. Constant comparative analysis was used (Mertens, 2010) to help assign categories or sub-categories, at differing levels of abstraction, to the meaning units. Categories were developed with the intent that data within each category shared certain similarities and was distinct from data within other categories (Merriam, 2009). Categories were often broad in scope and they were flexible in the sense that they were modified throughout the data analysis process (Mertens, 2005).

Once open coding was completed the categories were then organized into higher level categories or general themes that were based on the original model designed for this study (See Figures 3 & 4). This process was continued until no new themes or sub-themes were emerging, thus indicating that theoretical data saturation had been reached (Miles & Huberman, 1990). Using many of the tenets of selective coding (Strauss & Corbin, 1998), this process was undertaken to make sure that the general themes reflected the main model upon which the research was founded, and thus would assemble all the categories into a more coherent whole, which illustrated the relationships and connections between the categories. Through this process a rough coding tree was developed independently by both the assistant and myself.

Following completion of the independent coding, we (i.e., the assistant and myself) met with each other to compare coding trees, identified themes,

categories and specific meaning units. Through comparative analysis (Creswell, 2009) we ensured a more accurate interpretation of the data by discussing and reaching agreement upon identified themes, and sub-themes, and the specific meaning units that fit into these. This process was detailed in nature and once again demonstrated the flexibility within the research as new ideas or reformed themes were identified through this process. The outcome of this was a final coding tree that encompassed all of the coded data (Appendix E) and was agreed upon by both myself and the assistant. Similar to axial coding (Strauss & Corbin, 1998), labels for themes and sub-themes included in the coding tree were generated by a mix of direct words from participants, terms that I personally composed or terms taken directly from the study model (Creswell & Plano Clark, 2007).

In basic qualitative research the researcher examines the identified recurring themes found within the data and interprets them based on the researcher's understanding of their meaning (Merriam, 2009). This was done throughout the coding process but also finalized in the creation of this document. By providing in this document a thick description of the research findings and providing detailed examples of understanding (e.g., including direct quotes from the participants) I have clearly provided my understanding of the use of mental imagery by physical education teachers through my interpretation of the experiences and ideas presented by the study participants.

Trustworthiness

Ecklund (1996) argues that in qualitative research the investigator needs to establish a case for the trustworthiness of data collection, analysis, and conclusions. This helps to enhance the credibility of the research. As a means of establishing the trustworthiness of the present study, criteria for trustworthiness of qualitative research proposed by Lincoln and Guba (1985) were taken into consideration and addressed. Lincoln and Guba established that credibility, dependability, transferability, and confirmability were the four major criteria that should be attended to in qualitative research. I was cognizant of and accepted the position put forth by Hardy et al. (1996) that in both quantitative and qualitative research perfect studies are seldom, if ever conducted, but researchers should strive to meet as much of the credibility criteria as possible. The following four sections describe how each of these criteria were attended to in the present research.

Credibility. Lincoln and Guba (1985) suggested that credibility in qualitative research revolves around how well the realities represented by the researcher match the realities of the participants. Basically, what this means is that to increase credibility a researcher must establish audience confidence in the truth of the findings being reported. There are several strategies that were employed in the present research to help establish credibility. The first of these used in the present research was peer debriefing. Peer debriefing is the discussion of procedures and analysis with others and receiving feedback from them regarding the appropriateness, plausibility, possible changes and considerations

for the future (Lincoln & Guba, 1985). This was used both during data collection and analysis. Discussions regarding the interviews being conducted were frequently held between other researchers and myself (i.e., Doctoral supervisors, critical friend, other graduate students, and experts in related fields). These discussions helped to ensure that the data collection process was being conducted appropriately, that the interviews were evolving based on the data collection, and that meanwhile the research procedures remained consistent. In addition, when it came to data analysis, constant comparative analysis (Strauss & Corbin, 1998) between myself and the assistant ensured agreement was reached between the two of us. Identification of themes and development/structuring of the coding tree (See Appendix E) were discussed with a third academic colleague during the coding process. Furthermore, ongoing discussion occurred between me and my Doctoral supervisors regarding the appropriateness of the themes and the analysis.

A second common strategy for establishing credibility is through soliciting feedback from participants regarding your emerging findings and interpretations of the data or what is often called member checking (Merriam, 2009). Lincoln and Guba (1985) identified member-checking as an essential method for achieving credibility in research and ensuring the reality of participants is accurately described by the researcher. Member checking was achieved in this study by sending each participant a copy of their interview transcript along with a one page summary of my personal interpretation of the interview and asking the participant to review these documents to ensure that they accurately reflected their thoughts and feelings expressed during the interview. The participants were

offered the opportunity to clarify any misinterpretations and make any changes or additions to the transcript that they thought were necessary.

Denzin (1978) suggested that an important strategy that can be used to establish credibility is triangulation. This involves using multiple researchers to confirm emerging findings. In the present study, triangulation was used in analysis by having two individuals analyze and code the same qualitative data and then compare their findings (Patton, 2002). The coding of the data and generation of themes was conducted independently by me and a critical friend who was an experienced researcher in the area of physical education. Once each of us were finished coding the data, we met to compare the themes and sub-themes that we had identified in the data and the meaning units that existed for each of us. Any discrepancies were examined and discussed until a consensus was reached. The two of us then created an agreed upon coding tree and worked together to place individual meaning units into the proper sub-themes or properties that had been identified.

Discrepant case analysis, which involves purposefully searching for data that might challenge your expectations or emerging findings (Merriam, 2009) was another strategy used to ensure credibility in this research. Discrepant case analysis was completed by probing the interview data for data that did not fit into the preliminary themes or sub-themes that had been identified in analysis. Additional themes were produced to make certain that all data were included and represented in the coding tree. This was particularly relevant in identifying

themes that were not related to the specific behaviours and self-regulatory behaviours that were part of original research model.

Lincoln and Guba's (2000) idea of reflexivity – "the process of reflecting critically on the self as researcher, the 'human as instrument'" (p. 183) was one other final strategy employed for increasing the credibility of the present research. This was done in the current document by clearly identifying my personal assumptions, background, philosophical views, and personal biases.

Dependability. Dependability is often seen as a parallel to reliability (Lincoln & Guba, 1985). However, Merriam (2009) argued that "rather than demanding that outsiders get the same results, a qualitative researcher wishes outsiders to concur that, given the data collected, the results make sense" (p. 221). Creating an audit trail (i.e., documentation and evidence of decisions made and procedures used to arrive at the results) is one strategy that is commonly used to help increase confidence in the dependability of qualitative research (Lincoln & Guba, 1985). The audit trail developed for this study included ethics approval, consent forms, interview transcripts, interview summaries, member checks, demographic questionnaires, research notes, NVivo coding documents, and other documents and procedures that provided a detailed account of this entire research study from start to finish.

Transferability. Lincoln and Guba (1985) suggest that transferability is the degree to which specific findings in a study have applicability in other contexts or with other groups of participants. One strategy for improving the transferability of a study is to pay detailed attention to the purposive sample that

is collected and try to provide for the highest level variation possible within the boundaries of the sample criteria (Merriam, 2009). Teachers in this study were purposefully selected to create a sample that was diverse in the social and demographical contexts that were relevant to the study sample (e.g., both genders were represented; all grades taught from 7 – 12 were represented; years of experience ranged from the minimum of 2 years up to 32 years experience).

Providing thick and rich description that enabled readers to assess if the results could be applied to other contexts was another key factor in ensuring transferability of the research (Lincoln & Guba, 1985; Merriam, 2009). For the present study this consisted of description of the setting, participants, the methods used, and the findings made. Important to thick description in reporting findings was adequate supporting evidence presented in the form of quotes from the interviews (Merriam, 2009).

Confirmability. Mertens (2010) states that "confirmability means that data and their interpretation are not fragments of the researcher's imagination" (p. 260), and it should be possible to trace qualitative data back to their source. To help ensure confirmability of this research, I had another researcher review the audit trail to confirm that the conclusions were drawn from the data.

Limitations

In all research studies there are limitations that exist which are sometimes based on decisions made by the researcher and in other instances, out of the researcher's control (Thomas, Nelson, & Silverman, 2011). The present research was no exception, and although steps were consistently taken to diminish the

influence of these limitations it is important to recognize their existence. The following three limitations existed in the present research:

1. The use of one-on-one interviews with voluntary participants, as a primary source of data collection, relies on the participant being willing to give accurate and complete answers (Breakwell, Hammond, & Fife-Schaw, 1995). Furthermore it hinges on their ability to accurately recollect specific situations that will effectively answer the researcher's questions. It has been suggested that in these situations participants may hide or skew the truth due to feelings of embarrassment, inadequacy, lack of knowledge on the topic, nervousness, memory loss or confusion. On the contrary, they may also provide very elaborate answers in an attempt to figure out the purpose of the study (Wimmer & Dominick, 1997). Finally, some participants could have possibly answered questions based on what they thought the "best answer" would be or in a way that might portray them positively as a physical education teacher.
2. One limitation to snowball sampling as a method for recruiting participants is the possibility that all of the participants are somehow connected and thus you might have a very biased sample (Pitney & Parker, 2009). To try and avoid this in the present study, several participants were originally contacted and all of them were asked to provide other potential participants. Therefore, although groups of participants were indirectly connected, many of them were not (e.g., the participants from Ontario had no personal connection to those in Alberta).
3. Although including and being aware of my biases was important to this study, in some ways it still had to be viewed as a limitation. Specifically, this study

was limited by my own experiences and understandings. Furthermore, the study was limited because my ability to interpret the data and to discern meaning was naturally influenced by my own experiences, knowledge and understanding.

Chapter Summary

This chapter explained the choices I made with regards to the methodology employed throughout this research. The chapter was intended to clarify the philosophical position from which this research was conducted, provide a rich description of the methods used in the study, describe how trustworthiness of the research was addressed, and define the limitations that were a part of this research. In the following chapter (Chapter 5) the findings from the analysis are reported. This is aided by the use of direct quotes and examples from the participants' interviews.

CHAPTER FIVE – RESULTS

The overall purpose of this research was to develop a theoretical and practical understanding of mental imagery use by physical education teachers. To examine this, individual qualitative interviews were conducted with fifteen physical education teachers. These interviews collected detailed data on the physical education teachers' opinions and perspectives regarding their personal use of mental imagery for teaching physical education. In addition to the interviews, demographic questionnaires were completed by all participants to provide a clear picture of the individuals who participated in this study and provided the qualitative findings.

In this chapter the results from the research are reported. First, the demographic background of each of the individual participants is identified. Next, findings related to the participants' existing awareness of mental imagery are reported. This is followed by the presentation of the coding tree that was developed during the data analysis to identify themes and sub-themes found within the data. Subsequently, the resulting data (i.e., the identified themes and sub-themes) that were identified in the coding tree are reported on.

Demographic Background of Participants

As described in the preceding section of this dissertation, there were a total of fifteen physical education teachers that participated in this study. Several of the characteristics of the participants including their gender, years of experience, and grades taught were discussed in the methodology chapter. However, trends

existing in some of the other questions related to the participant's demographic background were not discussed previously and will be addressed here.

Table 1. Participant Characteristics

Participant Number	Gender	Years Experience Teaching PE	Present Grades Taught	Gender of Students Presently Taught	Activities Coached	School District	Mental Imagery Use Outside of Teaching
1	Female	4	9 - 12	Female, Mixed	Basketball, Volleyball	Toronto District, ON	No
2	Male	14	9 - 12	Male, Mixed	Volleyball, Hockey, Track	Thames Valley, ON	Playing sports
3	Male	14	9 - 11	Male, Mixed	Soccer, Badminton	Edmonton Public, AB	Playing sports
4	Female	6	7	Mixed	None	Edmonton Public, AB	Playing sports
5	Female	26	9 - 12	Female, Mixed	Volleyball, Track	Thames Valley, ON	Playing sports, Daily tasks
6	Female	16	7 - 9	Female	Dance, Rugby, Volleyball	Edmonton Public, AB	Playing sports
7	Female	29	10 - 12	Female, Mixed	None	Elk Island Public, AB	To help fall asleep at night
8	Male	5	7 - 9	Male, Mixed	Soccer	Edmonton Public, AB	Coaching
9	Male	18	7 - 9	Mixed	Basketball	Edmonton Public, AB	Yoga
10	Female	5	7 - 8	Female, Mixed	Cheerleading	Edmonton Public, AB	Coaching, Playing sports
11	Male	8	10 - 12	Male, Female, Mixed	Football, Basketball, Golf	Edmonton Public, AB	Playing sports
12	Male	15	10 - 11	Male, Mixed	Basketball	Edmonton Public, AB	Playing sports
13	Female	9	10 - 12	Female, Mixed	Volleyball, Basketball	Edmonton Public, AB	Yoga
14	Female	32	10 - 12	Female, Mixed	None	Elk Island Public, AB	Exercising, Playing sports
15	Male	1	7 - 12	Mixed	Volleyball, Wrestling, Badminton	Edmonton Public, AB	Playing sports

One of the trends found was that all of the teachers, except one (Participant 6), indicated that they presently were teaching at least one mixed physical education class (i.e., both female and male students in the same class). In addition, it was also noted that only three of the teachers (Participants 4, 7, and 14) indicated that they were not presently coaching any activities. Finally, only one of the 15 teachers in the study (Participant 1) indicated that they did not personally use mental imagery outside of teaching. Table 1 provides a detailed illustration of the specific demographic characteristics identified for each of the physical education teachers interviewed in the present research.

Participants' Existing Awareness of Mental Imagery

One of the areas of inquiry that was addressed in the early portion of each interview, before the researcher provided the participants with a formal definition of mental imagery, was examining what existing awareness the participants had regarding the term mental imagery. When participants were asked if they were familiar with the term "Mental Imagery", it was found that every participant in the study had heard of the term mental imagery before participating in this research. When Participant 4 was asked if she had heard the term mental imagery before, she responded "Of course! I mean, a lot of athletes do it, right?" This statement also pointed to another common trend in the participants' existing awareness of mental imagery, that being mental imagery was believed to be most often used in a sports context. Participants 4, 5, 6, 7, 9 and 11 all indicated personally having used imagery as an athlete. For example, Participant 6 stated "When I played college volleyball we used it, we just did some stuff before the game, sometimes

we got talked through it, sometimes we did it on our own, that kind of stuff" and Participant 11 commented "I was quite involved in it in university when I was playing football and then when I played in the pros a bit, I used it quite a bit".

With respect to the source of participants' existing awareness regarding mental imagery Participants 7, 9, 10 and 13 indicated that coaches had introduced them to mental imagery. Participant 2 suggested that he "... first ran into the idea in a University course", and this was echoed in similar comments made by both Participants 8 and 11. These two sources (i.e., coaches and university courses) appeared to be the most common sources for the existing mental imagery awareness that the participants held.

Based on the participants' existing awareness it was clear that within this participant pool the two most commonly known reasons for using mental imagery were to "...help relax" or to "...visualize" a physical event or skill. When considering relaxation, Participant 8 provided the following insight:

> I went to some sessions (yoga) and they were talking about nights when you can't sleep or your head and brain is racing and maybe you need to mentally picture yourself on a beach, relaxing, the waves, etc. Using it that way as a relaxation technique is a second way I have heard of mental imagery.

As for knowledge regarding the use of mental imagery to visualize physical skills, a good example of this was the following comment by Participant 4: "Working on a skill; seeing yourself doing a skill over and over; maybe it helps with muscle memory".

Summary

The responses from the teachers clearly demonstrated that most of them had at least some existing awareness of what mental imagery was. Whether it was simply recognizing the term or having personally been introduced to it through sport or education, the participants in the study, some more than others, were aware of this concept and some of its possible uses.

Coding Tree

When analyzing the data for this research, a coding tree was developed using both deductive and inductive analysis to help organize and illustrate the themes and sub-themes that emerged from the data. Because of the model created for the present research and Paivio's (1985) framework that has suggested mental imagery can be either cognitive or motivational, both of these functions of mental imagery were selected as major themes for the coding tree. However, some of the data analyzed clearly did not fit under these two themes and thus another major theme (i.e., "other") was created to include this data in the coding tree. The majority of the findings were related to the cognitive function of mental imagery used by physical education teachers in this study. This was not surprising because most of the teaching behaviours included in the research model and investigated in this research were cognitive in nature. Thus, there was more data regarding the cognitive function of mental imagery. The model for the present research, based on Bandura's (1977, 1986) social cognitive theory, helped to further divide the data related to the cognitive function of imagery into physical education teaching behaviours and self-regulatory behaviours for teaching physical education. A detailed description of the final sub-themes that resulted from the data analysis

can be found in the next portion of this chapter.

Cognitive Function of Mental Imagery Use for Teaching Physical Education

As suggested by Paivio (1985) mental imagery serves both a cognitive and a motivational function. The largest amount of data collected in this study was related to the cognitive function of the participants' mental imagery use. The reason for this can be attributed to the fact that this research focused largely on the behaviours and self-regulatory behaviours of physical education teachers, and based on Paivio's (1985) work most of these are cognitive in nature. The following section reports the themes and sub-themes that fit under the cognitive function of mental imagery use that were found during analysis of the data collected in this study.

Teaching Behaviours: Skill Instruction

Providing instructions on how to perform motor skills is one of the central behaviours undertaken by physical educators (Fishburne, 2005). Therefore, it was not really a surprise that this behavior was one of the most highly discussed by the participants in this study. The participants made more comments regarding using mental imagery in connection with this teaching behavior than any other. Eight different sub-themes emerged from the data on the use of mental imagery by participants in connection with providing motor skill instruction. These sub-themes were labeled who, when, visual, kinesthetic, auditory, metaphors, what's being taught, and reasons for use.

Who. The first sub-theme that was identified was related to who (e.g., themselves, students, professionals) the physical education teacher participants

mentally imaged when using mental imagery to help with skill instruction. Of the seven participants that commented on who they mentally image as part of their skill instruction, six of them (Participants 1, 5, 8, 12, 13 and 14) suggested that they sometimes mentally image themselves doing the skill. For example, Participant 12 commented, "I have to visualize myself doing it first, then I have to show the skill". Another example of this was found in the following statement made by Participant 14:

> I was a terrible free-throw shooter, so when I'm teaching shooting I always have that in my mind. Seeing myself. I have a picture that I used to use as a player. You know, the slow motion of the ball, the position the ball's in, and you see the ball leave your hand. Sometimes it just comes back because I'm so used to seeing that.

Although the participants most commonly cited mentally imaging themselves to aid in skill instruction, some of the physical education teachers in this study also imaged previous students or other people who are proficient at a skill (e.g., friends, professional athletes) completing the physical skill as part of their instructional behaviour. When describing who he mentally imaged before providing skill instruction, Participant 2 stated:

> I guess I am imagining people who do it correctly. I am thinking about the Reggie Miller's, the people that other experts have said have great form and their body is in good position and the rotation of the ball, all of that is good. So I know what that looks like in my head so that is what I am trying to convey to them.

Whereas, Participant 13 made the following comments when discussing the same topic:

> How I would do it or other people that I have played with or whatever. Like people around me who have done a good job. I may even watch a student, we have a few students that are phenomenal, some of these guys I am like yes, that is how you do it. I can even see some of them right now as I am going over in my mind students that are really good, showing the proper form.

Thus, it appears that depending on their personal preference the physical education teachers in this study could mentally image themselves, students, or others to aid in their skill instruction behaviour.

When. In the data regarding mental imagery for skill instruction another distinct sub-theme that emerged was comments related to when the participants were using mental imagery to aid in the behaviour of providing skill instruction). By far the most commonly mentioned time for using mental imagery to aid with skill instruction was immediately before providing instruction. Participants 1, 5, 8, 9, and 11 all commented on using mental imagery right before teaching a physical skill during their physical education lessons. This trend was exemplified by Participant 1 when she stated:

> So if it is a basketball class, they are shooting, warming up, so at that point in time I know I am going to be doing 3-point shots today or I know I am going to be doing foul shots, so I go over that in my head.

Another good example of physical education teachers using mental imagery immediately before instructing a skill was demonstrated by Participant 11, when he said:

> As the class is going I am always one step ahead of what I am actually teaching. What is the next element? Maybe while I have sent the kids off to practice one thing, I am kind of rehearsing in my head what the next element is that I am going to teach.

However, using mental imagery right before instructing a skill was not the only time that was mentioned by the participants. Using mental imagery during skill instruction was discussed by both Participant 8 and Participant 15. For example, Participant 15 said "I'm thinking in my head, going through the checklist of what

the parts of the movement are, and then you're kind of adding to it as you explain it"

Visual. This sub-theme involved data related to participants using visualization as part of mental imagery for instructing motor skills. Most of the participants involved in this study (12 out of 15) indicated using visual mental imagery to aid in their instruction of physical skills. Having a "...picture in my head..." or "...visually imagining..." what a physical skill should look like were common ideas presented among these participants. For example, Participant 5 stated:

> Whenever I am teaching a skill I have that visual picture in my head... So if I am teaching students how to do a smash in badminton, prior to going through the steps it is probably in my head.

Another good example describing visual mental imagery use by one of the participants was when Participant 15 said:

> I guess with a basketball jump shot. There are so many elements to it that make a successful jump shot, that you try to break it down for the students, but in my head I'm imagining what are the main points and what are the key things I should be going through.

These comments indicated that the use of the visual mental imagery in connection with this teaching behaviour (i.e., providing skill instruction) was used by the participants to provide a clear image of the proper technique so as to help explain what the skill should look like. This finding was further supported by Participant 7 who suggested "...imagining what the skill should look like" and Participant 13 who stated "...I might walk through the steps in my head"

Kinesthetic. Comments focusing on "feeling" or kinesthetic sense when using mental imagery to aid with skill instruction were the basis for this sub-

theme. Mental imagery related to this was not as frequently discussed or used as visual mental imagery was. Only one participant, Participant 12, specifically stated that he imagined how a skill should feel before he taught it. In his description of using mental imagery to help teach curling skills he stated:

> I have already done that probably a 100 times in my head between the night before and when I get on the bus, thinking about what is the first thing I am going to do, what will get to cover, I should give them a demo, what are my demos, so I am visualizing that. Where am I holding the broom, how is that going to <u>feel</u> on your back, put myself in balance with the rock.

Participant 11 suggested he tries "...to create an image in their head, either using a demonstration, giving them a feeling of what the skill should feel like". The other participants who mentioned "feel" of a movement (Participants 2, 3, 8, and 13) did not clearly indicate that they themselves were using kinesthetic mental imagery, but instead discussed how their students should learn to understand the "feel" of a movement. For example, Participant 2 commented "I am always talking about what's a good pass feel like? After they do 4 or 5 in a row, I will tell them "don't forget that feeling".

Auditory. This sub-theme involved data related to participants using sounds as part of mental imagery for instructing motor skills. As with kinesthetic mental imagery, the participants were less likely to report using this type of mental imagery for skill instruction in comparison to visual mental imagery. However, there were four participants that described using auditory imagery to aid in this behaviour. The following discussion with Participant 11 is a good illustration of such imagery use:

> Participant 11. We talk about the sound on the setting of volleyball, what it shouldn't sound like and what it should sound like.
>
> Interviewer. So you have a clear image, not just a picture, but a mental image of what the sound should be when you set. Is there a clear sound in your head of what it should sound like if it is done right?
>
> Participant 11. Yes I do. Usually again, partly from my own experience, but a lot of time from watching higher levels of volleyball, whether our team is playing, our coach is setting or clinics or whatever, usually I try to have that image when applicable. When there are sounds involved I would try to relay that to the kids in my teaching.

Similarly, Participant 12 also discussed imaging the sound when setting a volleyball and trying to encourage students not to make a slapping noise when they set the ball.

Participant 3 reported that "I always imagine hitting a soccer ball right in the middle of the ball, it should have a punch sound, rather than if you are slicing under the ball". Whereas, Participant 10 offered the following insight with regards to her personal use of auditory mental imagery when instructing dance steps:

> Any mixers, patticake polka, Tennessee wigwog, two-time mountain stomp. It is always like I know what they all are, but which one is it and sometimes I hear the music in my head and think, oh yes.

Metaphors. This sub-theme involved data related to participants using metaphors as part of mental imagery for instructing motor skills. Most of the physical education teachers that were interviewed (10 out of 15) discussed imagining other things and then describing these to students to help teach a physical skill. Participant 15 offered this insight regarding his use of metaphors:

> The metaphor I use for a class or a student I guess depends on what they have done before. For example, when I did my badminton unit, trying to teach an overhead smash, for my volleyball students it was an easy

> metaphor for an overhead swing. The old tried and true draw the bowstring back or backscratcher position and stuff like that.

Similarly, when talking about teaching students to dribble a soccer ball, Participant 3 provided the following story:

> I said imagine the ball is a dog and you have to walk your dog and keep it close to you, you don't want it to get too far away. Then I put these cones up. Now you are in the park and you have to keep your dog within the park. Outside is the road and cars can come and run over your dog. And there are some students that are sadistic and say Hey my dog got run over, haha! You are picturing things, not that exact skill, but I am a story-teller, metaphorically I use that a lot when I teach.

Similar descriptions and stories regarding the use of metaphors to help teach physical skills were provided by Participants 1, 4, 5, 6, 9, 11, 13 and 14.

When asked "...why she imagined these metaphors and then used them to help provide instruction" Participant 5 responded "Because I think they are movements that a lot of them already know so it is a reference for them". Participant 15 provided a similar response when he stated, "all students learn in different ways and just giving the kid something to mentally think about might give them a better opportunity to replicate the skill I'm looking for". Other participants cited using these metaphors because "People remember by using association" (Participant 14). A good example of this type of thinking was found in the subsequent comment made by Participant 13:

> ... it is fun, with basketball, you are pretty much like picking your nose guys. Like now all of a sudden it is funny. They are likely to remember that. Here is the technique, where does it go, but yeah she has to pick her nose. I can't believe our teacher just said to pick your nose. They will probably remember that.

What's being taught. Many of the participants revealed that their use of mental imagery to help them with instructing was influenced by what they were

teaching. First of all, some of the physical education teachers in the study (Participants 2, 5, 6, 10, 11 and 13) suggested that if they were teaching something "... new…" or "... less common to them…" they were more inclined to use mental imagery to help with skill instruction. Some participants (Participants 1, 5 and 14) also indicated that they were more likely to use mental imagery to help instruct skills that they were less confident about teaching. This was best illustrated in the following comments made by Participant 1:

> I think it would be useful in the things I am not so confident in teaching, like the things we were talking about before. Things like a basketball layup, for example, scare me to show in front of the class. Going through the steps in my head or how the arm is going to go up and using the backboards before actually demonstrating it would work in that scenario. That is when I would most likely use it as opposed to a situation where I have done something 1000 times, before I would feel more confident in the actual instruction time. Things that I feel less competent with, I think going thru the process first would help me do it.

Thus, it would appear that mental imagery is most often employed by these physical educators for aiding in the instruction of skills that are somewhat novel to them or skills that they are less confident teaching.

It should also be noted that one of the physical education teachers in this study indicated that the ease with which they were able to mentally image a skill was dependent upon what type of skill they were teaching. Specifically, Participant 11 said "The skills I am fairly confident in are fairly easy for me to recall. What does it look like? What are the elements of throwing a football?"

Reasons for use. The final sub-theme for this behaviour (i.e., skill instruction) was based on responses from the participants regarding why they felt mental imagery was important to them with respect to their skill instruction.

Eight of the participants (1, 8, 9, 10, 11, 12 and 14) specifically discussed why mental imagery was an important aid to them when performing this behaviour. Participant 1 suggested the main reason she would do mental imagery with this behaviour was "… because it would give me more confidence, it lets me review the skill in my head first to know exactly what I am going to do and how it should look or turn out". On the other hand, Participant 10 offered the following comments regarding why she used mental imagery for this behavior:

> Participant 10: Every year I teach it and I love that unit (wrestling). Every year we teach holds at the very end and how to take people down and every year it is like, ok, this arm is here, this arm goes here, that one is here, left, right, left leg steps here, then this is what you do. It is always having to slowly go through in my head.
>
> Interviewer: Why is that visual so important for you?
>
> Participant 10: Because I can't remember it from year to year.

Thus, it appeared that some of the teachers in this study also used mental imagery to help remember skills that they are about to teach and provide instruction on.

This idea of using mental imagery to remember a skill so that instruction can be provided was very similar to the most often discussed reason for using mental imagery to aid in skill instruction. That specific reason being the need to know what a skill should look like and having a visual mental image to be able to explain a physical skill. For example Participant 12 stated "I think imagery is a big thing in teaching because if you know what it looks like then you can teach it", and Participant 14 said "For me, having a clear visual of what something looks like helps and can be transferred to them I think". When Participant 11 was asked how important mental imagery was for him in providing skill instruction,

his response "Very important, because I have seen teachers try to teach something that they don't know what it looks like and it doesn't usually go off very well" also indicated the need for a visual image when providing skill instruction.

Finally, Participant 8 provided the following insight regarding why he believed mental imagery was important for him with respect to skill instruction:

> I am not really sure what it would be like to teach or coach or demonstrate without that imagery because I really think that I do use it that often, it happens that naturally. In a sense maybe it is vital no matter whether you have lots of experience or not because of the fact that I do it all the time naturally, maybe it is that vital. It is almost impossible to do it without the mental imagery. It is maybe a function of the brain, the brain needs to create that, whatever those functions are that are going on in there, that is part of the process.

Although he did not clearly pinpoint a specific reason why it was important to him for performing this behavior, it was obvious that Participant 8 clearly believed it was necessary and valuable.

Teaching Behaviours: Games and Activities

Fishburne (2005) suggested that teaching games and activities is another central behaviour often common to physical education teachers. Consequently, it was an area that was focused on during the interviews that were conducted for this research. The physical education teachers in this study did suggest that mental imagery was used to aid in this behaviour. The major sub-themes that the participants focused on with regards to using mental imagery for teaching games and activities were: setting up games and activities, modifying games and activities on the fly, and how what they were teaching influenced mental imagery use.

Setup. This sub-theme of mental imagery related to the teaching of games and activities focused on mental imagery during the physical education lesson for the purpose of setting up activities and games. Eight of the participants in the study discussed using mental imagery related to setting up games and activities. When Participant 6 was asked to discuss her use of mental imagery when running drills or activities she responded, "You have to look at your space, safety with equipment, do you have enough space? With 36 kids in a little space is it good to explain floor hockey? Probably not". Similarly, Participant 9 said, "I think that (mental imagery) is inherent in setup for different drills and activities. You need to know what it is going to look like to do it properly". Another similar sentiment was reported in the following statement by Participant 1:

> I would say in terms of setup of the field, in football for example, there are so many positions, so much to think about, I would picture in my head where I want the girls stationed in terms of using the playing area that they have to. Because especially in our school we have so many classes going on at the same time, we have limited field space so it is not like we get a full football field to play on. So I have to picture how I am going to set up the girls in the space that we have and how I am going to try to get them to relate to playing the game in that way. For example, we never use end-zones for a touchdown, it is always like a track on the sides, because that is the end. We play width-wise that way. So in terms of the set up of positioning I would say that is where it would be used more for me versus doing drills and things like that.

Thus, it is apparent that mental imagery can be of help to some physical education teachers for setting up games, drills and activities.

Modify on the fly. Participants' most commonly cited reason for employing mental imagery to aid in the teaching of games and activities was "to help modify games or activities on the fly" (i.e., making changes in the moment). With the exception of Participants 2, 6 and 9, all of the physical education

teachers that were interviewed described using mental imagery to help modify games on the fly. More specifically, these participants suggested that they used mental imagery to imagine ways to fix a game or activity that was not running as smoothly as they would like. For example, Participant 3 stated:

> I will see something and think, "How do I adjust it?" So I am doing it all the time. I am imaging, "What can I do to make it successful?" So I imagine, ok, make this modification, but if it doesn't work, ok we are going to add this too, or we are using a beach ball instead of a volleyball.

Another example of using imagery to help make activities better on the fly was provided in the following comment by Participant 8:

> As they do it once, it runs through my head again, "Is this working?" "Should I do it differently?" As it is going through my head, I think "maybe I should do it this way", "this will work better". It is all part of the process. A lot of it is not intentional. I don`t intentionally do it, it just happens as a process.

Using mental imagery for this purpose was one of the most highly cited sub-themes in the entire study (25 individual comments were made regarding this sub-theme).

What's Being Taught. A few of the participants reported that their use of mental imagery to help them teach games, drills or activities was influenced by what they were teaching. Both Participant 5 and 10 suggested that they find mental imagery to be useful for them when they are teaching an entire dance routine. Participant 5 said:

> I want to make sure I have that pattern right. There is a particular dance that I teach and I always get it mixed up, I get the steps mixed up. I don't know why after 26 years that this particular motor pattern of polka steps would not register in my head. That is an example of when I probably do stand there and I see it in my head, I go through the kinesthetic part without doing it full out, just to make sure I have the pattern right.

Dance was not the only specific activity or drill that was mentioned by the participants. Participant 14 suggested that she has found mental imagery helpful when teaching games that her students have not done before and the following comment by Participant 2 describes how he uses mental imagery to help teach specific drills:

> A certain class just might not get the give and go concept so I am trying to imagine in their heads, what is it about the give and go or some movement pattern where it is 2 or 3 people, what is it that they don't understand? As they are doing it, I am trying to think of what is a better way of teaching or explain it.

Based on these few examples it is evident that for some of the physical educators in this study the type of game, drill, or activity being taught may influence the teachers' use of mental imagery.

Teaching Behaviours: Maintaining a Positive Environment

One of the common physical education teaching behaviours identified in the literature review for this study was managing and maintaining a positive learning environment. The results indicated that some of the participants interviewed were using mental imagery to aid with different aspects of this behaviour. One way in which the participants reported using mental imagery to aid with this behaviour was in seeing potential safety problems that could occur if students misuse equipment. This was illustrated nicely in the following comment made by Participant 15:

> I can see things that are about to escalate or I can see potential problems. You know, as soon as you give a kid a piece of equipment the things they are starting to do with them you can see like OK this is going to be a problem.

Participants 2, 11 and 12 also made similar suggestions during their interviews.

Another way in which mental imagery was used by the physical education teachers to help manage and maintain a positive learning environment was for avoiding personal clashes between students. Specifically, imagining situations where certain students should be kept apart to avoid problems. This was best exemplified when Participant 7 mentioned that:

> Sometimes when you have kids in your class that aren't very cooperative with others or aren't very good at team work, then I guess in my head I must see how to make these teams or combination of kids so that things are going to work.

Participant 1 also indicated that she used mental imagery before lessons to "... picture and imagine how the lesson is going to look", as a means of avoiding "...down time..." that could negatively affect the positive learning environment.

In addition to using mental imagery to help see potential problems before they occur, Participants 1 and 13 also indicated that they used mental imagery to reflect on how they dealt with a behavioural issue. Specifically, this was described in a story told by Participant 13 in which she suggested:

> I imagine the first time I raised my voice to a student and I was angry and I can still remember exactly who it was and where it took place. Wow, I will never, ever do that again. It was a total waste of my energy, negative, so I totally remember that since then.

Similarly, Participant 1 stated "I find myself picturing scenarios after they have happened in terms of classroom management. So how would I have dealt with this student otherwise?"

Not all of the participants suggested that mental imagery was part of their management and maintenance of a positive learning environment. When Participant 14 was asked to discuss using mental imagery for such purposes she

suggested that she does not use imagery for managing and maintaining a positive learning environment because of the spontaneous nature of this teaching behaviour. "It just happens", she said.

Teaching Behaviours: Assessment

Assessment is a central part of teaching and learning in general (Grout & Long, 2009). As a result, it was an area of interest in the present research. All of the participants in the study indicated some use of mental imagery to aid in their assessment. The specific sub-themes that the participants focused their dialogue on were using mental imagery to help with feedback and correction, using mental imagery to help with grading, and also who they specifically imaged to aid in their assessment behavior.

Feedback and correction. Suggestions were made by Participants 1, 4, 6, 11, 12, 13 and 15 that when they are watching a student perform a skill they "... make comparisons..." in their head of how the student does the skill and how the skill should be done. Case in point, Participant 6 stated, "When I am watching them, I am comparing them to what I look like in my head doing it and I have seen other people do. It either matches that or it doesn't". This was also illustrated in the following comments made by Participant 12 while talking about how she corrects her students' technique in volleyball:

> You have to have imagery because you have to imagine what the perfect set or perfect underhand pass or bump looks like. So when I am looking at my students do it and say what is wrong, I can look and tell right away, you have your elbows pulled back when you are hitting on your hands. In my head that is wrong. It clicks right away because I know what it is supposed to look like.

In a similar line of thinking, Participants 1, 3 and 10 described using mental imagery to identify specific parts of a skill that a student may be performing wrong and using that image to help correct the skill performance. For example, Participant 10 made the following comment about her use of mental imagery to help provide feedback and correction:

> I think the times where it gets me the most is if someone is doing something that is just kind of off and you can't quite put your finger on it. You think what are they doing in my head, what should they be doing and trying to pick out that one small thing they have to change. If you don't know a skill too well it is like, how do I describe this? What does it have to look like?

Grading and evaluating. Seven of the fifteen participants mentioned that they used mental imagery in one way or another to help them grade a student or evaluate the quality of a student's performance. Participants 15 and 8 specified that they used mental imagery to help remember a student's performance after the fact as a means of establishing a grade (i.e., at the end of the week or unit). Participant 15 illustrated this use of mental imagery in the following comment:

> For sure, yeah. I guess it comes in two ways. The first one is that skill mark. As I'm giving them their skill mark it's usually at the end of the week or sometimes, unfortunately, even a week later sometimes you go back and fill in those marks. So I'm thinking back in my head, ok what was this kids skills like. Trying to figure out which group of kids are, these are the 5, these are the 4, these are the 3. Like what are kind of the criteria. Again, I'm trying to make it as objective as possible. I've got the criteria written out, so now it's kind of trying to match what this kids shown me and try to fit them in there.

Similarly, Participant 8 stated:

> I find when you are doing progress reports, writing comments, now the grade is done and you are writing comments about this individual, imagery is happening all the time. I am imagining how often can I remember him helping set up equipment, take down equipment, what is his attitude usually like, what is his approach, is he really positive, or just in the game

> in the moment. I try to imagine things to communicate to the parents. "This is what he is like, this is what we want to see improvement in". There is really a lot. Each individual, the imagery starts happening and I think about it.

However, this was only one way in which the participants reported using mental imagery in their grading and evaluating of students' performance.

Some of the physical education teachers in the study (Participants 7, 11 and 14) described using mental imagery during the lesson to evaluate how good a students' performance was. For example, Participant 11 stated "When I am watching someone do a skill I will have an image in my head of what it should like. I will hold their image up to the image that I have in my mind". Additionally, Participant 14 provided the following insight about her use of mental imagery to help evaluate students' performance:

> In terms of what my expectations are. You see what it should look like in your head and are they at that point. Are they excellent, proficient, adequate? Where are they in reference to my scale of what the skill should look like. That would be visualization because I know what it should look like. A kid here may be excellent and a kid here may be adequate.

Finally, one of the participants in the study (Participant 6) indicated that she used mental imagery to help plan for her grading. She provided the following description:

> When I am starting something new, the hardest part is me thinking it through. Before I write anything down I work it all out in my head as to what I want, then even my assessment things when I change the percents to letters, thinking about what to include in each of the categories and how that is going to look when I mark it and what is actually going to come out.

Who. The final sub-theme for this teaching behaviour that emerged from the data focuses on who the study participants were imagining when using mental imagery to help with assessment. When it comes to using mental imagery for

grading purposes it is no surprise that the participants who discussed this all cited imagining the actual students. This was illustrated best by Participant 8 when he stated:

> I am imagining how often can I remember him helping set up equipment, take down equipment, what is his attitude usually like, what is his approach, is he really positive, or just in the game in the moment. I try to imagine things to communicate to the parents

On the other hand, when the participants were describing using mental imagery to make comparisons to help provide feedback, they all suggested that they imagined someone who was good at the skill. This could be an expert or professional athlete as suggested by Participants 4 and 11, or it could be a mental image of themselves performing the skill as suggested by Participant 6.

Self-Regulatory Behaviours: Planning

The American National Association for Sport and Physical Education (2003) listed competent planning as a key component of teaching physical education. Consequently, this self-regulatory behaviour was an area focused on in the interview guide created for the present research. The data from all fifteen participants in the present study indicate that mental imagery was used to aid in their planning. The main sub-themes that emerged from the participants discussions of mental imagery in their planning were: organization, equipment and activity setup, where they were doing this mental imagery, for what specific skills and activities they were using mental imagery to help plan for, and finally why they felt mental imagery was important in aiding with their planning.

Organization. How to organize units or lessons was found to be a sub-theme for which the participants in this study used mental imagery as part of their

planning. With regards to using mental imagery to aid with organizing a unit plan, Participant 1 stated:

> I would say for each unit. I don't know if I am good enough yet to think about an entire year, but for a unit, we know ahead of time that we have 2 wks to do this unit say. So thinking about it in terms of what I want to do, when, and taking into consideration the level of the class and what I think they can do and not accomplish in that amount of time, just to picture how things are going to go and using it to define what each day will look like within that lesson and how I want to use my time best. That is how I would use it then in terms of unit planning.

Similarly Participant 5 said "As for unit planning I will go in my head, a Friday or Thursday before I am starting something new, then this is what I am doing this day, this day and this day". This idea of using mental imagery in organizing a unit was also mentioned by Participants 3 and 11.

As for using mental imagery to help organize a specific lesson plan, eight of the participants (Participants 1, 3, 4, 8, 11, 12, 13 and 15) discussed this. When Participant 4 was asked to describe why he uses mental imagery to help plan his lessons he responded "... it just kind of organizes things in my head. What it is going to look like, or what my class is going to look like". Participant 11 stated:

> I would say 90% of it (lesson planning) is mental because I am going to picture everything I do in my head probably once before I go out and teach it. I would actually run through the whole lesson, run through the whole skill development, the steps or sequence I am going to teach and I would also recall past experiences. Like last year when I taught this, this didn't work, lets try this and maybe that lets try this requires me to go out, talk to a basketball expert, or volleyball expert and find a new way.

Likewise, Participant 3 suggested he used mental imagery for planning a dance lesson because it helps him to know "... how it (the lesson) is going to be organized so it is successful, so you don't look like dumb at the front of the gym".

Equipment setup and space. A second sub-theme that emerged for participants' use of mental imagery in their planning was mental imagery to do with the equipment needed and how to set up activities. Ten of the fifteen physical education teachers that were interviewed made comments regarding this use of mental imagery in their planning. Of these, three suggested that sometimes in their planning they have mentally imaged the equipment they will need for a lesson. For example, Participant 12 stated "You already picture what you want to bring out for equipment and stuff like that because it is safety and it is the first mistake the student teachers make. They take out everything and everything is all over the place". Both Participants 1 and 13 reported similar use of mental imagery to plan what equipment they would need for a specific lesson.

In addition to mentally imaging what specific equipment they will need, some participants also reported mentally imaging how they will set up that equipment as part of their planning process. Specifically, Participants 6, 7, 9, 13 and 14 reported using mental imagery for this purpose. Participant 6 illustrated this when she made the following comments:

> Usually I use some kind of fitness stations, so I have to have all my fitness cards with the words on them. I will take all those, flip through them, think about where I am going to put each of those stations? How is it going to look? How much time am I going to put on those? I have something that I am starting with and I go from there and think about it. I need to think about where the starting point is.

Likewise, Participant 14 stated:

> I know exactly where I want them based on what has worked in the past. You can see how it should be set up properly and you see where the major mat is if they are performing on practice mats. You know, another thing is doing CPR. How I want my mats set up for effective teaching of CPR.

> These are all things I have in my mind before I get to my class so that I know how things need to be done.

Based on these and similar examples provided by other participants it was clear that mental imagery was perceived by some of the teachers as a vital part of planning how to set up the physical education environment.

Participant 8 said at one point in his interview, "You have to know where you are going to be. To plan something without knowing what the facility is like is almost impossible". Participants 1, 3, 7 and 11 also mentioned that when doing mental imagery as part of their planning for use of equipment and space they sometimes have to specifically imagine the facility or space that they will be teaching in. Specifically, Participant 7 elaborated on this by providing the following example:

> OK an example would be I have 29 kids in a class and I want to do a basketball drill but I want to get them all moving very quickly and nobody is waiting around. I picture, ok, I have 6 baskets that would mean 5 to a basket, so how can I make it so that there is maybe 1 to 2 mins between the time that they stand and the time that they are moving again and there is not a lot of down time.

Where. When asked about where they typically are when they do this mental imagery to help with their planning the participants provided a large variety of locations. Some of the participants suggested that using mental imagery for planning typically occurs in one or two specific locations, such as Participant 8 who stated "I do it at home" or Participant 11 who said, "Usually in my office or at home. Usually in front of a unit plan and my calendar". Participant 6 suggested that she does it "... mostly while I'm driving..." in my car, and this was a place where Participants 8 and 12 cited using mental imagery as

part of planning. However, other Participants 1 and 8 suggested that this mental imagery to help with their planning can occur almost anywhere. Participant 1 stated, "Sometimes at school or at home or sometimes out for coffee with somebody. It happens in a lot of places"; and Participant 8 said "Everywhere. At work, at my desk, at my computer, driving, in the bathroom, shower, everywhere. Anywhere and everywhere, when the thought strikes me, I am doing it". Therefore, it would appear that depending on the teacher, mental imagery to aid with planning can occur almost anywhere the teacher wants to do it.

What's being taught. Some of the participants in the study suggested that their use of mental imagery to aid in planning can sometimes be dependent on what they are teaching. Participants 6, 12 and 14 all indicated that they were more likely to use mental imagery in their planning of an activity that is new or uncommon to them. For example, Participant 6 stated, "If it is something I haven't done before, I spend way more time sitting and thinking about it than if I have done it before". However, in contrast to this idea of using mental imagery more for something that is novel, Participant 5 suggested "... if I am doing something new, it is probably going to be written in detail, but something that is very routine, that I have done a lot of, is all in my head".

Finally, Participant 3 suggested that his use of mental imagery in planning depends on his comfort level with the activity being taught. He stated:

> I will spend more time on things I am not comfortable with, which I think any teacher would. I am not comfortable with dance. I will spend more time prepping for a dance unit than I would for slow pitch. I don't dance every day, it is not a strength of mine. So you spend more time visually planning everything you are going to do in a dance unit than you would in organizing teams for a slow pitch game.

Consequently, the results seemed to suggest that for the physical education teachers in the present study, mental imagery use in planning was sometimes influenced by what they were teaching.

Reasons for use. This sub-theme deals with why the participants perceived mental imagery to be an important part of their planning. The first main reason, as suggested by Participant 4, was that mental imagery "… actually helped me organize it (the lesson) in my head and so I was more prepared to teach the lesson". Using mental imagery for this reason was also referred to by Participants 1, 7, 12; and also Participant 11, who when asked why he used mental imagery to help with planning he responded:

> To be prepared. As a teacher, if you are not prepared for a unit and for me that is the best way to prepare. Maybe some teachers need to read through the steps, for me it is in my head, it is that mental rehearsal.

Participants 1 and 6 also suggested that mental imagery was an important part of their planning because it "... helped make lessons run smoothly". For example, Participant 6 suggested:

> I think it (mental imagery) makes the lesson a better lesson, it is more productive. Things run more smoothly because I have already thought about where they are actually going to be instead of putting them their and going well this doesn't work.

Additionally, Participants 3 and 12 suggested that they have done the mental imagery as part of their planning to ensure that they will "... not look like an idiot..." in front of their students when teaching an activity or skill.

Thus, it appeared that the teachers involved in the present study had a variety of different reasons for using mental imagery as part of their planning.

Self Regulatory Behaviours: Self Confidence

Using mental imagery to improve confidence was only specifically mentioned by Participant 1. However, she raised this topic several times throughout her interview. When initially asked what she uses mental imagery for in her teaching she responded "In terms of feeling confident I guess and going through the skill or whatever it is, that way I have used mental imagery". In addition she indicated that she had used mental imagery in both her planning and with her instruction to help improve her confidence. Although she was the only participant who specifically discussed using mental imagery to improve confidence, it was deemed important to mention because of the frequency with which she pointed this out. Furthermore, she herself suggested in the following quote that this use of mental imagery may be related to her minimal amount of experience (i.e., only four years):

> At this point in my career, because I still consider myself fairly new, I like to plan ahead of time, I like to know what I am going to do when I go in that class and it makes me feel better about the class, about what is going to happen if I have that image in my head.

Self Regulatory Behaviours: Safety

The importance of safety in the physical education classroom has often been noted in the literature (e.g., Whitlam & Beaumont, 2008; Whitlam, 2005). Eleven of the participants in this study (Participants 1, 3, 4, 5, 6, 7, 10, 11, 12, 14 and 15) indicated that they have mentally imaged possible safety concerns and injuries that could happen while they teach physical education. With respect to this idea of using mental imagery to help keep the physical education environment safe for students, Participant 7 provided this insight:

> As a safety aspect you would have imagery of what it should look like in a safe environment. I find new teachers, you don't see that. There might be a ball laying around, there might be a kid swinging a thing, whatever, but as you get seasoned, you are always looking at that too. I suppose that could be a mental imagery thing, this is what it should look like in a safe environment. I shouldn't have a chair sitting here, I shouldn't have balls on the floor when kids are running around and you need to make the kids aware of that too. That could be an imagery thing too, what safety looks like.

More specifically, all of the Participants who described using mental imagery in relation to safety suggested that they are using it to see things that could lead to potential injuries. Participant 12 said "...you have to look at all the things and imagine what can happen so you can try to eliminate as much as you can". Another good example of this was provided by Participant 4 when she was talking about teaching a fitness unit with her students. She stated "The safety just with the way you would lift the weight, you could really hurt yourself if you pick up something really heavy and you don't do it properly, so I just have that in my head".

In addition to this idea of using mental imagery to help see and prevent possible injuries, one participant suggested another use of mental imagery related to safety. Participant 1 said "I have never had someone seriously injured in my class before but I am always prepared in my head with a game plan as to what is going to happen". Thus, indicating that she used mental imagery to plan how she would deal with an injury if one did occur.

Self Regulatory Behaviours: Reflection

Teacher reflection has often been cited in the literature as a vital teaching behaviour (e.g., Rink, 2010; Whitehead & Pack, 2010). Consequently, it was one

of the self regulatory behaviours discussed in each of the interviews. It was evident from the analysis of the data that many physical education teachers involved in the present study used mental imagery to aid in their reflections. The participants in this study discussed using mental imagery during their reflection that was related to both specific things that students did and specific activities that were done during a lesson. Furthermore, sub-themes emerged regarding when the participants most frequently did this mental imagery and why participants felt this mental imagery was important during reflection.

Student specific. When it came to reflection there were some participants in the study who suggested they used mental imagery to reflect on the overall student involvement and participation in a lesson. In particular, when describing her use of mental imagery during reflection, Participant 6 stated, "It is always about how many kids are active, how much of my class is spent being active compared to not active and why was that". Participant 3 offered similar insight, as did Participant 15 when he provided the following discussion of his imagery use during reflection:

> For me, a lot of the things I spend time thinking about when I reflect is related to the dynamics we have. I mean, we have a lot of mixed co-ed class and the boys can be easy to get going, you know. So a lot of the things I spend time thinking about in my reflection is did the girls participate? Did they seem to be enjoying themselves? And how could I switch it next time so that I get more of that behaviour?

However, participation related mental imagery was not the only student specific mental imagery that the teachers in this study reported. Participant 7 provided a detailed account of how she uses mental imagery during her reflection to focus on specific students who are having a challenging time with what is being taught.

She provided the following example to help illustrate this:

> I picture that kid every day because this particular student is afraid of moving things and in a gym class I really have tried modifying in so many ways and I am actually lost. I don't have any more tricks in my bag. I am actually at a point in my career where I think we have to do something totally out of the box because if anything, this kid is so frightened. She is getting to the point where she is going to puke in the bathroom because she is so terrified. How do you not have movement and kids are not that controlled with catching and throwing things, so there are things that might hit her. For sure that kid every night, I think "What can I do"", then I think "There is a good idea!" So next day I come up with this great idea and something else that I never thought about would come up.

Activity specific. In addition to mentally imaging students, some of the participants in the present study also indicated that during reflection they mentally image specific activities that were taught during a lesson. Specifically, reflecting on activities and imagining "... what went well..." and "... what didn't go well..." were common types of comments made by Participants 3, 4, 7, 11, 12 and 15. When asked if he used mental imagery when reflecting and if so why? Participant 12 provided the following insight:

> I think yes because I have to think about what went well and right for the whole class. I think it is imagery after the fact. You have to go back and you have to think, was it a good class? Sometimes you come back and think that was an awesome class. Why was it awesome? You start thinking about all the good things that went well. Other days it was awful and you think what made it awful? OK I am not doing that again definitely. I think it is like backwards imagery. Reflection is like backwards imagery in some ways like you are thinking about what went well, what went right.

This and similar examples provided by Participants 3, 4, 7, 11 and 15 all clearly demonstrate that physical education teachers can and are using mental imagery during reflection to evaluate the activities taught during lessons.

When. The participants in this study most frequently suggested that the use of mental imagery to aid in reflection was done "... during the class..." or "... immediately following...". For example, when Participant 11 was describing his reflection he provided the following comments about using mental imagery for reflection during the lesson:

> As soon as you finish the skill in a class and move on to something else, it is in your mind. That is how I think. It is ok, "How did that go?" "What went well?" "What did not go well?" All teachers probably do that to some degree. Whether it is conscious or not you are processing that, you have to be doing that in your head.

Whereas, when Participant 3 was discussing his use of mental imagery during reflection he stated:

> Obviously I maybe do a little more after the class, like "That was an awful class", "That didn't work", or "How can I change it to make that work?" I don't formally do it, write it down. But I absolutely do it in my head.

Reasons for use. This sub-theme focused on why the participants felt mental imagery was an important part of their reflection. Participants 1-7, 11-14 all cited "... identifying what did and didn't go well..." and by doing so "... improving future lessons..." as the reason for using mental imagery while reflecting. This was possibly illustrated best in the following comments made by Participant 11:

> I want to reflect and find out the things that didn't work, why they didn't work and can they be fixed or eliminated. The things that worked, how can I repeat that? What did I do, say or explain that made it a success? Those good things you want to repeat, the things that didn't work you want to fix, eliminate or find an alternative for.

Further support for using mental imagery as part of reflection was forwarded in the following statement from Participant 12:

> I think you have to. I think it is important whether you do it internally, write things down, because if something is not working, you need to make changes and if it went really well you have to reflect on that too.

Motivational Function of Mental Imagery Use for Teaching Physical Education

The data collected in this study provided only a small amount of support for the use of mental imagery by physical education teachers as a means to help motivate themselves. Although the use of mental imagery for motivational purposes was specifically addressed in each interview, the majority of participants either did not indicate that they used mental imagery as a motivator for teaching, or they only provided a minimal amount of insight into their motivational mental imagery use. The most interesting finding with respect to motivational mental imagery was that based on Paivio's (1985) framework for mental imagery use only one major sub-theme emerged from the data regarding the use of motivational mental imagery among the study's participants (i.e., using mental imagery for the self-regulatory behaviour of relaxation). The participants' remaining comments and discussions about using motivational mental imagery in their teaching was very diverse and was not found to really fit into any specific sub-theme.

One motivator that was indicated was imagining students "...carrying on in activities after high school..." and "... leading healthy lifestyles...", as suggested by Participant 1. Whereas, when Participant 8 was questioned about using mental imagery for motivation, she said, "I think when you have successful moments, lessons, enjoyable things, those reply in your head. You want to recreate that.

You know what that is like and you want to get back to that". This was not completely dissimilar to Participant 13, who stated "My biggest motivation is seeing my students enjoying what they are doing" and images of this "...come back to me all the time".

Participant 13 describes in the following statement how she mentally images previous positive experiences to help motivate herself when things are challenging:

> I was at awards last night and I was like, do I really want to be here at 8 p.m. and it is snowing outside and I am missing a basketball game. I looked over at the student and he was so proud and then I just started picturing him in my class, I thought there is no other place I should be than right here. Some of those times when teaching can get tough, that is definitely something that I find is important.

Whereas, Participant 11 suggested "Seeing kids reach goals is a motivator...", "... hoping in your mind that this particular student is going to finally get it". This was somewhat echoed in the following discussion provided by Participant 2:

> I guess I am imagining the end point. It would be awesome if it was really important and you all achieved a level 4 and if you are all in the 80s and 90s but to me that is not it. The one kid might not ever be able to achieve level 4 at this stage of their development, but at the end when they can look and see where they came from, from here to here the improvement or the maintenance of what they already had and then now they have added other things and with more repetition they would get better at skills, they would get better at their public speaking, they would be more confident, more on time even, it could be something like their day to day time management skills. Me imagining the end point, thinking about I know how good it feels to be successful and I know how good it feels when a plan comes together so to speak, so you are always trying to achieve that feeling. You feel proud. Without recognition, I don't need external recognition to feel I am proud of myself because that particular person came a long ways and I know that part of what I did brought them to that point.

Self Regulatory Behaviours: Relaxation

Three of the physical education teachers in this study (Participants 6, 7 and 13) suggested that they have used mental imagery to help them with the self-regulatory behaviour of relaxation. For instance, during the interview with Participant 6 she stated "I have used it sometimes to calm myself down a little bit. If some kid really gets me going I will just walk away and go take a few breaths, relax, think about a nice something else for a minute". Whereas Participant 7 provided this insight about using mental imagery of previous vacation spots to help her relax:

> Sometimes when I am anxious about something or I feel overwhelmed because I have so many things to do I sometimes need some "ahhh" time. For me that has helped me. The imagery of remembering that special place where I was relaxed and I had the waves, sounds that I remember and I can really picture exactly where we were and when and what it felt like, the heat etc. Bringing in the senses, that is a common thing for me.

Other Information Regarding the Use of Mental Imagery in Teaching Physical Education

Some of the information provided by the participants in this study did not fit under the themes of cognitive or motivational mental imagery use for teaching physical education, but were related to the overall use of mental imagery in teaching physical education. Specifically, the results provided interesting information regarding the structure of the participants' mental imagery use (i.e., is it typically a planned behaviour). Additionally, data related to participants' overall perceptions regarding the benefits of using mental imagery to help them teach physical education was collected.

Structure of Mental Imagery

The structure of the participants' mental imagery use refers specifically to whether or not the participants indicated having set and structured times to use mental imagery. Based on the results from this study it would appear that the majority of time the participants in this study did not structure their use of mental imagery. For example when asked to discuss the structure of their mental imagery Participants 2 and 12 both indicated "... it is not structured". "Comments supporting this lack of structure, such as "... it just happens..." and "... I do it subconsciously...", were made by Participants 3, 7, 8 and 11. Participant 7 even stated "I didn't think I did anything with imagery but after talking to you for an hour I realize I must do that unconsciously a lot of the time". Similarly, Participant 2 stated "I did not even realize I was using it".

Perceived Benefit of Mental Imagery

The final sub-theme of the coding tree focuses on the participants' perceptions with regards to the overall benefits of mental imagery as a skill that can be used by physical educators. There were some participants in the study (Participants 1, 12, 14 and 15) who suggested that overall they felt mental imagery was "... helpful..." or "... useful..." to them when teaching physical education. Other participants (Participants 4, 6, 7 and 10) referred to mental imagery as "... an important skill". In particular, Participant 10 stated, "It is something that is important when you are new" and Participant 7 said:

> I think as a teacher, a coach or a leader, if you don't have an end picture, end goal or objectives then it is hard to plan a lesson. So if you don't see or visualize where you want to be at the end of all this then it is very

> difficult to teach and to get there. I think it is important because you must see that end thing, whether it is an end skill or an end game or a result.

Then there was Participant 3 who suggested that he perceived mental imagery to be "... critical..." and Participant 8 who stated "I think it is vital". There were no participants in the study who suggested that mental imagery was not beneficial to them as a physical education teacher.

Six of the participants in the study indicated what behaviour they felt mental imagery was most helpful for. Participants 6, 7, 12, and 15 suggested that they perceived mental imagery was most beneficial to them when planning. Conversely, Participants 10 and 14 indicated that using mental imagery to aid in skill instruction was what they perceived it to be most beneficial for.

Chapter Summary

A plethora of information was collected in this study and the intent of this chapter was to report and analyze the data acquired from this research. Overall, the participants in this study were found to be using mental imagery to aid in both their teaching behaviours and the self-regulatory behaviours involved with teaching physical education. Furthermore, the use of both the cognitive and motivational functions of mental imagery was apparent among the participants in this study. However, the use of the cognitive function of mental imagery appeared to be much more prevalent among this sample of physical education teachers. These results will be examined and discussed in the next chapter (Chapter 6).

CHAPTER SIX – DISCUSSION

In this chapter the results from the present research are interpreted, and connections are made between the findings from this study and existing literature. The discussion is guided by the overarching research question for the study: "What role does mental imagery play for those who teach physical education?" The chapter is divided into seven different sections. The first section focuses on the existing awareness that the physical education teachers had/possessed with regards to the concept of mental imagery. This is followed by five sections that are focused on discussing findings that are related to the five specific research sub-questions that were introduced in Chapter 1 (pg, 4). Specifically these address the physical educators' function of mental imagery use (i.e., cognitive, motivational), mental imagery related to specific teaching behaviours, mental imagery related to the self-regulatory behaviours undertaken when teaching physical education, mental imagery use structure, and perceptions regarding the benefits of using mental imagery in teaching physical education. The seventh and final section of this chapter is an overall summarization of the findings.

Physical Education Teachers' Existing Awareness of Mental Imagery

When examining the existing awareness of the participants with regards to the term mental imagery, it was found that every participant in the study had heard of the term before/prior to participating in this research. This term is not uncommon and consequently it was not surprising that the participants were familiar with it, however the demographics of the sample may also have influenced this finding. All of the participants in this study came from an athletic

background and eighty percent of them said that they were presently coaching a sport. Mental imagery is commonly encouraged by coaches and used by athletes of all sports and at a variety of competitive levels (Jedlic et al., 2007; MacIntyre & Moran, 2007; Morris, Spittle, & Watt, 2005) and thus it was likely that many of the participants in this study had existing knowledge of this term because of their involvement in sport. This fact was supported by those in the study who stated that they had been introduced to the idea of mental imagery by a former coach. Furthermore, all of the participants who took part in this study had an educational specialization in physical education, which means that it is likely these individuals may have been introduced to the idea of mental imagery as part of a university course. Three of the participants supported this claim by suggesting that they were introduced to mental imagery in such a course. Thus, it would appear that the major reason all the participants in this study had an existing awareness of mental imagery was because of their educational and athletic backgrounds.

Another likely by-product of the participants' similar backgrounds in sport were the common uses of mental imagery (i.e., visualizing physical skills, and to help with personal relaxation) of which they were already aware. Using mental imagery to visualize physical skills is one of the most highly encouraged uses of mental imagery for athletes (Murphy, Nordin, & Cumming, 2008). Due to the sample of participants in this study having athletic backgrounds and also the importance of physical skills in their profession it seemed logical that their existing knowledge of reasons to use mental imagery might focus on visualization of physical skills. With regards to using mental imagery for relaxation, Hall et al.,

(1998) reported that the second most common function of mental imagery use among athletes was MG-A mental imagery (i.e., mental imagery for arousal and relaxation purposes). This high frequency of relaxation related mental imagery among athletes might therefore help to explain why use of mental imagery to aid with relaxation was common knowledge to several of the participants in the present study.

Function of Mental Imagery Use for Teaching Physical Education

As suggested by Paivio (1985) mental imagery can serve a cognitive or a motivational function. The data collected in this study indicated a use of both the cognitive and motivational functions of mental imagery by the physical education teachers. With regards to the cognitive function, the participants indicated using mental imagery at both the general and specific levels suggested by Paivio (1985). For example, the participants demonstrated use of CS mental imagery in their imaging of physical skills before they teach or provide instruction in those skills. The participants' use of mental imagery to help plan lessons is a good example of the employment of CG mental imagery. Similarly, use of both levels (i.e., cognitive and specific), were demonstrated for the motivational function of mental imagery. The MS function of mental imagery was exemplified by the participants who suggested that they used mental imagery to imagine their students reaching certain goals and what it would take to get them there. The MG function was demonstrated in the participants' implied use of mental imagery to help them relax. Thus, the sample of physical education teachers investigated in this study

demonstrated a use of both functions of mental imagery. However, the two functions of imagery did not seem to be equally discussed.

The physical education teachers investigated in the present study provided a much greater amount of data regarding the cognitive function of their mental imagery in comparison to the motivational function of their mental imagery. It is possible that this might have been influenced by the specific questions asked in the interview guide. In Gubrium and Holstein's (2002) "Handbook of Interview Research" they argued that the questions asked during an interview will direct and influence the answers that are provided. Because this study focused on behaviours and self-regulatory behaviours that were mostly cognitive in nature, it is possible that this lead to responses that were more focused on the cognitive function of mental imagery use. However, it should be noted that the most common behaviours of physical education teachers identified in the literature review and examined in this study, are not the only behaviours in which physical education teachers do engage. For example, Darst & Pangrazi (2009) indicate that physical education teachers should set goals as part of their professional work. Using mental imagery as part of this behaviour (i.e., goal setting) would fall under the MS function of Paivio's (1985) analytic framework of mental imagery use, but it was not one of the behaviours investigated in the present study because it was not found to be commonly endorsed in the existing literature.

Although the questionnaire may have influenced the responses, it is also possible that the reason for the lack of participants' discussion regarding the use of the motivational function of mental imagery could be due to other sources of

motivation that exist for physical education teachers. Fattig and Taylor (2007) suggested that teachers are most commonly intrinsically motivated. For example, they may be motivated by the positive feelings they get from seeing students succeed. When teaching physical education, student success is often something the teachers can physically see. Thus, they may be less inclined to mentally image it to motivate themselves because they can see it without using mental imagery.

Another potential reason for the lack of motivational imagery use could have simply been because the participants in the study find the motivational function to be less beneficial than the cognitive function. This is an interesting idea when it is compared to athletes who have been found to use MG and MS mental imagery more than CS and CG mental imagery (Hall et al., 1998). However, with athletes, much of the MG mental imagery they use has been found to be related to "psyching oneself up to compete" (MG-A imagery) and imaging oneself being "mentally tough" or "focused" (MG-M). The need to mentally image being "mentally tough" or "psyched up" to teach a physical education class seems much less likely and consequently this might explain why the participants in this study did not indicate using these functions of mental imagery as much as the cognitive ones. Using mental imagery to make plans (CG) or to rehearse a physical skill (CS) would appear to be much more applicable to a physical education teacher and therefore it seemed logical that the participants in the present study were found to use these more than the motivational functions of mental imagery.

Cognitive Mental Imagery Related to Specific Physical Education Teaching Behaviours

The participants in this study discussed using mental imagery for a variety of physical education teaching behaviours. These included providing physical skill instruction, teaching full games and activities, maintaining a positive learning environment, and completing student assessment. There were many findings for each of these behaviours that warranted detailed discussion.

Providing Physical Skill Instruction

The fact that the participants in this study discussed using mental imagery in connection with skill instruction more than any other teaching behavior seemed logical based on the existing literature. First of all, physical education teachers spend 23.5% of their average physical education lesson providing instruction (McKenzie et al., 2000). Thus, this is a major part of their teaching and consequently a likely behaviour for them to talk about when discussing their teaching. Secondly, in other areas of research one of the most commonly focused on uses of mental imagery has been the mental imaging of physical skills (Edwards et al., 2005; Feltz & Landers, 1983; Whetstone, 1996). Most notably, Overby and colleagues (1997) reported that all the coaches in their study reported using mental imagery to help with the instruction of skills. Therefore, based on trends in other mental imagery research, the fact that the physical educators in the present study often discussed mentally imaging physical skills to help with instruction seemed to make sense.

Due to this plethora of information regarding mental imagery use for skill instruction, there were several sub themes that emerged from the data. Upon analyses of these sub-themes there were many interesting findings that will now be discussed.

Who were participants mentally imaging when providing skill instruction? The first sub-theme that is important to discuss was related to who (e.g., themselves, students, professionals) physical education teachers mentally imaged when using mental imagery to help with skill instruction. Several of the participants made suggestions that they typically visualized themselves personally performing a physical skill before providing instruction for that same skill. This is somewhat in accord with other mental imagery research. In most other mental imagery research (e.g., Arora et al., 2011; Gregg et al., 2008; Whetstone, 1996) subjects are always encouraged to mentally image themselves performing a skill because they personally are the ones who have to do the skill. For example, in the research conducted by Arora et al. (2011) with novice surgeons, it was those surgeons that had to perform the specific surgery tasks and therefore one of the important parts of the mental imagery used was that they could see themselves successfully completing the surgery. For the participants in the present study a similar need would exist if the teachers planned on personally demonstrating a physical skill to their students; as often is the case for physical education teachers. Rink (2010) suggested that physical education teachers must strive to make sure that demonstrations are accurate. Thus, if physical education teachers are going to perform the physical skill themselves they would most likely want to see

themselves successfully completing the physical skill as part of their mental imagery to ensure their demonstration will be useful to their students.

On the other hand, some physical education teachers do not always personally do the demonstrations during skill instruction. In some instances a teacher may actually be teaching a physical skill that they personally cannot effectively perform. This might help explain why some of the participants in the current study suggested that they did not mentally image themselves as part of their instruction but instead mentally imaged someone else such as a professional athlete or a previous student who was proficient at the skill being taught. The idea seemingly being that for the teacher to provide their students with the best physical skill instruction, the teacher wants to have a clear mental image of the absolute best possible form for that skill. For example, Participant 2 discussed mentally imaging people with great form, such as former professional basketball player Reggie Miller, because this image provided the specific teacher with the best mental image of proper form. Consequently, it appeared that although most of the participants in the present study indicated mentally imaging themselves as part of their physical skill instruction, it was not as though they couldn't also benefit from mentally imaging someone else who was proficient at the physical skill being taught.

When were participants using mental imagery for skill instruction? The second interesting sub-theme that was discussed by participants in relation to their skill instruction was when they used mental imagery to aid in this instruction. As the results indicated, the physical educators in this study most commonly reported

using mental imagery to aid with skill instruction immediately before providing instruction. Participant 11, illustrated this when he stated "while I have sent the kids off to practice one thing, I am kind of rehearsing in my head what the next element is that I am going to teach". This use of mental imagery right before providing instruction seems like the most obvious time for a physical education teacher to use mental imagery with instruction. This is because before teaching a physical skill it helps to know exactly what that skill looks like, especially if the teacher is going to be providing a physical demonstration. Mental imagery is an excellent way for a teacher to recall exactly how a physical skill looks before trying to explain it.

That said; using mental imagery during skill instruction was also discussed by a few of the study participants. For example, Participant 15 said "I'm thinking in my head, going through the checklist of what the parts of the movement are, and then you're kind of adding to it as you explain it". This is in many ways extremely similar to the use of mental imagery before providing instruction. Again, it appeared as though the participants that used mental imagery during instruction were using it to help provide a clear visual in their head of what the skill being explained looked like. The difference is simply that these participants are doing this quickly, step by step, during their instruction. It would be hard to say that either time is more advantageous than the other, and it is likely that using mental imagery both before and during would actually complement each other. However, the use of mental imagery while providing instruction has to happen

incredibly quickly and therefore, this might explain why this approach was less common among the participants in this study.

Type of mental imagery. As reported in the results section, the participants in the present study cited using several types of mental imagery to aid with physical skill instruction. These included visual, kinaesthetic, auditory, and metaphorical mental imagery. This is similar to research findings on the types of mental imagery used by athletes (Hall et al., 1990), coaches (Overby et al., 1997), and surgeons (Edwards et al., 2005) who were found to use all these same types of mental imagery. This insight suggests, as with athletes and coaches from previous research, the physical education teachers in the current study employed a variety of mental imagery types.

The most frequently cited type of mental imagery used among the study's participants was visual mental imagery. This was possibly best exemplified in the following statement by Participant 5, "Whenever I am teaching a skill I have that visual picture in my head". The fact that the participants cited the use of visual imagery the most seemed to be logical given that vision is the dominant sense (Lishman & Lee, 1973; Melcher & Henn, 1981). Furthermore, because so much of instruction in physical education relies on providing a clear visual of what a skill or activity should look like, it would seem that having a clear visual image would be of great value to the physical education teacher. The participants in the present study suggested this was their main reason for using visual mental imagery as part of their skill instruction. This finding complements some of the mental imagery research done with coaches. Specifically, Thelwell and

colleagues (2008), found that some coaches reported visualizing what the performance of a skill should look like to help enable translation of technique into words.

The less common use of kinesthetic and auditory mental imagery among the study's participants was also deemed to be a finding that was consistent with research from other areas. Jedlic et al., (2007) found that kinesthetic and auditory mental imagery received less focus among coaches; Hall et al., (1990) reported similar findings among athletes; and Edwards et al., (2005) found that visual imagery was also the most prevalent type of mental imagery used among surgeons and family physicians. One possible reason for the small amount of kinesthetic mental imagery use mentioned by the participants in this study could have something to do with the fact that it would be very hard to tell if a student is experiencing the proper feeling associated with a movement or activity. Consequently, it would seem that for a physical education teacher, it would be more beneficial to have a visual mental image because students' performance of a movement or activity is something that can be readily assessed through the teachers' visual sense. In contrast, for the participants in the present study, mentally imaging sounds (auditory mental imagery) to help provide instruction seems more applicable than kinesthetic mental imagery. This is because explaining the proper and improper sound of specific skills, such as setting a volleyball, can be very helpful when teaching students. This idea was supported by certain participants such as Participant 12 who described imaging the sound

when setting a volleyball and trying to encourage students not to make a slapping noise when they set the ball.

Beyond the visual, kinesthetic, and auditory types of mental imagery, the participants in this research also described using metaphorical mental imagery to aid with instruction. There has been strong support in the literature for the use of metaphors in teaching almost all subjects, including physical education (Wormeli, 2009). Gassner (1999) posited that the objective of using metaphorical mental images in teaching physical education is to enhance the quality of movement by relating it to the characteristics of comparable things. For instance, Participant 5 suggested that when teaching proper running form she uses the metaphorical mental image of "pretend you have a hammer in your hand and you are hitting the nail on the back swing". It has been suggested that metaphorical mental images such as this one complement verbal instructions and help students learn and remember motor skills (Short et al., 2001). The results found in the current study suggested that several of the participants agreed with this idea. For example, Participant 14 commented that she used metaphorical mental imagery because "People remember by using association". Thus, the results from the present study regarding the use of metaphorical mental imagery by several of the participants appeared to be well justified by the existing literature.

The influence of what was being taught. Several of the participants revealed that they were more inclined to use mental imagery to aid with instruction when they were teaching something new, unfamiliar, or that they were not very confident in teaching. Fishburne (2005) suggested that when trying to

perform a motor skill that is new or uncommon there is a lot more cognitive thinking involved in comparison to performing a motor skill that is common and automatic to an individual. For several of the participants in the study, a similar trend exists with respect to providing physical skill instruction. Specifically, some of the participants suggested that they had to think more and consequently used more mental imagery when providing instructions in tasks that were new or that they were less proficient at.

The reason for this finding is likely to do with the mental image helping to improve the teacher's confidence in providing proper instruction for the specific skill. Participant 1 seemed to suggest just that when she stated "things that I feel less competent with, I think going through the process first would help me do it". Thus, it would appear that for the participants in this specific study, mental imagery was likely used for new and uncommon tasks as a means to improve the teacher's confidence in providing effective skill instruction.

Participants' perceived importance of mental imagery in skill instruction. The final sub-theme provided some interesting findings with respect to why the study's participants felt mental imagery was important to them when it came to physical skill instruction. Knowing what a skill should look like and having a visual mental image to be able to explain a physical skill was the most commonly discussed reason for using mental imagery to aid in physical skill instruction. Participant 12 illustrated this when he stated "I think imagery is a big thing in teaching because if you know what it looks like then you can teach it". This statement is particularly relevant because it would be very difficult, if not

impossible, to teach a physical skill properly if you do not know what it should look like. Therefore, because mental imagery can help provide a visual picture of what something looks like, it seems that the participant's use of mental imagery to have a clear visual of a physical skill being taught is a good idea and an effective use of this skill (i.e., mental imagery). Basically, it appears that for the participants in this study the use of mental imagery in providing physical skill instruction was primarily employed as a technique to recall what a physical skill looks like before providing instruction.

Many of the physical skills that are taught in physical education are complicated and require consideration of many aspects to be performed effectively (Knapp & Leonhard, 1968). Anything that can help a physical educator remember all of these things when providing instruction is very useful. It appeared that for many of the participants in this study mental imagery was one helpful strategy to aid in such instruction.

Teaching Games and Activities

For physical educators, teaching games and activities is a common behaviour (Fishburne, 2005). The teachers in this study indicated that mental imagery was used to aid in this behaviour primarily to aid in setting up games/activities and also for modifying games and activities on the fly.

Using mental imagery to aid in setting up games or activities. These findings focused on participants' use of mental imagery during the physical education lesson for the purpose of setting up games or activities. Participant 9 said, "I think that (mental imagery) is inherent in setting up for different drills and

activities". Physical education teachers are always teaching in different environments (e.g., gymnasium, playing field, ice rink) and so considering how to set up that space in a way that will be most conducive for student learning is important. Based on the analysis of the results, it appeared that mental imagery was a helpful skill for many of the physical education teachers in this study as an aid to effectively setting up games and activities during a lesson.

Using mental imagery to help modify games and activities on the fly. For the participants in the present research, using mental imagery to help modify games or activities on the fly was mentioned more frequently than any other specific use of mental imagery. This was possibly best illustrated by Participant 6 when she stated "I will see something and think "how do I adjust it?" So I am doing it all the time. I am imaging "what I can do to make it successful?" So I imagine ok make this modification". This idea of physical education teachers modifying activities on the fly has been encouraged by Zwozdiak-Myers (2010), but there is no existing literature in any area that relates to mental imagery for modifying something on the fly. This is likely because in most other areas where mental imagery has been researched (e.g., music, medicine, coaching) on the fly modification of an activity is not as common as it is in physical education teaching. However, its use by those who teach physical education, and specifically the participants in the present study, makes sense for two specific reasons.

First of all, the nature of changing something on the fly makes the use of mental imagery seem almost necessary. When physical educators decide to

modify an activity on the fly they do not typically have the time or the means to create a written plan of what changes are needed, but instead need to make those changes in their head. Thus, mental imagery, especially in the visual sense, is almost required for physical educators to change an activity or game on the fly.

The other reason it seems appropriate for a physical educator to use mental imagery when modifying an activity on the fly is because it may be helpful in identifying if and why an activity needs to be modified. For example, Participant 8 stated, "As they (students) do it once, it runs through my head again, "...is this working? Should I do it differently?"

Regardless of the reason, it was clear from the results that for the physical educators involved in this study, the use of mental imagery was definitely widespread when it came to modifying games or activities on the fly.

The influence of what was being taught. Hall and Fishburne (2010) suggested that the use of mental imagery by physical education teachers might be influenced by what they are teaching. This was found to be true for a few of the participants in the present study who reported that they were more likely to use mental imagery when teaching dance activities. Their reason for this was related to their need to recall the proper pattern of steps when teaching specific dance routines. The use of mental imagery to help image routines fits into the cognitive-general (CG) function of Paivio's (1985) analytic framework and there has been research with athletes that has reported performance benefits of using CG mental imagery for rehearsing pommel horse routines in gymnastics (Mace, Eastman, & Carroll, 1987), and rehearsing artistic gymnastic routines (White & Hardy, 1998).

Dance is the only activity that physical educators teach which would typically require them to know a routine and consequently this might help to explain why some of the participants in the study suggested they were more likely to use mental imagery when teaching dance activities.

Maintaining a Positive Learning Environment

When it came to managing and maintaining a positive learning environment, the idea of using mental imagery to foresee potential problems that could occur in the physical education class was cited by several of the participants. For example, Participant 15 said "I can see potential problems". This finding complements some of the mental imagery research in other areas. First of all, Thelwell et al., (2008) revealed that the coaches interviewed in their study consistently reported using mental imagery before both competition and practice to foresee difficulties that might occur. Due to some of the similarities that exist between coaches and physical educators it seems logical that the physical educators in the present study were using mental imagery to foresee problems like their coach counterparts. Other support for mental imagery use has also been found in the exercise literature. It has been reported that exercisers can use mental imagery to prepare ways to deal with potential barriers to exercising (Buman, Tuccitto, Munroe-Chandler, & Giacobbi, 2007).

Researchers have argued that physical education teachers should keep the time spent on management tasks at a minimum (Silverman & Ennis, 2003), and yet managing the learning environment is the teaching behavior that takes up the largest amount of time during an average physical education lesson (McKenzie et

al., 2000). Thus, the use of mental imagery to help foresee potential problems and therefore reduce the time spent on managing the learning environment makes sense for those who are teaching physical education. It is an effective strategy to help ensure things run smoothly with regards to the learning environment.

In addition to using mental imagery to help see potential problems before they occur, participants also indicated that they used mental imagery to analyze how they dealt with a behavioural issue. The example provided by Participant 13 describing how she had dealt with the behaviour of one particular student (i.e., raised her voice) and how her mental image of that situation has influenced her ever since, was a clear example of how a mental image could be used with respect to the learning environment. This use of mental imagery is supported in part by Zwozdiak-Myers (2010) who implied that visualization of student behavior following a lesson is important for teachers. In addition, when personally reflecting on this idea, I quickly realized that as a teacher I too have several visual images of previous student behavioural problems which have occurred while teaching and I use these regularly to help guide my decisions on how to deal with student behavioural problems that occur in my present teaching. Thus, it is possible that if other physical educators were specifically asked if they have used mental imagery for this purpose (i.e., to recall how they dealt with a behavioural issue) the prevalence of such use might be fairly common.

Overall, it appeared that among the participants in this study, mental imagery use related to managing and maintaining a positive learning environment was most commonly employed for visualizing potential problems. Because

reducing inactive student time during physical education lessons is of such high importance (Silverman & Ennis, 2003), it was not illogical that the physical education teachers in this study were using so much mental imagery to help avoid problems that could reduce the time that students are active.

Assessment

Schiemer (2000) suggested that assessment is one of the most important behaviours of a physical education teacher. It was found that every one of the physical education teachers who participated in the current research indicated using mental imagery to aid in their assessment. This finding suggested that for these physical educators one of the most universal uses of mental imagery in their teaching was to aid in their assessment. Rink (2010) suggested there is an increasing focus on the importance of teachers' assessment in physical education and the need for teachers to use all the skills available to them to be effective in their assessment of student achievement. This may have been one of the contributing factors behind the high frequency of imagery use among study participants when it came to assessment.

The participants focused their assessment related comments to using mental imagery as an aid for providing effective feedback and correction, as well as to help with grading. Furthermore, the participants provided interesting information regarding who it was that they mentally imaged, when assessing students.

Feedback and correction. Several of the study participants cited the use of mental imagery to help provide feedback and make corrections to students'

performance. More specifically, several participants made suggestions like this one from Participant 11, "...for me to correct a kid, I think it is always the picture in my mind and then you compare it to what they are doing...". It was not hard to see why this would be useful for the participants in this study. When it comes to providing effective feedback within a lesson, physical education teachers rely heavily on visual observation (Barrett, 1983). However, it would seem likely in many cases that if a teacher wants to provide effective feedback and suggestions for corrections, just observing a student completing a physical skill is not enough. They would also need to be able to compare that visual of how the student is performing the skill to a visual of how the skill looks when performed correctly. Mental imagery is an excellent way to do this as it allows for immediate comparison between desired performance and actual performance. It appears that for many of the physical educators in the present study this was exactly what they were doing.

Grading student performance. In the grading of student performance, some of the physical education teachers in the study appeared to be using mental imagery in a similar way (i.e., using mental imagery to make comparisons) to the way some participants used mental imagery to help provide feedback. For example, Participant 14 suggested that when grading a student performance he "... sees what it should look like in his head and are they at that point. Are they excellent, proficient, adequate?" As with the findings related to feedback and correction, using mental imagery as a means for making comparisons when grading is a logical use of this skill (i.e., mental imagery) when teaching physical

education. However, this was not the only reason for using mental imagery in grading that was cited by the participants in the present research.

A few of the physical educators in the current study indicated that they used mental imagery to help recall a student's performance after the fact (i.e., at the end of the week or unit), as a means of establishing a grade. Researchers have demonstrated that using mental imagery to help remember something can be beneficial (Pressley, 1976). This would seem particularly important if an individual is using their memory to grade performance of a physical task, such as the participants in the present study suggested. How could someone come up with a proper grade of a physical performance that happened in the past if their memory of that performance does not include a mental image of what it looked like? I would think that this would be very difficult. Thus, it would seem that the fact that some participants in the present study discussed using mental imagery to help recall a student's performance and provide a grade was logical.

Who participants mentally imaged when assessing students. One final interesting result related to participants' mental imagery use for assessment had to do with who the participants were mentally imaging when doing assessment. When the participants were describing using mental imagery to make comparisons to help provide feedback or establish a grade, they all suggested that they imagined someone who was good at the skill, such as an expert, professional athlete, or themselves if they were good at the skill being taught. This made obvious sense because in the majority of situations, if a physical educator wants to compare performances of a physical skill they need a good performance to make

the comparison against. Consequently, if using mental imagery is to make a comparison, the preference would be for a mental image of someone who performs the skill properly.

As for the physical education teachers who were using mental imagery when grading to help recall a student's performance of a specific skill, these individuals were all imaging the student. This was likely no surprise to anyone since the grading of a student's performance after the fact would obviously require the teacher to mentally image that specific student.

In conclusion on the topic of assessment, it appears that there were many different uses for mental imagery in assessment across the sample of participants in the present study. Mawer (1995) suggested that physical education teachers may be able to improve their motor skill assessment by developing clear mental images of physical activities or skills. The results from this study demonstrated that many of the participants in the present study are already doing this.

Cognitive Mental Imagery Related to the Self-Regulatory Behaviours of Physical Education Teachers

The results for this study clearly demonstrated that the participants were using mental imagery to aid in the self-regulatory behaviours that they complete as part of their profession. Specifically, the participants indicated that they used mental imagery in their planning, to improve self confidence, for dealing with safety concerns, and as part of their reflection. The results related to each of these self-regulatory behaviours will now be discussed.

Planning

It has been suggested that planning is essential to teaching (Clark & Yinger, 1987) and is a self-regulatory behavior that should be completed regularly by those who teach physical education (Graham, 2001). Hall and Fishburne (2010) hypothesized that physical education teachers might be using mental imagery to assist them in their planning behaviours. With regards to the participants in the present study this hypothesis holds true. Every single one of the physical education teachers in the present study indicated that they have used mental imagery to aid them in their planning. Thus, using mental imagery for planning was one of the most frequently described uses of mental imagery for the participants in this study. The fact that the physical educators reported using mental imagery for planning also complements the findings in the coaching literature. Thelwell et al., (2008) reported that coaches use CG mental imagery to help plan and rehearse training sessions.

The findings from each of the identified sub-themes related to using mental imagery to aid in planning (i.e., equipment and activity setup, organization, where they were doing this mental imagery, for what specific skills and activities they were using mental imagery to help plan for, and finally why they felt mental imagery was important in aiding with their planning) will subsequently be discussed.

Mentally imaging equipment, setup, and space. Several participants indicated that they used mental imagery when planning as a means of figuring out the equipment they need and how to setup activities in the space they will be

using. Using mental imagery to help plan what equipment is needed was illustrated nicely by Participant 12, who stated, "You already picture what you want to bring out for equipment and stuff like that". While Participant 1 provided the following example of using mental imagery to plan how equipment will be set up, "I will picture how I will set up pylons and stuff like that". There was no evidence found in the literature to suggest that mental imagery has been used for similar purposes in another profession. However, that being said, it seems advantageous to use mental imagery to help plan what equipment would be needed and how it will be set up. By visualizing this ahead of time, especially if they are not completing a written lesson plan, the physical educator is helping to ensure that they will have the equipment they need to teach a specific activity. In addition, they are possibly reducing the time spent in class setting up equipment because they have already practiced this in their head.

As for the participants indicating that part of their planning included mentally imaging the space or environment in which they were going to teach, this too seemed to be a practical use of mental imagery in planning. One of the differences between teaching physical education and other school subjects is that the environment where physical education is taught frequently changes. Gymnasiums, playing fields, ice rinks, parks, ball diamonds, weight rooms, and dance studios are just a few examples of the locations in which a physical education lesson can take place. Therefore, if a physical education teacher is going to plan effectively, they should be considering where they will be teaching and how they will use that space. It appears that for some of the participants in

the present study, mental imagery was one skill they could use to help plan the teaching space.

To help with organization. How to organize units or lessons was found to be a sub-theme for which the participants in this study used mental imagery as part of their planning. Specifically, they were found to use mental imagery as part of organizing their unit and lesson plans. When discussing visualizing things to help organize a unit plan, Participant 5 said "I will go in my head, a Friday or Thurs before I am starting something new, then this is what I am doing this day, this day and this day". The suggestion of using mental imagery in this fashion (i.e., to help organize a full unit) was interesting, however it was not completely clear if the participants were actually using mental imagery or just perceived that they were. For example, if you read the preceding statement made by Participant 5 it is suggested that in her head she thinks about the unit. However, is there specific mental imagery, such as visualization or kinesthetic imagery that occurs? It is possible, that the participant is visually imaging each activity that she will be doing throughout a unit as a means of organizing all of the things that she wants to complete over the course of the unit. Yet, this was not clear in any of the interviews, even following probing questions, and therefore would be something that requires further investigation to clearly establish if indeed this was mental imagery use. However, this lack of clarity did not exist with respect to the participants' use of mental imagery to aid in planning the organization of a specific lesson.

When discussing using mental imagery to aid in lesson planning Participant 3 suggested he used mental imagery when lesson planning because it helps him to know "... how it (the lesson) is going to be organized so it is successful". The participants who described this use of mental imagery clearly were using their visual sense to help plan the organization of a lesson. This was illustrated in comments such as the following one from Participant 11:

> I would say 90% of it (lesson planning) is mental because I am going to picture everything I do in my head probably once before I go out and teach it. I would actually run through the whole lesson, run through the whole skill development, the steps or sequence I am going to teach and I would also recall past experiences.

This use of mental imagery to help plan how a lesson will be organized and flow would seem to support the suggestions made by Livingston and Borko (1989), when they reported findings that teachers create extensive mental plans when preparing lessons. Furthermore, these findings regarding using mental imagery to help organize lessons complements findings from other areas.

As mentioned earlier, coaches have reported using mental imagery in a similar fashion (i.e., to help plan and rehearse training sessions) (Overby et al., 1997). In addition, Munroe et al., (2000) indicated that athletes employ CG mental imagery as a means of creating and rehearsing routines. Thus, the use of mental imagery by the physical educators involved in the present study to aid in the organization of lesson plans should likely not be considered an unexpected finding.

Where are participants when they use mental imagery for planning? The results for the present study illustrated that the participants used mental imagery in planning in a wide variety of locations. This included at the office, at home, in the car, in the shower, and everywhere. This made sense when the literature on

planning was considered. Researchers have established that physical education teachers do their planning in numerous different locations, including at their desk, while driving to work, in bed, and even in the shower (Graham et al., 1993; Placek, 1984). Consequently, if physical educators are using mental imagery to aid in planning, and planning can occur in a variety of locations, then the mental imagery that coincides with that planning is also likely to happen in a variety of locations. This seemed to hold true for the participants in the present who discussed using mental imagery for planning.

The influence of what was being taught. There were some participants in this study who indicated that their use of mental imagery to aid in planning was sometimes dependent on what they were teaching. Most notably was using mental imagery when planning an activity that was new. Several participants indicated that they were more likely to use mental imagery when planning an activity that was new to them. This is very similar to the findings discussed earlier in this study with regards to using mental imagery more for instruction of motor skills that are novel to the teacher.

Based on the fact that many participants suggested the use of mental imagery for practicing and organizing an activity before teaching it as a means of making sure an activity goes well, it would seem logical therefore that they would use mental imagery lots for something they are new to. The thought being that if a physical education teacher is teaching an activity that they have done many times they may not have to mentally rehearse it as much to ensure it runs smoothly in comparison to teaching something that they have never done before.

However, this was not the case for all the participants in this study. One participant was found to suggest the opposite. That is, she (Participant 6) reported that she used mental imagery more for planning activities that were routine because for these she could do all her planning in her head whereas with activities that were new she would write out her plans.

Thus, it appears that when it came to using mental imagery to aid with planning, many of the participants in this study believed that what they were teaching had an influence on how much they used mental imagery. However, for which activities they used mental imagery more was dependent on the individual participant.

Perceived importance of using mental imagery in planning. The participants in this research perceived mental imagery to be an important part of their planning, especially for organizational purposes as discussed earlier in this section. However, a by-product of this was the fact that some participants suggested mental imagery when planning was important because it helped to ensure that lessons would run smoothly and that they would not look incompetent in front of students. For example, Participant 6 said "Things run more smoothly because I have already thought about where they are actually going". By mentally going through their lessons in their head, the teachers are practicing the lesson before it occurs and thereby making sure they know how they will teach things. In many ways this is not unlike athletes (Salmon et al., 1994), musicians (Ross, 1985), or surgeons (Arora et al., 2011) who have been found to mentally rehearse a performance before doing it as a means of practicing.

Self Confidence

Although the use of mental imagery to improve confidence was only specifically mentioned by one of the study's participants (Participant 1), this finding definitely is interesting especially when considering the demographics of this teacher. This teacher was the second least experienced participant in the study (only teaching for four years). Furthermore, she was by far the least experienced female participant who taught Grade 9 – 12 students (female and mixed). It is possible that this lack of experience was the reason for her frequent citing of mental imagery use to improve confidence. Researchers in educational literature have reported that less experienced teachers tend to have lower self-efficacy for teaching when compared to their more experienced counterparts (Roehrig, Kern, & Kruse, 2008). Furthermore, Participant 1 personally suggested in the following quote that the use of mental imagery to improve self confidence may be related to her minimal amount of experience:

> At this point in my career, because I still consider myself fairly new, I like to plan ahead of time, I like to know what I am going to do when I go in that class and it makes me feel better about the class, about what is going to happen if I have that image in my head.

Thus, the use of mental imagery to improve self confidence of physical education teachers may be something worth investigating in the future. Based on the above finding this may be something that should be looked at among a population of less experienced/novice physical education teachers. For this participant in the present study, it definitely appears as though mental imagery was a skill she perceived to be helpful for improving her confidence to teach physical education classes.

Safety

Hall and Fishburne (2010) proposed that one possible use of mental imagery by physical education teachers might be to image safety issues that could occur in a lesson as a means to prevent problematic situations from arising. This appeared to be the case for the eleven physical education teachers in this study who indicated that they have used mental imagery as part of dealing with safety concerns and injuries. All of these participants suggested that they are using mental imagery to see things that could lead to potential injuries. For example, Participant 12 said "you have to look at all the things and imagine what can happen so you can try to eliminate as much as you can".

Researchers have posited that safety should be a chief concern for the majority of physical education teachers (Whitlam & Beaumont, 2008), and therefore it was good to see that the teachers in the present study were thinking about safety and employing mental imagery to help deal with safety. This is actually a very novel use of mental imagery in comparison to other professions (e.g., professional athletes, surgeons, law enforcement officers). Typically someone would not want to imagine an injury ahead of time as this might cause them to become less confident or timid in doing something. For example, an athlete is not likely to want to mentally image an injury occurring while performing a specific skill. However, for the physical education teachers, using mental imagery to foresee potential injuries or ways to deal with injuries that do occur is an excellent way to minimize safety risks and ensure they are prepared to deal with injuries in the most effective manner.

Reflection

Reflection has often been promoted in the literature as a valuable behaviour when it comes to effective teaching of physical education (Darst & Pangrazi, 2009; Rink, 2010). For some of the physical educators in the present study, mental imagery was indicated as being a skill they used when reflecting on their teaching. This supports assertions made by both Rink (2010) and Zwozdiak-Myers (2010) who discussed visualizing lessons after they are completed as part of reflection. More specifically, the participants in the present study frequently described using mental imagery to reflect on the behavior and participation of specific students, and to reflect on the specific physical activities that were part of a lesson.

Student specific mental imagery during teachers' reflection. When it came to reflection there were some participants in the study who suggested they used mental imagery to reflect on the overall student involvement and participation in a lesson. This would suggest that these teachers were using mental imagery as part of their reflection on action (Schon, 1987). For example, imaging a specific student or group of students and how much they participated and were active during a lesson. This seemed like a very logical use of mental imagery for a physical educator, mainly because there is an emphasis on ensuring students are sufficiently active during physical education classes (Silverman & Ennis, 2003). By mentally imaging the amount of activity that specific students are attaining, the teachers can help make sure that all the students in their class are attaining appropriate amounts of physical activity during physical education

classes. However, it does not necessarily have to be activity level upon which the teachers are focusing. Mental imagery of specific students during reflection could also focus on things such as: "...was that student smiling and enjoying the lesson?", or "...was that student engaged in the learning experience?"

Activity specific mental imagery during teachers' reflection. As opposed to mentally imaging specific students during reflection, some of the physical education teachers in this study described mental images of specific activities during reflection. This was illustrated by Participant 4 who, when asked why she used mental imagery during reflection, replied "I guess probably to see what worked that day, and maybe to say well maybe we should have done something else". Dewey (1910) suggested that teacher reflection is often completed as a puzzle solving venture. The comments made by Participant 4 and some of the teachers in the present study seemed to indicate that they were using mental imagery to help solve puzzles or problems that occurred with the activities they did during a lesson. "How to make an activity better?" or "why did an activity not succeed?" are the kinds of questions that seemed to be most commonly discussed. Thus, in these situations the participants were using mental imagery during reflection to help visualize answers to these questions. This once again demonstrated the value of mental imagery for some of the participants in this study because any skill that can help inform a teacher and improve future lessons is beneficial.

When participants' used mental imagery in reflection. The findings regarding when the participants used mental imagery to aid in reflection

complemented the existing literature on teacher reflection. Zwozdiak-Myers (2010) proposed that reflection can occur during the instructional episode (reflection in action) and/or after the instructional episode is over (reflection on action or reflection for action). There was indication by participants in the present study that mental imagery for reflective purposes occurred both during the instructional episode and following the instructional episode. This made sense because if teachers do use mental imagery as part of their reflection and they can reflect at both of these times, then they are likely to also use mental imagery at both of these times too.

Perceived importance of using mental imagery as part of reflection. There was one major reason why the participants believed mental imagery was an important part of their reflection. This was that they perceived mental imagery to be a helpful skill in identifying things that did and did not go well during a lesson, and consequently helped improve future lessons. This indicated that for the participants in this study the use of mental imagery was perceived to be especially beneficial as part of their reflection on action and reflection for action (Schon, 1987). There is so much that goes on so quickly during a physical education lesson that it can be hard to remember everything. Mental imagery is one way to go back and review the events again in detail. When mentally imaging, an individual can slow things down (Munroe et al., 2000) which can help to fully analyze what happened. Thus, the fact that some of the teachers in the present study used mental imagery to help reflect on what went well in a lesson seemed to be a logical application of that skill (i.e., mental imagery).

Motivational Mental Imagery Use by Physical Education Teachers

Paivio (1985) argued that mental imagery serves a cognitive and/or a motivational function. Thus, the use of mental imagery for motivational purposes was investigated in this study. The results provided only a small amount of support for the use of motivational mental imagery by the physical education teachers in this study as suggested in the previous section on "Function of Mental Imagery Use for Teaching Physical Education". However, there were some interesting results related to motivational mental imagery use by study participants. Overall, the participants indicated a variety of things that they mentally imagine to help motivate themselves in their teaching of physical education. For example, mentally imaging successful previous lessons; students reaching goals; or the positive effects their teaching may have on students' future lives. This suggested that for the participants in this study, what was mentally imaged to help motivate them was very much dependent on the specific participant.

As for using motivation mental imagery to aid in teaching behaviours or self-regulated behaviours, there was only one that was discussed by study participants. This was the self-regulatory behaviour of using mental imagery to help teachers to relax.

Relaxation. The use of mental imagery to help relax fits under the MG-A function of Paivio's (1985) analytic framework of mental imagery. Specifically the teachers in this study who described using this function of mental imagery were using it to control arousal levels. For instance, during the interview with

Participant 6 she stated "I have used it sometimes to calm myself down a little bit. If some kid really gets me going". The fact that some of the participants were using mental imagery to help relax is supported by previous literature that has found mental imagery can help people to relax. For example, Wynd (1992) found that individuals who have recently quit smoking can use mental imagery to help themselves relax when feeling stressed and in need of a cigarette.

There can be a great deal of stress in teaching physical education, or teaching in general, but it appears mental imagery was a skill that some participants in the present study found useful as a way to help them relax. Relaxation techniques have been found to help teachers reduce perceived stress levels (Nassiri, 2005). Therefore, the participants' use of mental imagery to help relax would seem to be a logical idea.

The Structure of Physical Education Teachers' Mental Imagery Use

Although mental imagery was being used by all of the participants in this study, their use of mental imagery was found to be very unstructured. That is, they did not plan times to use mental imagery but instead the participants indicated that their mental imagery use was often done subconsciously and "just happened" whenever or wherever. This finding was very interesting because it suggested that for the teachers in this study, although mental imagery was perceived to be useful and often employed, it was still not skill that they often set aside time for. Yet, these findings are not a contrast to the existing literature on structure of mental imagery use. Hall et al. (1990) found that athletes' mental imagery use was not always structured or regular. However, the fact that the

teachers in the present study had little to no structure for their mental imagery use raises the question of "How much more effective could their mental imagery use be if it was planned and completed on a regular basis?"

Perceived Benefits of Using Mental Imagery in the Teaching of Physical Education

One of the final questions in each interview was aimed towards the participant's perceptions regarding the overall benefits of mental imagery in their own teaching of physical education. Words such as "vital" and "critical" were used by some participants in their description of the benefits of mental imagery for their teaching of physical education. Thus, it was clear from the results that the majority of the participants in this study perceived mental imagery as being a valuable and helpful skill (see page 114). It was found to be useful for the participants in this study in many of the teaching behaviours and self-regulatory behaviours that are an integral part of their profession. Although, the participants indicated that mental imagery was most beneficial in planning, aiding in skill instruction, and dealing with safety.

Overall Summarization of Findings

This study produced many valuable and interesting results. The physical education teachers that took part in this research were found to use the skill of mental imagery to aid in many of their teaching behaviours and self-regulatory behaviours. Most of the mental imagery they described was cognitive, however there were also teachers in this study who reported using motivational mental imagery. Furthermore, their mental imagery was typically unstructured.

The most commonly cited uses of mental imagery were to aid in planning, skill instruction, safety and assessment. Since the existing literature has identified all of these as behaviours and self-regulatory behaviours that are key parts of teaching physical education, it seemed logical that they would be common behaviours to use mental imagery for. For each of these and several other behaviours and self-regulatory behaviours, the participants provided detailed information regarding aspects of their mental imagery such as: why they used mental imagery, what they were mentally imaging, who they mentally imaged, where and when they did their mental imagery. All of this information helped provide a clear understanding of mental imagery use by this group of physical education teachers.

Overall, this study found that mental imagery was a skill that the participants were using for many purposes and also a skill that the participants believed was beneficial to their teaching of physical education classes. This overall finding, supported by many of the specific findings, has several implications and also provides a foundation for future research that should be undertaken. These will be discussed in the subsequent chapter of this document (Chapter 7).

CHAPTER SEVEN – CONCLUSION

This concluding chapter was designed to draw the study to a close by discussing the implications of the study's findings, as well as to provide some potential future directions for research related to this topic. Consequently, this chapter has been divided into the following three sections: 1) implications of this research, 2) recommendations for future research, and 3) a concluding statement regarding the overall study and its relevance to me personally.

Implications of This Research

The potential implications of this research are related to various different groups of people. Firstly, the results from this study may have implications for the specific physical educators that participated in the study. By participating in the study these individuals may have increased their awareness with respect to using mental imagery in their teaching of physical education. Some participants indicated that when it came to their teaching they had not really considered the term mental imagery before or its use. For example, Participant 2 stated "I did not even realize I was using it". Consequently, this study has likely improved some of the participants' understanding of mental imagery and helped them to identify how they are already using it.

The physical educators in this study thought that mental imagery was beneficial and they utilized it for a variety of teaching behaviours and self-regulatory behaviours, but none of the participants used mental imagery for all of the teaching behaviours and self-regulatory behaviours that were identified in the study. Thus, the participants in this study could possibly benefit from learning

about the other teaching behaviours and self-regulatory behaviours that fellow participants were using mental imagery for. This could allow them to broaden their use of this skill (i.e., mental imagery) and thereby possibly aid them in their overall teaching of physical education. Furthermore, because the results found few participants in this study cited using mental imagery to help motivate themselves, the participants could potentially benefit from being informed about the possible ways in which mental imagery can be used as a motivator. For example, describing to participants who indicated that they did not use mental imagery to help motivate themselves how a fellow physical educator (Participant 13) suggested mentally imaging previous positive experiences to help stay motivated when things are challenging; or the possibility of improving their motivation to teach by mentally imaging students reaching goals such as Participants 2 and 11 indicated.

A second group of people that could benefit from the results of this research are the general population of physical education teacher specialists. Although the results for this study were specific to the sample that was investigated, the general population of physical education specialists could potentially benefit from being made aware of the study results. First, the participants in this study indicated that they personally found mental imagery helpful when performing many of the teaching behaviours and self-regulatory behaviours they completed as physical education teachers. Other physical education teachers may have never considered using mental imagery to aid with these teaching behaviours and self-regulatory behaviours and thus the results from

this study could possibly provide physical educators with some new ways in which they might be able to incorporate mental imagery into their teaching and self-regulatory behaviours. Furthermore, if there are any physical education teacher specialists who have never heard of the term mental imagery before or have never considered using it to aid in their teaching, this study could potentially raise their understanding and awareness of mental imagery use. Also, like some of the participants that took part in the study, this research may help some physical educators identify how they are already using mental imagery if they had not previously realized they were using it.

There are also some potential implications for physical education teacher education programs. In these programs, physical education teacher candidates are provided with knowledge and skills that will help them be successful/effective physical education teachers in the future. The results from this study demonstrate that mental imagery is a skill that some physical educators (i.e., the participants in this study) find helpful. Therefore, it is possible that other physical educators may also find mental imagery to be a useful skill. Thus, when providing instruction in physical education teacher education programs, it could be valuable to inform pre-service physical education teachers about the results of this study so that they are aware of what mental imagery is and some potential ways in which they might use mental imagery to aid them in their teaching.

Future Directions for Research on Physical Education Teachers' Use of Mental Imagery

This study represented the first investigation specifically designed to examine the use of mental imagery by physical education teachers. Thus, although it provided a large amount of detailed data, there remains the potential for a vast array of future research focused on the use of mental imagery by physical education teachers. This study focused on a small number of physical education specialists and their use of mental imagery to aid in teaching. It will be important for future research to investigate a larger and broader population. To do this, a quantitative investigation might be the most appropriate approach. Consequently, it could be useful if a measurement instrument (e.g., questionnaire) was developed to help assess mental imagery use among physical education teachers. This would make it easier for researchers to investigate a much broader and larger population.

A second future direction would be to examine other groups of physical education teachers to see if they use mental imagery in the same ways as the participants in this study. All of the teachers in the present study were physical education specialists presently teaching physical education classes in Grades 7 - 12. It would be interesting to see if mental imagery is being used for the same teaching behaviours and self-regulatory behaviours by generalist teachers that teach physical education, or by elementary school physical education teacher specialists. Additionally, it would be interesting to see if pre-service physical

education teachers are also using mental imagery and if so examine how their use of mental imagery compares to the participants in the present study?

It could also be beneficial for future research in this area to investigate the effects of different demographic factors on physical education teachers' use of mental imagery. In the present study there were a variety of teachers with different demographic characteristics. However, in this relatively small sample there were no clear demographic trends that seemed to occur. That said, one of the participants in the study with limited teaching experience (Participant 2 = 4 years teaching experience) appeared to use mental imagery for some different reasons than the other participants (i.e., to help feel confident). This brings to question whether this might be due to her years of experience or maybe some other demographic factor. Research on mental imagery in other areas has found that demographic factors can affect mental imagery use. For example, several studies have reported that elite athletes use mental imagery in different ways than their novice counterparts (Hall et al., 1990; Hall et al., 1998; Salmon et al., 1994). Maybe similar trends could exist for physical education teachers. Thus, future research into how demographics influence mental imagery use among physical education teachers seems warranted. Research based understanding could help establish when mental imagery might be most needed for physical educators and for what purposes mental imagery is most applicable for different teachers depending on their demographics.

One other future direction for research on mental imagery use by physical education teachers would be to conduct intervention studies to investigate whether

mental imagery can improve the effectiveness of physical education teachers. For example, many of the participants in the present research suggested that they used mental imagery to help them plan their lessons and by doing so this helped their lessons be more effective. Thus, researchers could have a group of teachers receive training in mental imagery use and have them employ it as part of their lesson planning. Then comparisons could be made between this group of teachers and a control group to see if there are differences between their ability to provide an effective physical education lesson. This would help to establish the importance and benefit of mental imagery use in regards to the effective teaching of a physical education lesson.

Concluding Thoughts Regarding the Present Research

Given the findings of the present study it appeared as though mental imagery was a skill being used by the study participants for many of the typical teaching behaviours and self-regulatory behaviours they complete when teaching physical education. This demonstrated that mental imagery is a skill that can be and is used by some physical educators to help them in their teaching. Thus, other teachers and future teachers of physical education should be made aware of this skill and its possible uses.

As a researcher, I was impressed by the variety of ways in which the participants were using mental imagery to aid them in their teaching. Such variety illustrates how versatile this skill is and also the difference that exists between teachers of physical education and how they teach. Furthermore, the results from this research have led me to believe that some physical education

teachers could possibly use mental imagery to aid them in even more of their teaching and self-regulatory behaviours. For some of the participants in the present study, mental imagery was a skill that seemed to be underutilized as they used it for only a limited number of the teaching behaviours and self-regulatory behaviours that were identified (e.g., Participant 14).

This study confirmed the suggestion by Hall and Fishburne (2010) that some physical education teachers could be using mental imagery to aid in teaching. Furthermore, this study provided an in-depth look into how some physical educators use mental imagery and thereby has increased our knowledge and understanding of this topic. That said, this research also made clear the fact that there is still much to learn with regards to the use of mental imagery in the teaching of physical education. However, this research should help lay the foundation for future investigation into the use of mental imagery by physical educators.

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APPENDIX A

Research Interview Guide

1. Introductory Comments
    - *a.* Welcome participant, introduce myself, and general purpose of the study:
        - *i. "To explore some of the different ways in which you might use mental imagery as a physical educator"*
    - *b.* Discuss (be specific) confidentiality
    - *c.* Reason for audio-taping and note-taking (and ask for permission)
    - *d.* Focus and direction of questions:
        - *i. "We'll begin with some general questions about your physical education teaching experiences, teaching tasks related to teaching physical education, and your confidence in relation to these. We'll then talk about mental imagery and its use in teaching physical education."*

2. Introductory question
    - *a. So, to start off, would you be able to tell me about a few of the things that you enjoy about teaching physical education?*

        Possible Probes:
        - *i. Why do you enjoy these things?*

    - *b. The provincial government has a set curriculum that you are supposed to follow when teaching physical education. Could you discuss how you feel about your ability to deliver and achieve all the aspects of the curriculum?*

        Possible Probes:
        - *i. Why do you feel this way?*
        - *ii. Are there any specific parts of the curriculum that are harder or easier to follow/meet for you personally?*

3. Self-efficacy in teaching physical education lessons.

    The central role of a Physical Education teacher is to provide instruction in the form of a physical education lesson.

    - *a. Developing motor skills is a common component of most physical education curriculums. Could you discuss how the development of motor skills fits into your physical education instructional episodes?*

Possible Probes:

i. *What are your feelings about teaching motor skills to your specific students?*
ii. *How confident are you that your lessons will improve individual students' motor skills?*
iii. *How much does your own personal skill level and knowledge relate to your confidence in teaching different motor skills?*

b. *Another part of the physical education curriculum is the teaching of different types of physical activities. Many of these activities are often taught through playing games or sports during the instructional episode. Can you list some of the games and sports you most often teach, and also any activities that you might not typically teach or avoid as part of your physical education program?*

Possible Probes:

i. *Why do/don't you incorporate these activities as part of your physical education program?*
ii. *Which activities are you most comfortable teaching and which are you least comfortable teaching? Why?*
iii. *How much does your own personal skill level and knowledge relate to your confidence in teaching different sports/games?*

c. *Maintaining a positive learning environment or what is sometimes referred to as "classroom management" is a common part of teaching any lesson, including Physical Education. Could you describe the importance of this for you during the physical education instructional episode?*

Possible Probes:

i. *Could you describe the ease or difficulty you experience with trying to maintain a positive learning environment?*
ii. *How confident are you in your ability to maintain a positive learning environment during your physical education lessons?*

4. Introduce mental imagery

I am not sure if you have heard the term "mental imagery" before now, so I was wondering if you could take a few moments to discuss your understanding of this term?

Possible Probes:

i. *Where have you heard this term?*
ii. *In what context have you heard this term used?*

5. Provide a working definition of mental imagery

Mental imagery has been defined by researchers as the psychological creation or re-creation of an event that imitates the real experience. It is a volitional act involving one or more of the senses (sight, sound, feel, etc.) and is based on information stored in your memory. Furthermore, you can do mental imagery anywhere and in the absence of the stimuli associated with the real experience (Morris, Spittle, & Watt, 2005).

An example of this would be: an athlete imagining themselves winning a competition or a surgeon imagining themselves properly performing a surgical procedure.

- *This will be used to provide participants with an idea/concept to focus their answers around*

6. Mental imagery use during the instructional episode

a. *I would like you to think about the actual physical education instructional episode we have been talking about, could you think of any situations in which you employed mental imagery during your physical education instructional episodes?*

b. *Considering how you teach motor skills, can you talk about any times that you may have used mental imagery to assist in this part of your teaching?*

Possible Probes (if they suggest that they don't use mental imagery for teaching motor skills)

i. *Could you discuss the process you go through when you explain a new motor skill to your students and possibly provide an example?*
ii. *What do you use as a reference for proper technique of a motor skill?*
iii. *Some teachers have suggested the use of metaphors in teaching motor skills, could you comment on this for your teaching?*

Possible Probes (if they suggest that they use mental imagery to help teach new motor skills)

i. *Could you talk me through a situation in which you used mental imagery to help teaching a new motor skill?*
ii. *Please discuss in more detail how mental imagery is used along with the teaching of a motor skill?*

iii. *What are some examples of things you image when you are explaining a new motor skill to your students?*
iv. *Why do you image these things?*
v. *At what specific points in your teaching of a lesson do you employ mental imagery? Why?*
vi. *Some teachers have suggested the use of metaphors in teaching motor skills, could you comment on this?*
vii. *How convinced are you that mental imagery is effective for helping you provide instructions on how to perform motor skills?*

c. *Earlier we discussed teaching sports and games as part of your physical education program. Could you discuss any times where you have used mental imagery to help provide instruction regarding games or sports?*

Possible Probes (if they suggest that they don't use mental imagery for providing instructions regarding games and sports to be played during the instructional episode)

i. *Could you discuss the process you go through when you explain the rules to a new game or activity to your students?*
ii. *What do you use as a reference for proper technique of a motor skill?*
iii. *Some teachers have suggested the use of metaphors in teaching motor skills, could you comment on this?*

Possible Probes (if they suggest that they use mental imagery for providing instructions regarding games and sports to be played during the instructional episode)

viii. *Could you talk me through a situation in which you used mental imagery to help provide instruction for a game or sport to be played?*
ix. *Please discuss in more detail how mental imagery is used along with the instruction of a game or sport?*
x. *What are some examples of things you image when you are explaining a game or sport to the students?*
xi. *Why do you image these things?*
xii. *How confident are you that mental imagery is effective for helping you provide instructions for activities, games, sports during a physical education lesson?*

d. *Would you be able to discuss how you might have used mental imagery to assist with maintaining a positive learning environment?*

Possible Probes (if they suggest that they don't use mental imagery for maintaining a positive learning environment)

i. *How do you go about avoiding situations where a negative learning environment could arise (e.g., fighting or arguments between students)?*
ii. *If an activity does not seem to be working what do you do? Why?*

Possible Probes (if they suggest that they do use mental imagery to help with classroom management)

i. *Please discuss in more detail how mental imagery is used along with developing and maintaining a positive learning environment?*
ii. *What are some examples of things you image to help control and manage the classroom?*
iii. *Why do you mentally image these things?*
iv. *How strongly do you believe that mental imagery can help you to maintain a positive learning environment?*

e. *In your opinion how effective is mental imagery in helping you during your actual Physical Education instructional episodes? Overall, how confident are you in using mental imagery during an instructional episode?*

7. Self-efficacy to complete self regulatory tasks of a physical educator

Literature suggests that there are many other tasks that Physical Educators typically complete as part of their teaching. Some common tasks include planning (yearly, unit, lesson), equipment and facility organization, assessment and evaluation, and personal reflection.

Could you please discuss each of these with respect to how important each task is to you, how difficult each task is, how enjoyable each task is. We will start with planning... How about equipment and facility organization? ..... What about assessment and evaluation?..... Finally, what about personal reflection?

8. The use of mental imagery in select self regulatory tasks of a physical educator

a. *One task that Physical Education teachers do is planning (e.g., yearly, unit, and lesson). Could you discuss when you might have used mental imagery to help in your planning?*

Possible Probes (if they suggest that they don't use mental imagery for planning):

i. *How do you plan for possible safety issues that could arise in your lesson?*
ii. *How do you decide on activities that will meet the goals of the Physical Education program of studies*
iii. *Can you describe in detail how you know if an activity you are planning will work effectively?*

Possible Probes (if they suggest that they do use imagery for planning):

i. *Could you talk me through a situation in which you used mental imagery to help with your lesson planning?*
ii. *What specifically do you image with regards to [specific situation/task]? Examples of specific situations?*
iii. *Explain further? Describe in more detail?*
iv. *Why do you image this?*
v. *Where are you when you typically do the mental imagery involved with your lesson planning?*
vi. *Would you discuss the influence you feel mental imagery has on your ability to plan?*
vii. *Can you explain how you learned to image for this task?*
viii. *When did you first start using mental imagery in your planning?*
ix. *Do you feel that mental imagery is helpful in planning?*
x. *How do you know it is helpful?*
xi. *How convinced are you that mental imagery is helpful when it comes to your planning?*

b. *Another common task among Physical Education teachers is the organization and planning of equipment and facilities. Could you discuss when you might have used mental imagery in relation to facility and equipment planning?*

Possible Probes (if they suggest that they don't use imagery for equipment and facility plans)

i. *Would you describe to me how you decide which equipment to utilize and in what space it will be used?*
ii. *How do you know where an activity should be conducted?*
iii. *Can you describe in detail the way in which the equipment you select will be used and how you know it will be used in that manner?*
iv. *Do you consider any possible safety issues with relation to the equipment you select? If yes how do you know these issues exist?*

Possible Probes (if they suggest that they do use mental imagery for planning equipment and facility use):

i. *Could you talk me through a situation in which you used mental imagery to help with facility or equipment organization/planning?*
ii. *What specifically do you mentally image with regards to equipment and facilities?*
iii. *Explain further? Describe in more detail?*
iv. *Why do you image this?*
v. *Where are you when you typically do the mental imagery involved with equipment and facilities?*
vi. *Would you discuss the influence you feel mental imagery has on your ability to use facilities and equipment?*
vii. *How confident are you that mental imagery is helping you deal with equipment and facility concerns?*

c. *Physical Education teachers are known to complete assessment and evaluation in their classes. Could you discuss when you might have used mental imagery in relation to your evaluation and assessment in physical education?*

Possible Probes (if they suggest that they don't use mental imagery for assessment and evaluation)

i. *Comment on your evaluation and assessment methods in physical education?*
ii. *When providing feedback to students practicing motor skills how do you know what the skill should look or feel like?*
iii. *What do you use as a point of reference to assess proper performance of motor skills or game play strategies during physical education classes?*

Possible Probes (if they suggest that they do use imagery for assessment and evaluation)

i. *Could you talk me through a situation in which you used mental imagery to help with your assessment or evaluation?*
ii. *Please discuss in more detail how mental imagery is used along with assessment and evaluation?*
iii. *What are some examples of things you mentally image to help with these tasks?*
iv. *Explain further? Describe in more detail?*
v. *Why do you image these things?*
vi. *When do you typically do the mental imagery involved with assessment and evaluation?*
vii. *Would you discuss the influence you feel mental imagery has on your ability to evaluate and assess?*

viii. *How important do you feel mental imagery is when completing assessment and evaluation in your physical education program?*

d. *In many of the books published about teaching Physical Education there is discussion regarding the common practice of teacher reflection following a lesson. Could you please discuss how you might have used mental imagery in any reflection you have done following a Physical Education lesson?*

Possible Probes (if they suggest that they don't use mental imagery for reflective purposes)

i. *Could you comment on lesson reflection and how you do it?*
ii. *Could you discuss how previous lessons relate to future lessons in your Physical Education teaching?*

Possible Probes (if they suggest that they do use mental imagery in their lesson reflection)

i. *Could you talk me through a situation in which you used mental imagery when reflecting?*
ii. *Please discuss in more detail how mental imagery is used along with reflection?*
iii. *What are some examples of things you image in your reflections?*
iv. *Why do you image these things?*
v. *Where are you when you do your reflection involving mental imagery?*
vi. *To what extent do you feel mental imagery is useful for the reflection you do?*

9. *Research in the field of mental imagery has suggested that many individuals use mental imagery for motivational purposes. For example, some athletes have been found to motivate themselves by imagining goals and what must be done to achieve those goals. Athletes also have suggested using mental imagery to help them relax before competition by imagining things such as their body feeling relaxed or seeing themselves in a relaxed state. For a different example, professional musicians have been found to use mental imagery to help themselves stay focused, positive, and confident before performing.*
Would you be able to describe any situations where you may have used mental imagery as motivation in your teaching of physical education?

Possible Probes (if they suggest that they do not use mental imagery to help motivate themselves)

i. *Please discuss how you motivate yourself to teach?*

ii. *Could you describe some factors that influence your confidence to in providing quality physical education?*

Possible Probes (if they suggest that they do use mental imagery to help motivate themselves)

i. *Could you talk me through a situation in which you used mental imagery as motivation for teaching physical education?*
ii. *Please discuss in more detail how mental imagery motivates you to teach physical education?*
iii. *What are some examples of things you mentally image to help motivate you?*
iv. *Why do you find these mental images motivating?*
v. *Specifically, when do you use mental imagery for motivation to teach physical education?*
vi. *How effective do you feel mental imagery is at motivating you?*

10. Other general questions regarding mental imagery as part of teaching physical education.
    a. *Do you encourage your students to ever use mental imagery? If so please explain how.*
    b. *How important do you feel mental imagery is in relation to one's ability to be an effective physical educator.*

11. Concluding Comments/Summary
    a. *Review briefly some key things that have been discussed*
    b. *Is there anything that we have missed or misinterpreted?*
    c. *Could we go back to....?*
    d. *Is there anything else that you would like to add about how you use mental imagery as a physical educator?*
    e. *Thank, debrief, release*

APPENDIX B

Demographic Questionnaire

Gender: Male / Female

Present grade(s) in which you teach physical education:
_____

Have you previously taught physical education in any other grades?

Yes / No

If Yes, which grades? _____

Number of years experience teaching physical education classes:

_____

Do you coach any sports or instruct any (extra curricular) physical activities (e.g., yoga)?

Yes / No

If yes, please specify: _____

Other than teaching, do you use mental imagery for anything in your day-to-day life?

Yes / No

If yes, please specify: _____

What was/is the gender make up of the physical education classes you have taught this past year?

Male / Female / Mixed

APPENDIX C

Physical Educator Recruitment E-mail

Department of Secondary Education
University of Alberta
Edmonton, Alberta
T6G 2G5

Dear Physical Educator:

I am a PhD student at the University of Alberta in the Faculty of Education. I would like to invite you to participate in a research study titled "The Use of Mental Imagery by Physical Education Teachers". I am looking to recruit secondary school physical education teachers that are presently teaching physical education classes. The purpose of this study will be to collect detailed information from physical education teachers with regards to the use of mental imagery in teaching physical education classes. If you choose to participate in this study you will be asked to complete a one-on-one interview regarding mental imagery use and self-efficacy as a physical educator, as well as, a short demographic questionnaire. The interview will require you to answer questions regarding mental imagery and if you use imagery as part of your physical education teaching. It will also involve questions related to your confidence in completing certain tasks associated with teaching physical education. The interviews will be conducted at a time and location of your choosing (outside of your school) and will take less than an hour to complete. The demographic questionnaire involves simple questions relating to demographic variables (e.g., gender, present and previous grade/grades of physical education classes taught, years experience instructing physical education courses, gender of students typically taught, coaching experience, use of mental imagery in day-to-day life). Confidentiality will be ensured, and there are no anticipated risks associated with your voluntary participation in this study. For more information please see the attached document (Letter of Information).

If you are interested in participating in this study, please contact me about a possible time and location to complete the interview and questionnaire. My contact information is located below. Please note that your participation in the study is completely voluntary. You are free to choose whether or not you wish to participate in this study.

I thank you for your time and consideration in regards to this research. If you have any questions or concerns about this study, please do not hesitate to contact me, Nathan D. Hall, as per the contact information below.

Sincerely,

Nathan D. Hall
University of Alberta, Graduate Student
Department of Secondary Education
Tel: (780) 492-2902
e-mail: ndhall@ualberta.ca

The plan for this study has been reviewed for its adherence to ethical guidelines and approved by the Faculties of Education, Extension, Augustana and Campus Saint Jean Research Ethics Board (EEASJ REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the EEA REB at (780) 492-3751

APPENDIX D

Letter of Information and Consent

"The Use of Mental Imagery by Physical Education Teachers"

You are being asked to participate in a research study conducted by Nathan Hall, a PhD student in the Faculty of Education, University of Alberta. Mental imagery use by physical education teachers will be investigated. If you have any questions or concerns about the research, please feel free to contact me at the University of Alberta (Tel: 780-492-2902 or e-mail: ndhall@ualberta.ca)

Purpose of the Study
The purpose of this study will be to collect detailed information from physical education teachers with regards to their use of mental imagery in teaching physical education classes

Researchers
The principal investigator for this research is Nathan Hall; a PhD student in the Faculty of Education at the University of Alberta. His PhD supervisors, Dr. Clive Hickson and Dr. Nancy Melnychuk, will be overseeing this research.

Procedures
If you agree to participate in this study, you will be asked to complete a one-on-one interview and a short demographic questionnaire. The interview will require you to answer questions regarding mental imagery and if you use imagery as part of your physical education teaching. It will also involve questions related to your confidence in completing certain tasks associated with teaching physical education. The interviews will be conducted at a time and location of your choosing (outside of your school) and should take approximately sixty minutes to complete. The demographic questionnaire involves simple questions relating to demographic variables (e.g., gender, present and previous grade/grades of physical education classes taught, years experience instructing physical education courses, coaching experience, use of mental imagery in day-to-day life). Participants will complete the one-on-one interview with myself (Nathan Hall), and interviews will be recorded using an Olympus DS-5000 digital voice recorder. Recordings will be used for future transcription of the interviews. You will be provided with a copy of your verbatim interview transcription and a summary of the investigator's interpretation of the interview within seven days of the interview. You will be asked to review the transcription and summary to make sure the information is accurate and provide any extra information that may be missing. Upon completion of this review you will be asked to return the transcription and summary with any revisions that you feel need to be made. This process will be completed through e-mail.

Feedback from the Study
If you volunteer to participate in this study I will gladly provide feedback to you upon request. If you have any additional concerns or questions you can e-mail or call me (Nathan Hall) at the address or number below.

Potential Risks and Discomforts
There are no known expected risks associated with completing the interview or demographic questionnaire.

Potential Benefits to subjects and/or to Society
The information gained from this study will provide valuable insight into physical education teachers' use of mental imagery. Furthermore, results from this study will hopefully provide a foundation for future research on this topic. Results from this study may form part of a presentation at an academic conference or part of a publication in an academic journal. All identifying information will be removed. In addition, if you agree to participate in this study you will possibly learn a little about mental imagery during the one-on-one interviews.

Payment for Participation
Participants will not be compensated for their involvement in the project.

Confidentiality
If you agree to participate in this study, any information that is obtained in connection with this study and that can be identified with you as a participant will remain confidential. All completed interviews and demographic information will be kept in strict confidence. The information obtained from the study will not be used for any purpose other than the present research and the communication of the results. All completed interviews and subsequent transcriptions will be kept in a locked cabinet in the principal investigator's office. There is no access to this cabinet by anyone other than the principal investigator. All computer files with transcribed versions of interviews will be encrypted, and will be destroyed once transcribed versions have been reviewed by the participant and returned to the researcher. Following completion of the study the information collected will remain securely stored for five years and then it will be destroyed.

Participation and Withdrawal
Your participation in this study is completely voluntary. You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time up until you return your verified version of the transcribed interview and summary. You may also refuse to answer any questions you do not want to answer and still remain in the study. The investigator may withdraw your data from this research if a situation arises which necessitates doing so. If you decide to not participate or withdraw from the study, there will be no consequences.

Rights of Subjects
You may withdraw your consent at any time and discontinue participation without penalty. This study has been reviewed and received ethics clearance through the University of Alberta. Approval has been given by the Faculties of Education, Extension, Augustana and Campus Saint Jean Research Ethics Board (EEASJ REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, please feel free to contact the Chair of the Research Ethics Board at (780) 492-3751. I hope that you will participate in this study. Should you have any questions regarding rights as a research subject or if you need further clarification please contact either the Chair of the Research Ethics Board at 780-492-3751 or the investigator as indicated below:

Nathan D. Hall (MHK)
Department of Secondary Education
University of Alberta
Edmonton, Alberta, T6G 2G5
Tel: (780) 492-2902
ndhall@ualberta.ca

Dr. Clive Hickson
Department of Elementary Education
University of Alberta
Edmonton, Alberta, T6G 2G5
Tel: (780) 492-0918
clive.hickson@ualberta.ca

SIGNATURE OF PARTICIPANT
I understand the information provided for the study "The Use of Mental Imagery by Physical Education Teachers" as described herein. I also understand that I may withdraw from the study at any time up until I return my verified version of the transcribed interview and interview summary to the principal investigator. Furthermore, I have been made aware that any information that is obtained in connection with this study and that can be identified with me as a participant will remain confidential. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____

Name of Participant

_____ _____
Signature of Participant Date

The plan for this study has been reviewed for its adherence to ethical guidelines and approved by the Faculties of Education, Extension, Augustana and Campus Saint Jean Research Ethics Board (EEASJ REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the EEA REB at (780) 492-3751

APPENDIX E

Coding Tree for Imagery Use by Physical Education Teachers