A Blended Online Instructional Approach to Physical Education Instruction: A Combination to Enhance Student Cognitive and Physical Ability

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Abstract

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Education budget limitations in the province of Quebec have led to a narrowed focus on math and the hard sciences in public schools at the expense of physical education programmes, reducing the amount of exercise time set aside for youth. This reduction is reflected in the amount of time allocated to physical education in schools and the growing youth inactivity that will eventually lead to youth obesity and an expensive health care problem. This thesis examined ways in which available technology - specifically a blended learning approach involving multimedia and classic physical education class - can be employed to increase student time on task by reducing demonstration and instruction time by the teacher during class time. It examined criticisms and studies of blended learning and used these to determine a proper mix of technology and classic instruction that would best make use of available time. Badminton was the sport selected during this six-week study. One hundred students were separated into two control groups and two experiment groups and completed a junior level badminton course. The control groups were under a regular structured badminton class, while the experimental groups utilized a badminton website specially created to augment the regular classroom instruction. At the end of the study the students underwent a badminton performance and knowledge test in order to evaluate whether or not significant differences existed between groups. The results indicated that a blended online learning approach to badminton was more effective than the traditional method of teaching badminton. The experimental groups as a whole out performed the control groups in both written and practical tests, with a total mean score of 24.72, compared to 20.66.

Dedication

Many thanks, to my professors over the past four years for their guidance as teachers, advisors and friends. Special thanks to Dr. Richard Schmid for taking me on in the eleventh hour of this project. As well, many thanks to Mrs. Anne Brown and the ladies in the main office for their continued support and invaluable information and personal care. Another hidden member of my advisory team who pushed me beyond my comfort zone at every chance in her cruel yet effective constructivist ways is Mrs. Laura April McEwen. Without her, I would never have looked beyond the round peg and the round hole. A great big thank you to Daina Vasiliauskas, my editor and chief over the past few years, without her help your pain reading this would be even more severe. Last but not least, Number 6 in the program but number one in my heart, is my family, my loving wife Sherri and our three children: Keera, Jared and Mirrah, for without their continued support over the past four years, this thesis could never have been completed. Many family trips and much family time were put aside for school assignments and projects. I thank you, for your enormous support and love throughout the years!

DUCIMUS!
In Memory of My Friend M.K. October 12, 2006

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Introduction

This thesis will explore the effectiveness of using a blended learning approach in physical education class at the high school level. The study is undertaken in response to years of physical education teachers' observations and questions about time constraints, cognitive development and skill development of their students. The optimism that online learning coupled with regular physical education class instruction will increase or accelerate the cognitive as well as physical capabilities of the students is the driving force.

Blended learning has always been utilized by the teaching profession as addition to a classroom capability; however, physical education specialists at the high school level have rarely had the opportunity or resources to incorporate it into their teaching environment. In the past decade there has been an increase in utilization of educational technology by physical educators. Yet, this use has been limited at the high school level to the computer being used for data storage with the exception of the few pioneers in video analysis of students engaged in sports (Silverman 1997). I would argue that the time has arrived to fully and acceptingly embrace this technology while accepting it as an advantage instead of a detriment to our physical well being.

Over the past two decades, physical education has received less focus as an educational discipline due to budget reductions and an increased emphasis on math and the hard sciences. At the same time, increasingly sedentary lifestyles are being reflected in a growing youth obesity problem leading to the corresponding mental and physical hardships that will eventually pose an increased budgetary burden on the health system.

Until the beginning of the 1980s, a child in secondary school received 150 minutes per week of physical education. Today, this same child will receive only 100 minutes. This 30% reduction has left a void in the physical skills development of our growing children. The implications of this neglect will impact the overall physical health and well being of the youth of tomorrow, as will be discussed in greater detail later on. Yingjie, Weriqiang and Xibin (2004) observe that insufficient time is allowed for physical education teaching, practice and expert demonstrations.

From 1981 to 1996, the prevalence of overweight youth doubled, and obesity tripled, for both boys and girls (Canadian Medical Association Journal, 2000). For many children, school is the only opportunity to participate in organized sports. The human body absorbs fuel in the form of food that must be converted into energy for the brain to function. If the human body is unable to complete this conversion effectively, cognitive ability suffers.

The response favored by the Quebec government to date is to encourage individuals, families and community organizations other than schools to provide skills development and the recommended amount of physical activity. All of these solutions incur a substantial monetary and time cost for families – money and time that is not always available to lower-income demographics.

What can we do?

A solution to this problem exists: technological advancements in multimedia can, if applied with the correct instructional approach, nurture physically active lifestyles in children. The solution is for schools to choose a more proactive course by embracing science and technology. A curriculum that uses computers to aid in the instructional process would reduce frontal teaching (face-to-face teaching), thus saving time. This course would merge the physical and cognitive domains and maximize the students' time on task during class.

The important question is whether or not this technology will help improve the knowledge and physical development of a child. Chris Dede (1997) warns that simply using the technology as a tool for learning, instead of as the means to deliver appropriately designed content, will lead to failure.

Teachers need to employ technological innovations to their advantage by creating an educational platform that engages students. Bandura (1997) summarizes the benefits of observational learning: by observing modeled performances, individuals gain knowledge about the dynamic structure of the skill being acquired. Repeating the modeled activities enables observers to discover the essential features of the skill (Carroll & Bandura, 1990). By transitioning some of the frontal teaching and demonstration time to outside of the class, teachers will be able to focus more on game time, evaluation and one-on-one teaching, as recommended by Lamb (2003). Unfortunately, as Silverman (1997) notes, relatively little research has been done on the topic of general-purpose computer-aided physical education, particularly internet-based applications.

Blended learning is an approach employing education outside the institutional environment, using available technology, coupled with traditional classroom instruction. This process optimizes learning by dividing instruction material into synchronous (classroom) and asynchronous (online) learning environments, depending on requirements. Many professional fields, including police, nursing, medicine and the military, use the blended learning process to achieve what would be relatively impossible under normal circumstances.

However, Morrison (2003) asks why these organizations are employing blended learning, and whether they have chosen the approach for the wrong reasons. He argues that only once both instruction areas, classroom and online, have been implemented successfully can the focus can be shifted to a combination of the two. Parks, S., Hout, D. *et al.* (2003) reinforce this point. Also, as shown in the ACM Symposium on Applied Computing (2004), "Blended learning has added value only if designed thoughtfully and accompanied by high interpersonal skills of the instructor" (p.916).

Addressing the problem

The teaching strategy that presents itself as having the right mix for a physical blended learning approach is a class period combined with an asynchronous module on CD-ROM or website that provides pre-class/post class instructions, information and demonstrations. In such a way, students are able to progress anywhere at their own time and pace.

My intention in addressing this problem is to create a learning module which allows the student to participate in a regular physical education class and at the same time

create access to an online component for the student to utilize outside the gym in order to augment the in-class instruction. Here the gym time will let the student practice skills and drills, to improve his hand-eye racket coordination while the online website components will provide basic and in-depth information on the sport, video clips of the skill performances that may be viewed multiple times and provide a portal in which the student can direct his own knowledge through hyperlinks and sanctioned websites. The student will now have the ability to prepare for an upcoming class in order to maximize his practice time, refer back to a previous class for reinforcement and view skill performance cues performed by an expert in the field as many times as required.

Literature Review

General introduction

Over the past decade, physical education in the province of Quebec and across Canada has found itself removed from the educational radar in terms of pressing importance. With continued cutbacks to the public educational system the reality of under funding has begun to make a major impact on option subjects in high school. The emphasis on math and the sciences due to economic demands has also taken more time from a finite amount of available resources, so that less time is being allocated to the daily skill development and physical activity of our youth. Coupled with the time problem, are the long term implications of less physical activity and increased sedentary lifestyles by our youth leading to overweight children. Yet, like all things that are ignored for too long, this can manifest into a greater problem later in life, such as under-developed motor skills, as well as mental and physical wellness, which in turn will increase the financial burdens on the already dilapidated health sector, adding to the burden of the Quebec tax payer.

A solution to help alleviate this problem may be currently available for innovative and inspired physical education teachers. Technological advancement in the area of computers, multimedia applications and the proper blending of the two can, if applied with the correct instructional approach help create and nurture more physically active lifestyles in children.

Quebec's continued deteriorating emphasis on physical education

In the sixties, seventies and early eighties a child in secondary school could spend an average of 150 minutes per week (three 50 min periods) participating in a physical education class. Today, this same child averages a maximum 100 minutes (two 50 minute periods) in the same time period. In Quebec, both private and public schools fall under the jurisdiction of the Quebec Ministry of Education, which is responsible for determining the curricula. School boards implement policies established by the Ministry (Parks *et al.*, 2003). This reduction of 30 % over the last twenty years has created a shift in the educational paradigm that has left a void in the physical skills development of our growing children. The implications of this neglect will impact the overall physical health and well being of the youth of tomorrow.

Yingjie, Weriqiang and Xibin (2004) state: "With traditional instructional methods, teachers face some problems. For examples they have not enough time to explain systematically the theory and method about a course, and not all teachers can demonstrate the technique actions about the course exactly, etc" (p.01). This quote directly indicates that from the author's point of view, the deteriorating allocation of time directed towards Physical Education classes is detrimental. It will force physical education teachers to continue to face the difficulty of not having sufficient time to completely teach, whilst allowing for an inadequate amount of practice time in class for the students to develop the required skills. Also having the availability of expert demonstrations for skill demonstrations is limited to teacher frontal time alone.

A crucial area of improvement, therefore, is to develop an instructional approach to maximize the amount of time on task during actual class time for each child, within the imposed confines of the regime pedagogic of the Quebec government.

A by-product of this tragic state of affairs is the rise of inactivity in our children resulting in increased childhood obesity. What standard is set with the noticeable reduction in time allocated to the health and physical development of the child by the government in public education, other than that it's not all that important? From 1981 to 1996, the prevalence of overweight children and youth doubled, and obesity tripled for both boys and girls (Canadian Medical Association Journal, 2000). In order to create a more active youth, we have to create a more constructive atmosphere towards physical fitness. We have to lead by example and increase physical activity in the public school system, creating a positive habit and allowing the student to take a greater interest in his physical health in and outside school. If we do not and the government continues to slash away at time allotment for physical education in the public sector, the prognosis can only get poorer for all concerned. For some children, high school is their first and only opportunity to try various organised sports. This exposure to a choice of "sport for life" is a crucial evolution at this level of motor development. With the introduction to a variety of sports, the children may gain a preference for a specific sport in which to continue outside or after their secondary education. For many students this may be their only exposure to physical fitness and activity.

One course of action, which seems to be the most prevalent position of the government, is to place greater emphasis on individuals, their families and organisations outside the educational setting for providing the skills development and recommended

daily physical activity. This takes the form of clubs such as karate, tennis, racquetball or squash, fitness or dance clubs etc., at a high cost to the families' disposable income. Another alternative is city-run amateur sports leagues such as hockey, baseball, soccer or basketball. These teams try to function with a nominal cost, but a cost none the less to the individual families.

Educational institutions could adopt a more proactive, dedicated, strategic, and "*harder*" course of action and embrace science and technology. A curriculum that embraces the extension of the classroom, by utilising the computer to assist in the instructional process would increase student familiarity and reduce frontal teaching by the teacher. Such a move would bring together the physical and cognitive domains innovatively, and maximise the students' time on task during class, potentially creating a more skilled, knowledgeable and healthier populace aware of the enjoyments and benefits of daily physical activity and physical education

Computer Technology advances in the field of education

The enormous technological improvements over the years have enhanced learning by leaps and bounds. Computers are faster, able to hold ten times the amount of information they did twenty years ago. Memory sticks, the size of a cigarette lighter, are able to carry vast amounts of information from one computer to the next. Personal Device Assistance (otherwise known as PDA's) which fit into the palm of your hand are able to take pictures, act as cell phones or connect to the internet via wireless connections. These advances eliminate the limitations imposed by the brick and mortar institutions that could only facilitate learning with books and second-hand experiences.

Today's teachers and students have vast accessible communities of learning available as resources. Such tools have become an integral part of every school in the province. Computers have been moved out of the computer labs and placed in classrooms, library and student common areas of most secondary schools. The big question is, can this technology help improve the knowledge and physical development of a child in physical education class? Will it be an instructional aid or the proverbial ball and chain? Simply using the technology as a tool for learning, instead of as the means to deliver proper instructionally-designed content, will lead to failure. Chris Dede (1997) states: "That they assume that teachers and administrators who use new media are automatically more effective than those who do not. They envision the classroom computer as the technology comparable to fire: Students benefit just by sitting near these devices" (p. 01). This technology in itself is useless, unless properly and effectively incorporated into the content and methodology of the course.

Teachers need to leverage this technological innovation to their advantage by creating a modern educational platform that excites, elevates and motivates students to learn. These platforms can also serve as portals to more in-depth advanced information if a student wishes to go further than the required curriculum. Students would arrive in class already aware and motivated for the skills and drills for the day. By transitioning some of the frontal teaching and demonstration time (observed learning) to the home or outside of class time, teachers would be able to reallocate more resources to game time, evaluation and one-on-one teaching. Class time could be dedicated to students' time on task actually engaged in physical activity. Lamb (2003) advocates that teachers should: "Decrease the time you spend lecturing and disseminating information, while increasing the time

students spend interacting and applying information" (p.15). The more students are actively engaged the more likely they will be able to reproduce the movements over time without focusing on the individual components of a skill so that "Practice makes perfect", rather than prolonged watching and listening.

For years, teachers have had to rely upon their own ability or the ability of an expert model to demonstrate repeatedly, the movements required performing a skill, allowing the student sufficient amount of visual repetitions, in order for the action to be learned and later replicated. This form of modeling is the most efficient and effective way for children to develop the proper skills required to perform a prescribed movement.

Bandura (1997) sited in Computer-assisted Observational Learning of Novice Tai Chi Learners summarises the benefits of observational learning as follows: By observing modeled performances, individual gain knowledge about the dynamic structure of the skill being acquired. Repeated to observe the modeled activities, enables observers to discover the essential features of the skill, organise and verify what they know, and give special attention to the missing aspects (Carroll & Bandura, 1990). This method of frontal teaching is extremely time consuming, leaving very little in the way of "hands on" practice time for the students to perfect their newly acquired skill. With the implementation of computers, the perfect model in which the skill can be demonstrated can be accessed and viewed an infinite amount of times.

The students would now have an instructor available before, during and after school 24 hours a day for their individual demonstration purposes. They would have access to demonstration videos, rules and regulations, drills, tactics, and game plays to strengthen their cognitive framework of the sport. "Through asynchronous learning,

access can occur at any time of day and at any location and does not involve real-time contact with the instructor" (Wright, 2001, p.26). This type of asynchronous program can be accessed by CD ROM or via the internet depending on the means, capabilities and location (urban vs. rural) of the individual learner.

Available software applications

There are many commercial software applications available today which can to some degree enhance classroom instruction. Yet, when it comes to a physical education class the number of instructional software drastically drops to less than a handful. Silverman (1997) indicates: "Where as the use of computer-assisted instruction will grow, there has been little research on the topic in physical education" (1997, p.308). The majority of programmes out there for physical education are being used solely for fitness assessment data entry. Corel presentations, Microsoft PowerPoint, Apple presenter and Microsoft Word to some extent can help present information with a different approach yet these programs do not allow for increased interaction by the student nor offer authoring capabilities to the instructor. Programs such as ADAM, Simathlete 1.1, and Biomechanics Made Easy 1.1 are programs specific to one area: exercise physiology/anatomy, motor learning or biomechanics respectively. They are commonly used for high school students and do utilise multimedia and its multi-facets yet do not focus on more then one field of study. The average cost for any one of these programs is an average of 200 dollars per unit.

One of the better programs that offer authoring privileges as well as combining multiple fields of study is Multimedia Analysis of Sport Skills (MASS) developed in

1996, in the United States. MASS was developed to be combined with the classroom instruction for elementary education majors at Appalachian State University in order to help students evaluate children's biomechanics. The non-linear, intranet-based program allows students of the course to view children's skill performances, components, teaching cues, and tests. Unfortunately it was never intended for the internet and its technological shelf life has been reached due to the ever increasing upgrades and platform changes.

The crucial question for all these computer programs is how to incorporate them into the classroom *environment*. The majority of previously written programs were created for and incorporated by single station use, where the student moves from one learning station to the next, at one point sitting at a computer terminal to view the multimedia presentation before moving on. Some teachers have the entire class simultaneously watch the program being projected on a large screen or television presentation. The advantage of these formats is (1) the fact that the student can see and, time permitting, in a very short period of time, do and (2) it elevates the problem of individual accessibility outside the institution where there maybe the persisting problem of the haves and the have nots. Findings from the literature have indicated the disadvantage of these formats is that CD ROMs are being used to transmit the information and crucial class time is still being utilised for showing and not doing, a problem that can be alleviated by a dedicated course website for online asynchronous instruction.

Blended learning: a possible way ahead

Blended Learning is an approach that calls for educating outside the institutional environment with available technology, coupled with the art of traditional classroom instruction. This form of education tries to optimize learning by incorporating the use of technologies with the regular class-based teaching strategies in the form of asynchronous or synchronous online learning environments, depending on the requirements of the course and its learner. These practices can be in the form of regular classroom instruction coupled with pre-course online activities, self-paced tutorials, online assessment, enrichment online, post course online activities, online surveys, online video demonstration videos, CD-ROM's, Websites, email, etc. to help facilitate learning. Previously this form of teaching was being used frequently in the corporate world as a strategic business resource to train employees for the use of new products or services or refresher training. Post secondary education professional fields such as police tech, nursing, medicine and the military used the process to enhance or complement what would be relatively impossible to provide via the normal circumstances.

Now, more-and-more secondary educational institutions are looking to gain time in the classroom by innovatively utilizing students' time outside of it. The question that arises most often is which combination or combinations are the best suited for the overall maximum results? In a leading article, Morrison (2003) argued that the more imperative question should be ***why*** are we considering blended learning? From his point of view numerous organizations move toward blended learning for the wrong reasons, the most

frequent being their poor results at e-learning implementations. The majority of the businesses, thinking that e-learning was an "off the shelf" tool that would solve all learning problems, now turn to blended learning to bridge the gap between traditional and e-learning. He also argued that the problem stems from their traditional teaching and training approach. If their curriculum was sound from the onset, and they had a proper strategy and learning methodology for the e-learning, they would have far fewer e-learning tribulations and could harmonize the two, classroom and online instruction for increased results. What do you think of this?

Once both areas, classroom and online instruction have been implemented successfully, the focus can be shifted to a combination of the two. That combination or "blend" would allow for increased flexibility, responsibility and control to students for their learning. "The use of technology for the sake of technology itself is a rapid path to disaster. Merely focusing on the results of innovation perpetuates the myth of computers as tools capable of themselves of effecting change" (Parks *et al.*, 2003, p.41). There is no perfect or ideal situation, or remedy for poor preparation and lack of forethought. Likewise, is there any forgiveness for assumptions made about the clients (the students) or instructor? Both the students and the instructor must be fully committed to the venture or the benefits will be lost. The instructor will be called upon to lead the students through this new endeavor guiding them and motivating them along the way through example.

Students' motivation to participate in a blended learning physical education environment must be sparked by the instructor's ability, dedication, and enthusiasm towards the innovative program. This in turn will help the students to take advantage of the revolutionary learning opportunity provided by the advanced approach. "Blended

learning has added value only if designed thoughtfully and accompanied by high interpersonal skills of the instructor" (ACM Symposium on Applied Computing, 2004, p.916).

The teaching strategy that presents itself as having the *"right mix"* for a physical education class is a regular class period combined with an asynchronous model that provides pre-class/post class instructions, information and demonstrations. This asynchronous learning tool can be CD Rom, website or learning management system (LMS) accessible via the internet. Here the students will have access to the course outline, course calendar, written instructions of techniques and drills, drill graphics, skill performance videos, game footage, hyperlinks to advanced instructional information, quizzes and links to other Websites for supplementary information. By accessing this learning tool in advance of the next physical education class, the student will have the necessary information for the actual practical skills and drills. This prior knowledge will reduce the skill repetition and drill explanation by the instructor for the class as a whole, thus allowing more on task for all and more one on one time for the students that require it the most.

The fact that the information is constant and continuously on hand, allows students access before or after the class, and numerous amounts of time throughout the course without distractions or possible ridicule by other students who may be ready to participate/perform in a shorter period of time. More conveniently, students are able to progress anywhere at their own time and their own pace.

Methods

Participants and Design

The research location for the blended learning study was Macdonald High School in the city of Saint Anne de Bellevue, Quebec. MacDonald High School is situated on the western tip of the island of Montreal with a population of nine hundred students. The school falls under the jurisdiction of the Lester B. Pearson School Board. This school was the chosen location primarily because of its accessibility to the researcher, as an employee of the Pearson School Board. Students come from a generally affluent area of the West Island of Montreal although some (roughly 10% of the student population) are disadvantaged.

The study participants were in the cycle one level of the Quebec high school system. There were four classes in total participating in the study, grade seven and eight (old level system) regular physical education class. Each class consisted of between twenty-five and forty students of different physical abilities and levels of activity.

Participants were assigned to one of four groups (two controls, two experimental) according to their class scheduling. The determining factors in the makeup of the students' physical education classes were their core science course section, English, French or French mother tongue. The school programmer inputted all the student names into the school computer. From there he selected the students' core courses (math, English, French and science). Depending on this science placement, the computer program automatically selected the student physical education class. Given this process

of class creation, the researcher was not able to randomly assign the participants for each group. Therefore the experimental groups gained access to the website and their subsequent counterparts will have access to the website only at the end of the study. The design model that was be used is quasi-experimental. There were four groups of participants, two control groups and two experimental groups during the study. The number of students in each group varied anywhere from eighteen to forty students. This was dependent on the science placements. All data in this study will be analyzed using the Statistical Package for Social Science (SPSS 12.0)

Consent

Prior to conducting the study, applications for review and approval of the study were sent to Concordia University Human Research Ethics Committee. Other documentation that was be included were "permission to video tape" forms, pre-study questionnaire, written tests and a practical post test (Shown in Appendix H, F). Consent forms were completed by the parents of the students due to their age.

Parental consent was obtained by submitting to each parent or guardian a "parental consent form" during "Meet the Teacher Night" in early September. As well the consent letters were sent home during the first few days of the term for parents, who were not able to attend the teacher night. This time frame allowed the researcher 30 days to collect all permission to video and consent forms before the commencement of the study.

The researcher knew the participants throughout the study. However, in order to protect the confidentiality of the student, each was assigned a numerical code to insure his identity was not disclosed in the final report.

Materials

Sport selection

The sport of Badminton was selected, as it requires the student to develop the added skills of controlling an implement for the use of striking. Most students are able to manipulate objects with their dominant hand or foot at a basic to intermediate level by the time they enter high school. By having the student utilize an implement as an extension of his hand (badminton racket), the researcher was essentially attempting to create a new dimension to his (student's) motor processing skills, requiring one of the most difficult perceptual judgments at this level. Most students at this age are unlikely to have any extensive hand-eye-racket coordination, which is required with sports such as tennis, squash, racquetball and badminton. This absence or reduction of skill hand-eye-racket coordination increases group equivalents.

Targeted skills

At the junior badminton level the targeted skills of the serve, the drive and the clear were intended to allow the student to engage in a rally style format of play. The attention span and motivation of the player greatly diminishes if he must continually start off the play with the serve only to be followed by an improperly returned shuttle. By teaching the proper technique for the serve, the drive and the clear at an early stage, the likelihood of a proper execution will increase, therefore increasing the probability that the student will enjoy the sport and continue to be actively engaged. The student was expected to execute the skill at a level that would enable him to perform the task

successfully. Although style and form will be taught, it will not be evaluated at this level. General rules for doubles play will also be focused on. Experience has shown that the "fewer" the interruptions in play arising from arguments in interpretations and perceptions of the game, the more informed the student is about the rules.

Documenting prior knowledge and experience

A pre-study questionnaire was developed and administered by the researcher to the class preceding the first class of badminton instruction in order to bench mark each student's physical ability. Although for most students this sport was physically new, some may have had the opportunity for non structured, recreational badminton. As well, other students may have played similar sports to badminton that may have given them an advantage in the form of skill transference (tennis, squash, etc). There was a post study questionnaire administered to all participants in order to collect written qualitative data on their perceptions of the interventions put into place (shown in Appendix D).

Study duration

The study was eight classroom (gym) periods in length, which took approximately four to six weeks to complete. This amount of time allowed for basic shot introduction and game play (rules). The key skills the student was expected to perform at this level were the short serve, the long serve, the clear and the drive. All four of these skills allow the student to play the sport of badminton at a level conducive to match play at a junior level. Each student wrote a test at the end of the eight period section. This test consisted of three multiple choices, 21 fill in the blank and two figure indication questions. Each

question was based on information given in class either orally or in a handout format. Students in the experimental section did receive additional information other than the handout via the website.

Testing

Each student performed a badminton practical test during the regular class time. The practical test was regulated and marked by student peers, in the format of number of completions out of number of attempts (1 out of 5) for each skill performed. During this time randomly selected students were video taped. In order to control reliability each student went through the video taping area. Yet, only the previously, randomly selected students were actually filmed for evaluation purposes.

Video Clips

Video clips of the required skills to be performed by the students were video taped and uploaded to the website for the students' viewing 24/7. The instructor of the class was videoed performing each skill multiple times. Two other physical educators determined the best video clip that demonstrated each skill. These selected clips were the videos uploaded to the website.

Website

The website (www.macbadminton.com) for the study was created by the researcher and students of a senior media class at Macdonald High School in the spring 2006 term. It was created with the website design program FrontPage. Material on the

website was compiled from many sources: other web pages, Wikipedia sites, coaching books and /or manuals. The researcher created the online surveys and tests.

Procedure

Students received an orientation class on the website prior to the start of the study project. This orientation took place the class before the first badminton class. Here students received information on access, expectations, website availability and they received the website work booklet. As well the students had the chance to ask any questions they may have had, regarding the site or its navigation.

Students had access to the Website throughout the study. It was accessible 24/7 out side the school for home use. In school, students were able to use the computer labs before school (8:30 to 9:00) at lunch (13:15 to 13:45) and selected other times upon request. The online information sessions required on average no more than 30 minutes of computer time before classroom implementation.

An accompanying workbook was created for student use. The student was expected to log in the date and time spent on the badminton website. As well, he was expected to provide answers to questions and comment on his experience each session. The booklet was used to see if the student utilized the web site for each class. The student was reminded to go to and complete the log book each class, even if after the fact. Data collected was not analyzed beyond the level of completion because the results would fall outside the scope of this study (Shown in Appendix B).

The badminton study took place in late November during the second school term reporting period. It consisted of 8 periods of 50 minutes classroom (gym) time and

several online requirements. The classroom section was taught in the gym 1 and the online portion took place in either one of the school's computer facilities or at the student's own residence. Each classroom period of 50 minutes in length accommodated for the five minutes changing time at either end, for a total of 40 minutes of teaching.

The researcher collected data concerning the subdivision of time used for frontal teaching and time on task by the students (practicing and playing) during the regular classroom portion. Data collected at the end of the badminton section for practical testing purposes was collected and scored manually by a class-testing assistant. The scores were then manually transcribed into a database for analysis. The practical tests consisted of the short serve or long serve (5) and clear (5), for a total possible score of 10 (1 point for every completed attempt). A final multiple choice and short answer written test was administered at the end of the section for comprehension. Pre-and post-questionnaires were taken either online or during class time. The experimental group received the written test on line, while the control groups completed it in class. A staff member other than the researcher at the school corrected both sets of tests.

In order to assess utilization of the website the student's were required to complete the daily logbook indicating when and how long they spent on the website, looking at or reviewing the information provided. They had to answer 1 to 3 questions on the section reviewed. The student's spent approximately one half hour per session on the website for a total of four hours to completely cover the material. Logbooks were scored at the end of the study to review and evaluate the amount of time spent on the website. A group of five randomly selected students from each class were filmed performing the "serve and clear" to evaluate their motor skill performance. These films were reviewed

and marked by two different physical education teachers other than the researcher. A check off sheet created in a "Likert" scale format was provided for scoring each skilled performance. This information was placed in data file for analysis.

Potential Bias

The written tests at the end of the badminton section were scored by one person other than the researcher, without knowledge of the identity of the subjects as experimental or control group members. The five students selected randomly in each group were filmed and assessed, and evaluated by two teachers other than the researcher in the physical education department. This increased intra-rater reliability on the motor performance of the student's during the practical test.

Results

This study was designed to test the effects of a blended learning approach of classroom (gym) teaching coupled with an online website component of a Physical Education course. Both written and physical skills were tested at the end of the eight class learning unit and defined as written test result, total practical score (totalpra) and total score (totalsco). Pre- and post- study questionnaires were completed to see if any prior badminton or manipulative knowledge would be brought into the study. Students were also asked report to on their presumed physical abilities, knowledge and attitudes on the study.

The Sample Description

In the study, the sample (n=100) consisted of 50 Cycle One, Year One (grade 7) students and 50 Cycle One, Year Two students (grade 8) of which 64 were male and 36 were female. The Year One control group (n=19) consisted of 17 boys and 2 girls. The Year Two control group (n=31) consisted of 20 boys and 11 girls. The Year One experimental group (n=23) consisted of 14 boys and 9 girls. The Year Two experimental group (n=27) consisted of 13 boys and 14 girls. The average age for the entire sample was 12.86. For the purpose of grouping the data for analysis, the control group is indicated as GROUPDI 1, and the experimental group as GROUPDI 2.

When asked in the pre-survey questionnaire about their badminton play, students responded on the Likert scale of 1 representing "never" and 5 being "all the time", of the control group, 2% never played, 22% played once, 48% sometimes play, 22% play a lot and 6% play badminton all the time. Of the experimental group, 46% never played, 30% played once, 14% sometimes play, 10% play a lot and 0% play badminton all the time. These percentages as expected increased on the lower end of the Likert scale and decreased on the upper end when it pertained to the question of playing organized badminton. When asked to rate their computer experience level, the control group indicated 2% had none at all, 4 % some what use it, 24% are good, 40% are very good and 30% indicated they were excellent. The experimental group indicated that 0% indicated they had no experience at all, 8% used it somewhat, 2% were good, 34% were very good and 16% indicated they were excellent. That no statistically significant difference between the two groups was evident giving neither an advantage nor disadvantage to the experimental involved in the study.

Research Question One

Research question number one was: do the students with access to the online blended learning component demonstrate better cognitive understanding of the game of badminton thus achieving higher written results?

The results of the written badminton tests for the complete study are shown in table 4.2, 4.3 and figure 4.1. The thirty-seven point multiple choice test was subdivided into six sections: racquet labeling, court labeling, types of shots, rules of the game, proper techniques and understanding of game play, with a value of 5 marks, 5 marks, 8 marks, 12 marks, 3 marks and 4 marks respectively for a maximum possible score of 37. The overall mean score by all the groups for the written section for the study was 17.14.

Table 4.2 Results from Written Badminton Test

	Racquet labeling	Court labeling	Types of shots	Rules of the game	Proper techniques	Understanding of game play	Written test results
mean	**3.71**	**1.62**	**2.28**	**6.62**	**1.52**	**1.35**	**17.14**
sd	1.21	1.36	1.60	2.88	.99	1.25	**5.95**
N	100	100	100	100	100	100	**100**

Table 4.3 T- Test Results from Written Badminton Test by Group

Dependent Variable: WRITTEN TEST

			Year		Marginals
			7	8	
GROUPDI	Control	mean	18.68	13.06	**15.20**
		sd	5.648	4.946	5.855
		N	19	31	50
	Experimental	mean	18.96	19.19	**19.08**
		sd	4.666	6.127	5.45
		N	23	27	50
Marginals		mean	18.83	15.91	17.14
		sd	5.07	6.284	5.956
		N	42	58	100

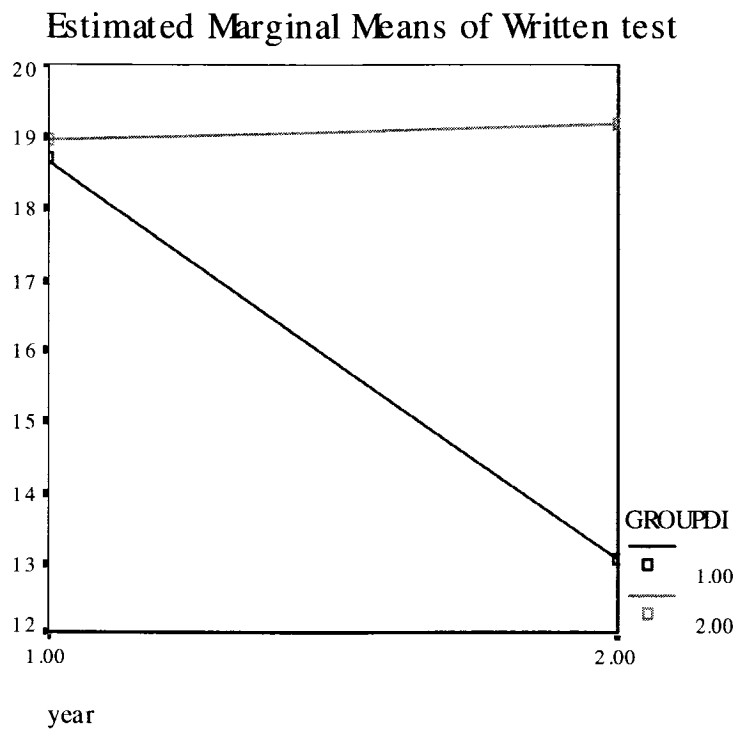

Figure 4.1 SPSS 12.0 Figure Representation of Results from Written Badminton Test by Group

The control group's Year One mean score was 18.68 and the Year Two mean score was 13.06, given them a total mean was 15.20. The experimental group's Year One mean score was 18.96 and the Year Two mean score was 19.19, giving them a total mean score of 19.08, indicating that the blended learning approach was at least as effective as the regular classroom (gym) instruction.

The statistical differences in the written test results were not significant. The anomalous performance by the second year cycle 1 control students (grade eight) produced outliers, which created data that could not be explained by the study's data collection procedures. Therefore, to avoid speculative interpretation, the results are analysed from a descriptive point of view.

Research question two

Research question number two was: do the students with access to the online blended learning component demonstrate better physical badminton skills thus achieving higher practical results?

The results of the practical badminton tests are shown in table 4.4, 4.6 and figure 4.5. The 10 point test was divided into two sections; practical service and practical clear, each worth a total of 5 marks. Although students had to learn and perform other stokes they were not tested at this level. The mean score for the total practical section for the study was 5.55. The control groups mean were 3.04 for the practical service test and 2.42

for the practical clear test. The experimental groups mean were 3.18 for the practical service test and 2.46 for the practical clear test.

Table 4.4 Results from Practical Badminton Test

	Practical service test	Practical clear test	Total practical
mean	**3.11**	**2.44**	**5.55**
sd	1.55	1.54	**2.43**
N	100	100	**100**

Table 4.6 T- Test Results from Practical Badminton Test by Group

Dependent Variable: PRACTICAL

			Year		Marginals
			7	8	
GROUPDI	Control	mean	5.1579	5.6452	**5.46**
		sd	2.52241	2.02564	2.21507
		N	19	31	50
	Experimental	mean	5.0435	6.1481	**5.64**
		sd	2.60207	2.65596	2.66313
		N	23	27	50
Marginals		mean	5.0952	5.8793	5.55
		sd	2.53569	2.33266	2.43864
		N	42	58	100

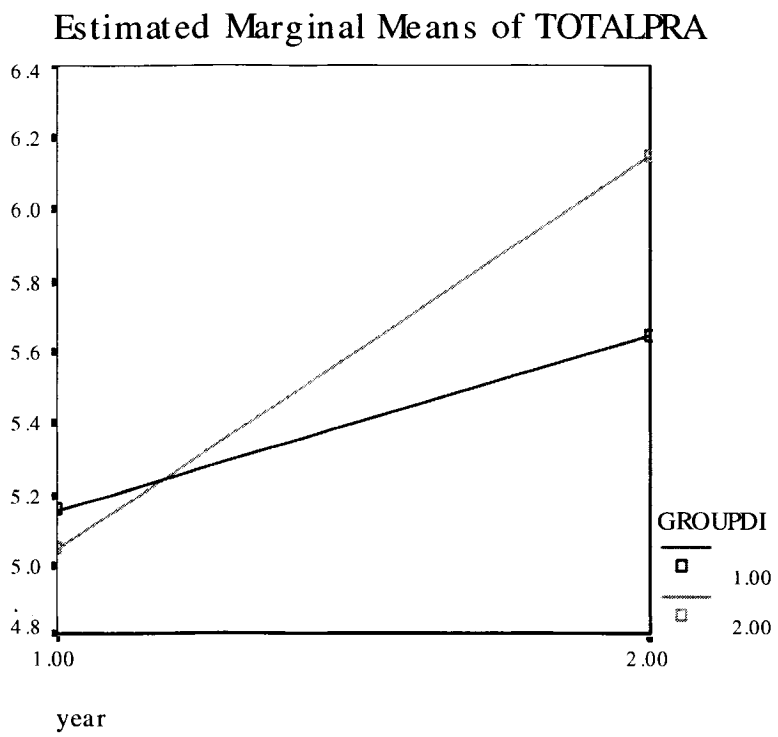

Figure 4.5 SPSS 12.0 Figure Representation of Results from Practical Badminton Test by Group

The control group's Year One mean score was 5.16 and the Year Two mean score was 5.64, giving them a total mean score of 5.46. The experimental group's Year One mean score was 5.04 and the Year Two mean score was 6.14, for a total mean score of 5.64, indicating that the blended learning approach was at least as effective as the regular classroom (gym) instruction.

Research question three

Research question number three was: do the students with access to the blended online approach demonstrate better overall skills, thus achieving higher results on the badminton unit and the video skills analysis?

The results of the badminton tests are shown in table 4.7, 4.9 and figure 4.8. The forty-seven point overall test was subdivided into two sections, 37 points for the written section and 10 points for the practical. The mean for the total score for the study was 22.69. A random sampling of four members from each group was administered in order to conduct a video analysis assessment of their skills. Table 4.9B indicates the results of the assessment.

Table 4.7 Results from overall Badminton Test

	Practical test Results	Written test Results	Total Score results
mean	5.55	17.14	22.69
sd	2.43	5.95	7.00
N	100	100	100

Table 4.9 T- Test Results from both Written and Practical Badminton Test

Dependent Variable: TOTAL SCORE

			Year		Marginals
			7	8	
GROUPDI	Control	mean	23.84	18.71	**20.66**
		sd	7.03	5.74	6.68
		N	19	31	50
	Experimental	mean	24.00	25.33	**24.72**
		sd	5.80	7.57	6.78
		N	23	27	50
Marginals		mean	23.93	21.79	22.69
		sd	6.31	7.39	7.00
		N	42	58	100

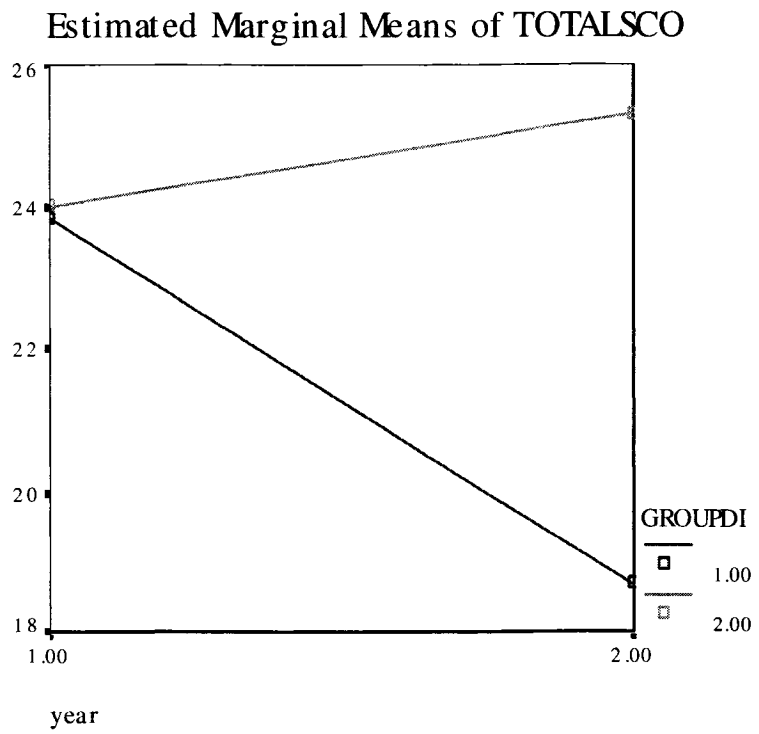

Figure 4.8 SPSS 12.0 Figure Representation of Results from both the Written and the Practical Badminton Test by Group

The control groups Year One mean score was 23.84 and the Year Two mean score was 18.71, giving them total mean score of 20.66. The experimental group's Year One mean score was 24.00 and the Year Two mean score was 25.33, giving them a total mean score was 24.72.

Table 4.9B Results from the Skills Analysis Review

Descriptive Statistics
Dependent Variable: SKILL
ANALYSIS

GROUPDI		T1 serve	T2 serve	T1 clear	T2 clear	**Marginal**
Control	Mean	**2.87**	**2.13**	**3.0**	**2.38**	**2.32**
	N	8	8	8	8	24
	Std. D	0.991	1.126	1.069	0.916	
Experimental	Mean	**3.25**	**3.13**	**3.87**	**3.13**	**3.35**
	N	8	8	8	8	24
	Std. D	1.165	1.356	1.356	1.246	
Marginal	Mean	3.06	2.63	3.44	2.75	3.01
	N	16	16	16	16	48
	Std. D	1.063	1.31	1.263	1.125	

The results of the video skills analysis are shown in table 4.9B. These are the results of two tests, the serve and the clear, evaluated by two physical education teachers other then the researcher. The control group's total mean score for the skills analysis was 2.32. The experimental group's mean score was 3.35. Once again the experimental group out-performed the control group indicating that the blended learning approach was at least as effective as the regular classroom (gym) instruction.

Correlation Data

Table 5.1 Results

Correlations

		Gender	Practical service test results	Practical clear test results	Written test results	If yes, on average how long did you spend on it each time?
Gender	Pearson Correlation	1	-.139	-.191	.190	.197
	Sig. (2-tailed)	.	.336	.185	.186	.171
	N	50	50	50	50	50
Practical service test results	Pearson Correlation	-.139	1	.518**	.176	.211
	Sig. (2-tailed)	.336	.	.000	.221	.142
	N	50	50	50	50	50
Practical clear test results	Pearson Correlation	-.191	.518**	1	.358*	.167
	Sig. (2-tailed)	.185	.000	.	.011	.246
	N	50	50	50	50	50
Written test results	Pearson Correlation	.190	.176	.358*	1	.191
	Sig. (2-tailed)	.186	.221	.011	.	.183
	N	50	50	50	50	50
If yes, on average how long did you spend on it each time?	Pearson Correlation	.197	.211	.167	.191	1
	Sig. (2-tailed)	.171	.142	.246	.183	.
	N	50	50	50	50	50
Did you go to the Badminton website?	Pearson Correlation	-.371**	-.095	.044	-.128	-.401**
	Sig. (2-tailed)	.008	.510	.760	.376	.004
	N	50	50	50	50	50
Student workbook completion level	Pearson Correlation	.040	-.081	.147	.428**	.187
	Sig. (2-tailed)	.781	.574	.309	.002	.193
	N	50	50	50	50	50

Table 5.2 Results

		Did you go to the Badminton website?	Student workbook completion level
Gender	Pearson Correlation	-.371**	.040
	Sig. (2-tailed)	.008	.781
	N	50	50
Practical service test results	Pearson Correlation	-.095	-.081
	Sig. (2-tailed)	.510	.574
	N	50	50
Practical clear test results	Pearson Correlation	.044	.147
	Sig. (2-tailed)	.760	.309
	N	50	50
Written test results	Pearson Correlation	-.128	.428**
	Sig. (2-tailed)	.376	.002
	N	50	50
If yes, on average how long did you spend on it each time?	Pearson Correlation	-.401**	.187
	Sig. (2-tailed)	.004	.193
	N	50	50
Did you go to the Badminton website?	Pearson Correlation	1	-.081
	Sig. (2-tailed)	.	.576
	N	50	50
Student workbook completion level	Pearson Correlation	-.081	1
	Sig. (2-tailed)	.576	.
	N	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 5.3 Results

		TOTALPRA	Written test results
Have you played badminton before?	Pearson Correlation	.136	.106
	Sig. (2-tailed)	.345	.462
	N	50	50
Please rate how well you believe you currently play and understand the game of badminton?	Pearson Correlation	.249	.041
	Sig. (2-tailed)	.081	.780
	N	50	50
If yes, on average how long did you spend on it each time?	Pearson Correlation	.215	.191
	Sig. (2-tailed)	.134	.183
	N	50	50
Student workbook completion level	Pearson Correlation	.048	.428**
	Sig. (2-tailed)	.743	.002
	N	50	50
TOTALSCO	Pearson Correlation	.648**	.928**
	Sig. (2-tailed)	.000	.000
	N	50	50
TOTALPRA	Pearson Correlation	1	.314*
	Sig. (2-tailed)	.	.026
	N	50	50

Table 5.4 Results

Correlations

GROUPDI			TOTALSCO	TOTALPRA	Written test results	How would you describe your experiencein the study?
1.00	TOTALSCO	Pearson Correlation	1	.517**	.946**	.487**
		Sig. (2-tailed)	.	.000	.000	.000
		N	50	50	50	49
	TOTALPRA	Pearson Correlation	.517**	1	.211	.267
		Sig. (2-tailed)	.000	.	.140	.064
		N	50	50	50	49
	Written test results	Pearson Correlation	.946**	.211	1	.451**
		Sig. (2-tailed)	.000	.140	.	.001
		N	50	50	50	49
	How would you describe your experiencein the study?	Pearson Correlation	.487**	.267	.451**	1
		Sig. (2-tailed)	.000	.064	.001	.
		N	49	49	49	49
2.00	TOTALSCO	Pearson Correlation	1	.646**	.928**	.343*
		Sig. (2-tailed)	.	.000	.000	.015
		N	50	50	50	50
	TOTALPRA	Pearson Correlation	.646**	1	.314*	.289*
		Sig. (2-tailed)	.000	.	.026	.042
		N	50	50	50	50
	Written test results	Pearson Correlation	.928**	.314*	1	.285*
		Sig. (2-tailed)	.000	.026	.	.045
		N	50	50	50	50
	How would you describe your experiencein the study?	Pearson Correlation	.343*	.289*	.285*	1
		Sig. (2-tailed)	.015	.042	.045	.
		N	50	50	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 5.5 Results

Correlations

		Have you played badminton before?	Please rate how well you believe you currently play and understand the game of badminton?	If yes, on average how long did you spend on it each time?	Student workbook completion level	TOTALSCO
Have you played badminton before?	Pearson Correlation	1	-.189	-.079	-.036	.139
	Sig. (2-tailed)	.	.189	.587	.801	.335
	N	50	50	50	50	50
Please rate how well you believe you currently play and understand the game of badminton?	Pearson Correlation	-.189	1	-.184	.159	.130
	Sig. (2-tailed)	.189	.	.201	.270	.367
	N	50	50	50	50	50
If yes, on average how long did you spend on it each time?	Pearson Correlation	-.079	-.184	1	.187	.238
	Sig. (2-tailed)	.587	.201	.	.193	.095
	N	50	50	50	50	50
Student workbook completion level	Pearson Correlation	-.036	.159	.187	1	.363**
	Sig. (2-tailed)	.801	.270	.193	.	.010
	N	50	50	50	50	50
TOTALSCO	Pearson Correlation	.139	.130	.238	.363**	1
	Sig. (2-tailed)	.335	.367	.095	.010	.
	N	50	50	50	50	50
TOTALPRA	Pearson Correlation	.136	.249	.215	.048	.646**
	Sig. (2-tailed)	.345	.081	.134	.743	.000
	N	50	50	50	50	50

Table 5.6 Results

Correlations

		Have you played badminton before?	Please rate how well you believe you currently play and understand the game of badminton?	If yes, on average how long did you spend on it each time?	Student workbook completion level	TOTALSCO
Written test results	Pearson Correlation	.106	.041	.191	.428**	.928**
	Sig. (2-tailed)	.462	.780	.183	.002	.000
	N	50	50	50	50	50

Discussion and Conclusions

This study was designed to test the effects of a blended online learning approach classroom (gym) teaching coupled with an online component of/for a physical education course. It was designed and implemented for the cycle one Quebec high school physical educational program. Together with the regular class room teachings were the online (website) component and the badminton workbook. Students were able to access web pages for written information, ranging from the history of badminton to game tactics. They were able to view video clips of skills, game play and access a practice written test. The badminton logbook was created in order to generate a study guide that would help the students self-monitor their progress and provide the researcher with information as to their online use.

The results of the study indicate that this form of combined online and regular class room teaching, known as a "blended learning" approach, was more effective than the regular form of teaching the badminton unit. In fact, statistically (as indicated in tables; 4.3, 4.6 and 4.9) the experimental group out-performed the control group in all tested areas (the written, the practical and on the overall score) although by only a small margin. The experimental group as well scored higher results on the skill analysis evaluation section. In order for there to have been no biases by the researcher and to increase intra-rater reliability, this aspect (skills analysis) was evaluated by two other qualified physical education teachers without any knowledge of which individuals were in the control or in the experimental groups.

The online version of the Badminton unit was up and running at the start of the study without a problem. One glitch that was encountered and dealt with fairly quickly

was with the hyperlinked online survey section. At the start most students were gaining access to the surveys at school until it was discovered that the surveys would allow each computer and its unique address to save and record a survey only once. The students therefore had to do the surveys out side the school, but could still use the computer at school for any other aspect of the unit. Internet problems have become an obstacle that can undermine online educational experiences. Simple hardware breakdowns and internet service issues can frustrate and de-motivate students and teachers and should be avoided at all costs (Owston, 1997). Throughout the badminton unit students in the experimental group generally asked fewer questions and seemed to be more mentally prepared for each class. The experimental group required less global class instructional time, which allowed me, the teacher to focus more on the individual student. Students from the control group had class notes available to them for pick up at the end of each class. The percentage of handouts that were picked up for studying purposes totalled less than 3 %, indicating an over confidence on their ability to recall information in preparation for the final test or a lack of concern by the end of the unit.

By comparison less than 6% of the experimental group did not hand in their workbook prior to the final written exam. Of the workbooks handed in, 14% of the students did 0% work in the booklet, 10% of the students completed less than 25 %, 10% of the students completed between 26% and 50%, 18% completed between 51% and 75%, 12% completed between 76% and 99%, and 24% of the students completed the entire booklet. These completion results were based on correct responses to logbook questions. The availability of the information on the website 24/7 or the students' sense of being monitored may have influenced the completion rate of the workbook. Having

access to online written and visual information all the time allows the student to fully concentrate on the lesson instead of note taking, and it saves on photocopying expenses (Goggins et al, 1997).

Written Understanding of the Sport of Badminton

Research question number one, "Do the students with access to the online blended learning component demonstrate better cognitive understanding of the game of badminton thus achieving higher written results?" was evaluated by means of the badminton unit written test. This test was created in order to obtain a mark of their cognitive knowledge of the game of badminton. As indicated in table 4.3 the results of the overall written test by all four classes (two control and two experimental), show that the experimental groups out-performed the control groups with a combined mean score of 19.08 compared to 15.20. This result was very promising in regards to the online component and the students' ability to retain and reiterate the information given.

A more in-depth look at the written results shows that the experimental groups outscored the control groups in every section. In section 1 "Racquet Labeling" the mean score was 3.8 compared to 3.6; in section 2 "Court Labeling" the mean score was 1.9 compared to 1.4.; in section 3 "Types of Shots" the mean score was 2.6 compared to 2.0; in section 4 "Rules of the Game" the mean score was 7.6 compared to 5.7; in section 5 "the Proper Techniques" the mean score was 1.6 compared to 1.4, and final section 6 "Student Understanding of the Game" the mean score was 1.6 compared to 1.1. This consistent outscoring in all sections seemed to be a result of the constant availability of the multi-faceted online portion of the badminton unit.

One aspect of the written test results that was not anticipated was the lower score of the Second Year control students. They received a mean score of 13.06, the lowest of all the test groups. One hypothesis for this occurrence is the so called "sophomore slump", in which some students in their second year in an educational institution, perform

below the norms, lowering the average scores. This, no longer the "new kid on the block" or "been there, done that" attitude when it came to their work ethic, may have been a factor. The understanding that the written badminton results would not be seen by anyone other than the examiner alleviated any peer or teacher pressure to perform at their best or highest obtainable level.

Practical Performance in the Sport of Badminton

Research question number two, "Do the students with access to the online blended learning component demonstrate better physical badminton skills thus achieving higher practical results?" was evaluated by means of a practical badminton unit test. This test was created in order to establish a mark for their ability to perform the required skills associated with the sport of badminton. As indicated in table 4.6 the results of the overall practical test by all four classes shows that the experimental group once again out-performed the control group, although only marginally, with a mean score of 5.64 compared to 5.46. This result was very promising in regards to the online component, with its visual keys and the students' ability to transfer the written knowledge into positive practical outcomes.

There were two parts to the practical badminton test, the short or long service test and the clear test. The results of the practical tests indicated that the experimental group again outscored the control group in both the tests. The experimental group's service tests' mean score was 3.3 compared to the control group's score of 3.0. The experimental group's clear tests mean score was 2.5 compared to 2.4 by the control group.

Here, unlike the written test results, the Second Year control students had better results than the First Years' within the control group. One reason for this may have been the peer pressure to perform well was greater, because the practical test was performed in front of the entire class. They could not have the same "laissé faire" attitude, without answering directly to their peers about a poor performance.

Overall Performance in the Sport of Badminton

Research question number three was: "Do the students with access to the blended online approach demonstrate better overall badminton skills, thus achieving higher results on the badminton unit and the video skills analysis review?" The answer for this questions stems from the results of the first two research questions plus the results of the video skills analysis of the students by examiners other than the researcher.

Each student was video taped performing two types of badminton skills, the serve and the clear. The student attempted to perform each skill a minimum of five times. His ability to perform the skill using the proper technique regardless of the shots' success was given an overall mark on a Likert scale of 1 being "terrible" to 5 being "excellent".

We know from the written and practical aspects that the experimental group out-performed the control group each time. As indicated in table 4.9 and 4.9B, (the results from the skill analysis review) the experimental group out-performed the control group by a full marginal score of 1.03. This number alone does not appear to be significant until one bears in mind the scoring was out of five, thus increasing the impact. The outcomes of this question are inline with the results in the study conducted on the

understanding of ballet allegro terminology by Fisher-Stitt. Here students with higher results in written understanding had higher results in their performed understanding. If the learner is able to understand the meaning and theoretical aspects of the desired performance outcomes, it should not be unanticipated that this would promote the correct performance (Fisher-Stitt, 1996).

Performance connections

Significant correlations for the experimental group existed in several types: (1) Written test results and the practical clear test had a Pearson' r = .36, possibly indicating that there was improved cognitive carry over from the students who scored higher on the written test than their practical test. (2) Significant correlations between written scores and total scores, with a Pearson's r = .31 and (3) written results with work book completion with a Pearson's r = .43. This suggests that the students who took the time to diligently go online and completed their workbook achieved higher results. This is confirmed by the next significant correlation (4) between student work book completion and total scores with a Pearson's r = .36. There was also a significant correlation between the students who actually went to the website and their gender, with a Pearson's correlation of r = .37, which indicated males went to the website more than their female counterparts.

Data collected during the study for both groups, control and experimental, had significant correlations in two areas; (1) between written tests and how they described their experience, the control group had a Pearson's r = .45 and the experimental group

had a Pearson's r = .29, indicating a correlation between their results and their study experience. Students who indicated they had increased enjoyment out of the study on the final survey also achieved higher results. Low results were correlated to lower enjoyment during the study. (2) In regards to the students total practical marks, it produced significant correlations, indicating there was a correlation (Pearson r = .31) between total practical score and the written score obtained by the student.

Future Directions in Research

Many programs are now on the markets that utilize computer based programs for physical education without data indicating whether or not they are as effective as they are perceived to be. Simply alleviating a portion of the enormous pressures on the classroom teacher and passing them onto the student outside the class is not appropriate nor is it truly educational. Proper research and evaluation must be conducted in order to incorporate the "right blend" for maximum results.

High school students are a unique *genre* and a technologically savvy group. They require programs that are not only informative but have the ability to captivate their attention while passing on information. With increased programs available for K to 12 and the thrust for teachers to familiarize themselves with the technologies available, comes the need for increased research into the online learning environments and their capabilities at the adolescent level.

Further research into the field of online asynchronous physical education is required to determine its effectiveness and age/level appropriateness for implementation. This type of study needs to be replicated at different levels and in different K to 12 sports. Information obtained from this study can be used to expand and improve upon the online component, the workbook and the pre and post questionnaires. The students' readiness to learn will always be a concern in regards to anomalies in their performance that are unpredictable and, for research purposes, not controllable.

With the capabilities of the internet and broadband use available to all, video, a key visual aspect for physical education, is readily available and accessible. Now is the time to pursue needed research into this field of study.

Conclusion

This study was designed to test the effects of a blended learning approach of classroom (gym) teaching coupled with an online website component of a physical education course. The overall results signify that this form of blended online learning approach to physical education can improve cognitive and physical performances at the high school level. With the multimedia capabilities incorporating video and animation, today physical education classes can take full advantage of the technology.

As seen by the results in this study, there is a great possibility for expanding the physical education curriculum outside the brick and mortar institutions once the focal point of its teachings. Students are very open and responsive to fresh and innovative ideas that create new learning environments. The online environment can be a useful tool if utilized appropriately. At the same time the students can be very hesitant to take major amounts of their time at home for school work, outside what has become the teaching norm. A "happy medium" must be found in order to take full advantage of student participation.

The major disadvantage of having this study conducted at the high school level was attempting to control or overcome all the outside factors; student absences, fire drills, doctors' appointments, snow days, or any other unforeseeable interruption that would cause the student to miss information or cause confusion amongst the student population as to whether or not they had had the physical education class on a particular day. The major obstacle to overcome at the beginning of this area of study is the creation of the online material. Here not only must it be sport-specific, it has to be age appropriate and engaging. Burk (2001) indicates that commercially created software does not meet the

needs of individual students and perhaps does not address the specific standards required for the class.

Developmental cost of just under $ 100 for the website, the work booklet and the online survey were absorbed by the researcher. The time required to create the three components, on the other hand was more substantial. The website took approximately 120 hours to create including the videos. The work booklet took 20 hours and the quickest and least time-consuming were the online surveys at 4 hours. These time factors are estimated at the intermediate ability level to create, for all three components. One must keep in mind that these costs could become considerable, depending on the program familiarity and design knowledge of the individual teacher.

Although many studies have been done in the area of physical education, no research has touched on the online asynchronous aspect of teaching physical activity and very little research has been conducted in the field of physical education at the high school level. With increased pressure on the government and the educational system to play a more active role in the health and fitness of the youth, it is imperative for them to plan on how and when to implement a more productive health and fitness regime while at the same time minimizing the impact on the school day. With the mind set that it is not the instructor that is imperative but rather the pedagogy, we must pursue the "right mix".

This study is only the beginning: Much more research is required in this field and at this level of teaching. The accelerated influx of computers into our school system has fuelled the demand for their incorporation into all subjects, including physical education.

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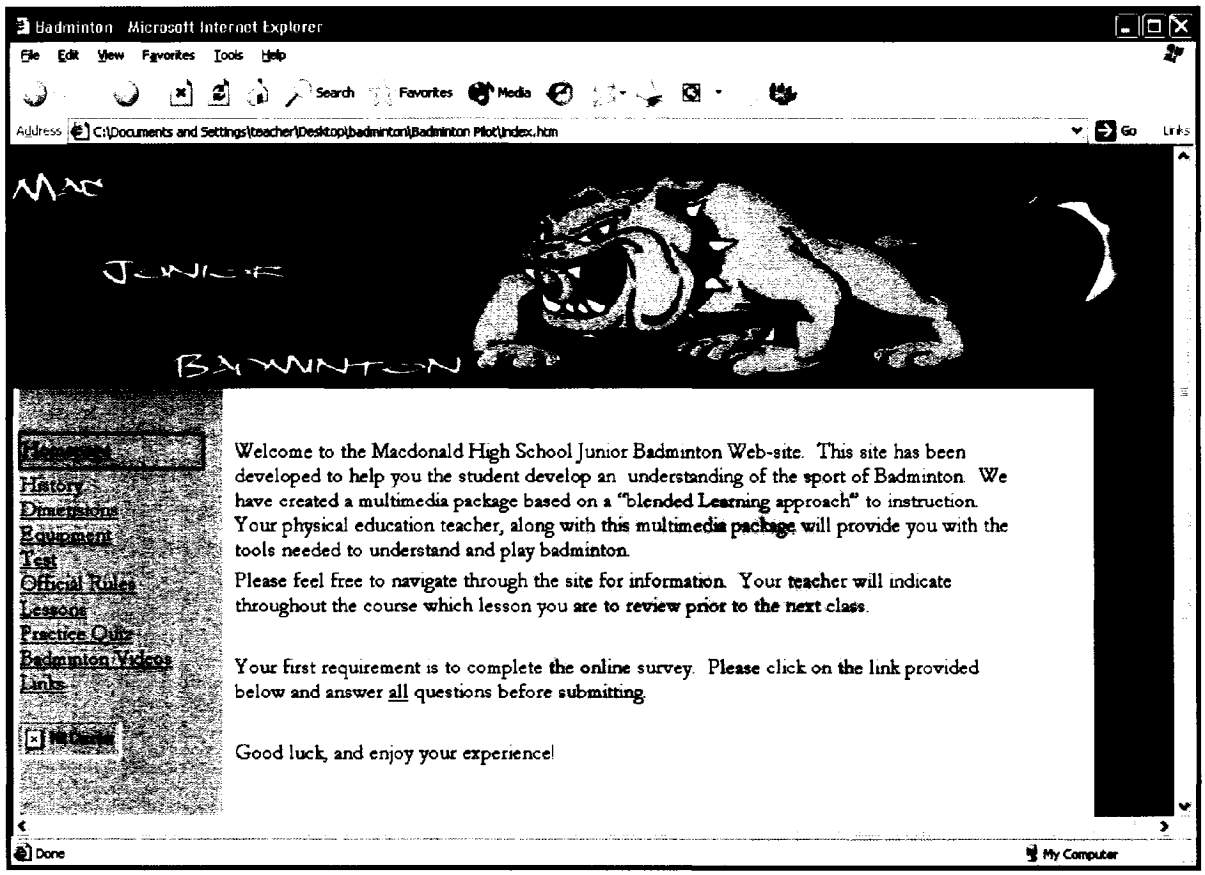
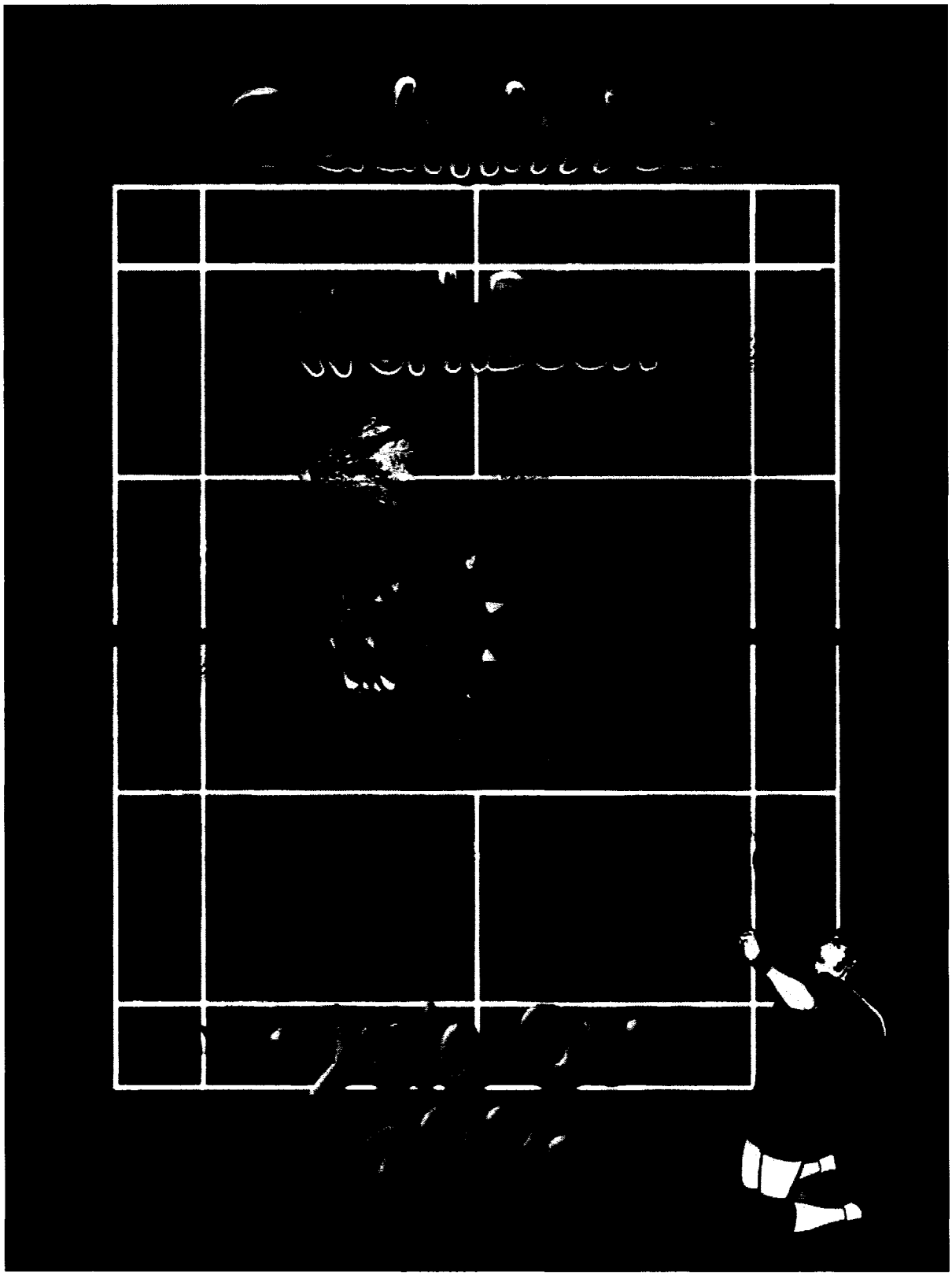
Appendices

Website sample





Welcome

Welcome to the Macdonald High School Junior Badminton Workbook. This workbook has been created to help you the student maximize the accompanying website to its best use. The multimedia package that you will use along with the booklet is based on a "blended learning approach" to instruction. Your physical education teacher, along with this booklet and the multimedia package, will provide you with the tools needed to understand and play badminton.

Preparation

I recommend that you keep this book either at home or school, depending on where you will work on the online portion (website). As well you should have the workbook and a pen or pencil in front of you as you work, in order to fill in the answers as you go along.

Instructions

Begin each session by opening your workbook and filling in the date reviewed. For best results the session should occur prior to the next badminton class. Then completely read through the section indicated. You can answer any questions as you go along. Do this, before you navigate anywhere else on the website. That way, you can be sure it gets done. At the end of your session indicate what two things you learnt that day.

Lesson 1

Date reviewed: _____

Quote of the day: Show me a guy who's afraid to look bad, and I'll show you a guy you can beat every time. – Lou Brock

Complete the online survey if you have not already done so.

Read the history of Badminton on the website.

List 2 things you learnt today on the website or in class.

1.

2.

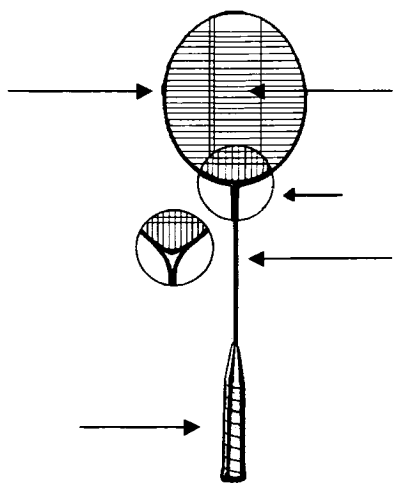
Lesson 2

Date reviewed: _____

Quote of the day: It is a rough road that leads to the heights of greatness. - Seneca

Read the section on the Serve and forehand short serve.

Indicate and list the parts (5) of the racket.



List 2 things you learnt today on the website or in class.

1.

2.

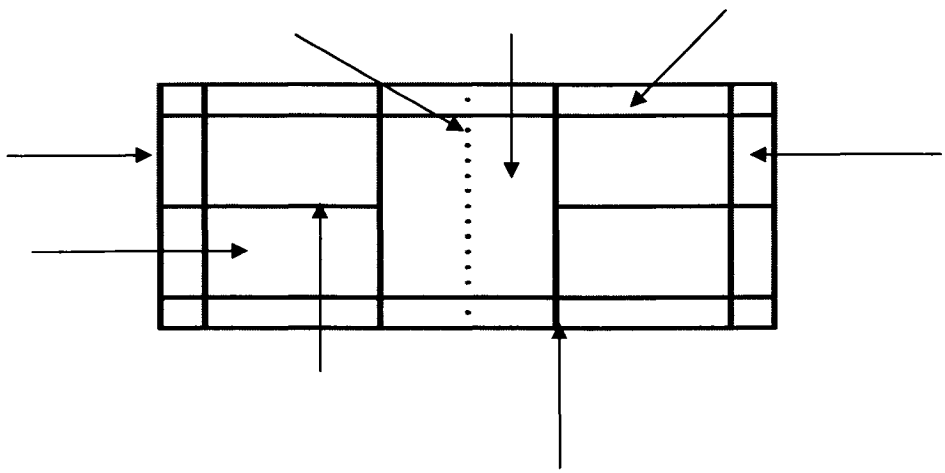
Lesson 3

Date reviewed: _____

Quote of the day: Adversity causes some men to break; others to break records. –William A. Ward

Read the section on the backhand Serve and forehand long serve.

List the parts of the badminton court indicated with an arrow.



List 2 things you learnt today on the website or in class.

1.

2.

Lesson 4

Date reviewed: _____

Quote of the day: The will to win is important, but the will to prepare is vital. -Joe Paterno

List 4 key points for a proper grip.

1.

2.

3.

4.

List 2 things you learnt today on the website or in class.

1.

2.

Lesson 5

Date reviewed: _____

Quote of the day: Do not let what you cannot do interfere with what you can do. –John Wooden

In your own words, explain the very start of badminton game until the second loss of serve. (50 words or less)

List 2 things you learnt today on the website or in class.

1.

2.

Lesson 6

Date reviewed: _____

Quote of the day: If you train hard, you'll not only be hard, you'll be hard to beat. -Herschel Walker

List 3 key points that you should in sure, when performing a proper serve.

1.

2.

3.

List 2 things you learnt today on the website or in class.

1.

2.

Lesson 7

Date reviewed: _____

Quote of the day: If you can believe it, the mind can achieve it. – Ronnie Lot

List 3 key points that you should in sure, when performing a proper clear.

1.

2.

3.

List 2 things you learnt today on the website or in class.

1.

2.

Lesson 8

Date reviewed: _____

Quote of the day: The principal is competing against yourself. It's about self improvement, about being better than you were the day before. – Steve Young

List 3 key points that you should in sure, when performing a proper drop.

1.

2.

3.

List 2 things you learnt today on the website or in class.

1.

2.

Lesson 9

Date reviewed: _____

Quote of the day: To be prepared is half the victory. -Miguel Cervantes

Go over your workbook in preparation for the final test in badminton.

Look through the website at all the information covered during the badminton classes.

Good luck on the final test and have fun playing badminton in and outside of Physical Education class.

Pre-study Questions

#1 What is your badminton student Number?

#2 How old are you?

11 12 13 14 15

#3 Gender?

Male Female

#4 Which group are you in?

PED 100-01 PED 100-02 PED 200-01 PED 200-02

#5 Have you played organised Badminton before?

Never once sometimes a lot all the time

#6 Have you played badminton before?

Never once sometimes a lot all the time

#7 Have you played squash before?

Never once sometimes a lot all the time

#8 Have you played tennis before?

Never once sometimes a lot all the time

#9 Do you play organised sports outside of high school?

Yes No

#10 What sports do you play?

#11 Please rate how well you believe you currently play and understand the rules of badminton?

A) I do not pay or no the rules of badminton
B) I am familiar with some of the rules and can play a little
C) I know the most rules and play it sometimes
D) I know the rules and play it all the time

#12 Please rate your computer experience level.

None at all Somewhat use it Good Very good Excellent

#13 On average, how much time do you spend on the computer each day?

Less than 1hour 1-3 hours 3-5 hours 5-8 hours 9 or more

#14 What is your main purpose for your computer use?

A) School work
B) Surfing the internet

C) Gaming

D) Buying stuff

E) Creating web pages, blogs, flash/videos etc.

#15 On average, how much time do you spend doing school work on the computer each day?

Less than 1hour 1-3 hours 3-5 hours 5-8 hours 9 or more

#16 On average, how much time do you spend surfing the internet on the computer each day?

Less than 1hour 1-3 hours 3-5 hours 5-8 hours 9 or more

#17 On average, how much time do you spend gaming on the computer each day?

Less than 1hour 1-3 hours 3-5 hours 5-8 hours 9 or more

#18 On average, how much time do you spend on online chats on the computer each day?

Less than 1hour 1-3 hours 3-5 hours 5-8 hours 9 or more

#19 On average, how much time do you spend buying stuff on the computer each day?

Less than 1hour 1-3 hours 3-5 hours 5-8 hours 9 or more

#20 On average, how much time do you spend Creating web pages, blogs, flash/videos etc on the computer each day?

Less than 1hour 1-3 hours 3-5 hours 5-8 hours 9 or more

Post Study Questions

#1 What is your badminton student Number?

#2 Have you participated in a research before?

Never once sometimes a lot all the time

#3 How would you describe your experience participating in the study?

Bad Fair Good Very Good Excellent

#4 Compared to your other sports topics so far. How much information did you receive participating in this study, than you would normally get?

None A little Good Amount A lot Too Much

#5 Have you played badminton outside class time?

Never once sometimes a lot all the time

#6 If you play any racquet sports (tennis, squash etc.), do you continue to play it?

Never once sometimes a lot all the time

#7 Do you intend on playing badminton outside your physical education class?

Never once sometimes a lot all the time

#8 Did you go to the badminton website?

Yes No

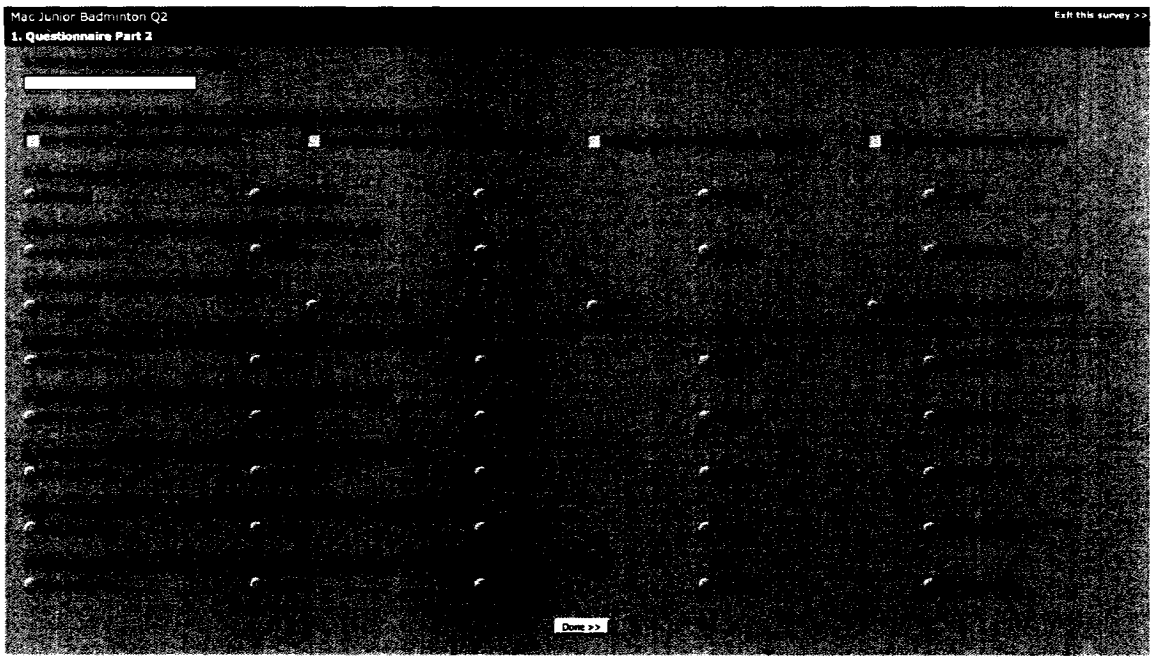
#9 If yes, on average how long did you spend on it each time.

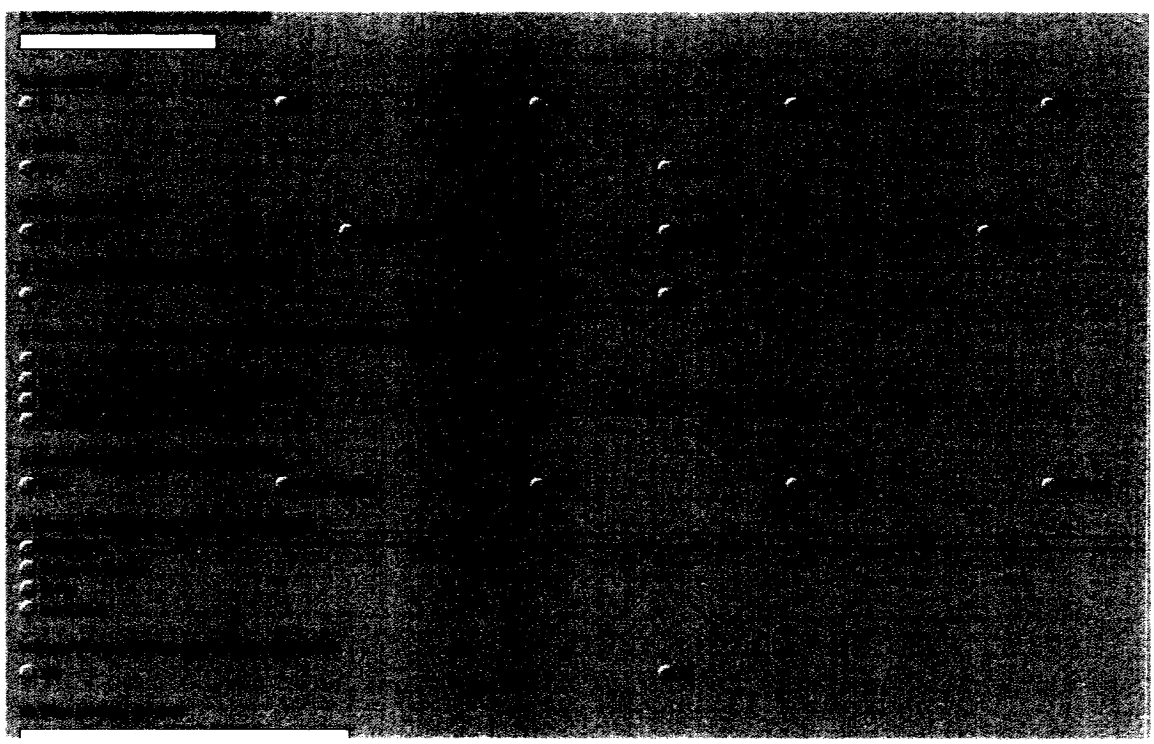
15 min 30 min 45 min 1 hr More than 1 hr

#10 Did you like the website?

No A Little A Lot Totally

Online Versions





Test

Cycle One Badminton final

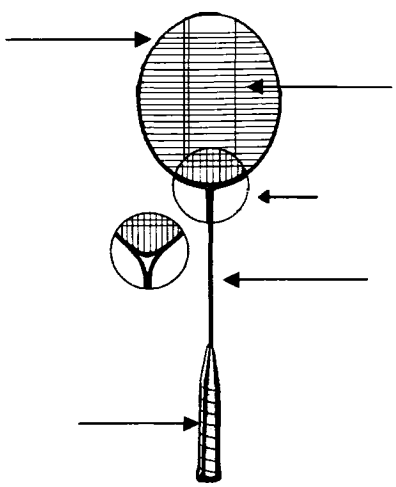
/35

Name: _____ Number _____

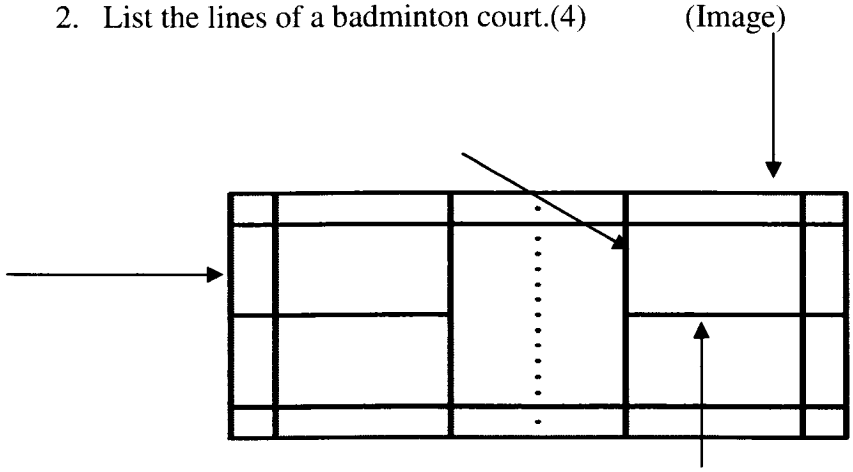
Answer each question below. You will encounter fill in the blanks and multiple choice type questions. A list of words has been provided for you to use as an aid in completing each question. Not all words need to be used, only the correct ones (one time).

Good Luck.

1. List the parts of the racquet.(5) (Image)



2. List the lines of a badminton court.(4) (Image)



3. There are two types of serves, the _____ serve and the _____ serve.(2)

4. The _____ is meant to go _____ and to the _____ of the court.(3)

5. The _____ is an offensive shot.(1)

6. The game always starts with the _____ of a racquet. The winning team gets choices of whether to _____ or _____.(3)

7. The team that serves first receives _____ opportunity for a loss of serve (fault), before it is the other teams turn to serve.(1)

8. You always serve on a _____ and the birdie must pass the _____ _____ line.(3)

9. When you serve in doubles the boundary lines are _____ and _____.(2)

10. You only score a point when you are _____.(1)

11. If the birdie lands on a line it is considered _____ or _____.(2)

12. A real game of badminton normally goes up to _____.(1)

13. Which of the following is not a key element for the serve?(1)

A) Racquet head must pass over the wrist during contact for it to be good

B) Feet are shoulder width apart
C) Drop the shuttle (birdie) not toss it
D) Stand behind the service line

14. Which of the following is not a key element for the clear?(1)

A) Racquet arm is extended on contact
B) Racquet foot remains behind you after contact
C) Follow- through in intended direction of shuttle flight (birdie)
D) Player moves forward to meet shuttle

15. Which of the following is not a key element for the grip?(1)

A) Grip is neither limp nor, too strong
B) Heel of hand should be at the butt or handle
C) Hand should form a letter "O" around the handle
D) Hand should form a "V" on the handle with index finger and thumb

16. Consider the following scenario and provide the correct answer.(4)

Team AB has won the deciding factor for choice. They elected for team CD to serve. "C" serves to "A". "A" returns the birdie with a smash that falls outside the court. "C" serves again and it is returned back over the net. "D" attempts to hit the birdie over but drives it into the net on his own side.

Who is serving to whom and what is the score? _____to_____ and the score is ___-___.

Serve	String	Shaft
Birdie	In	21
One	Spin	7
Two	Spinning	Doubles serving
Head	Choice	Base
Neck	Diagonal	Handle
Receive	Line	B
Net	A	C
Drive	Center line	Doubles side line
Drop	Back	Right service box
Smash	D	Toss
Short service line	High	Deep / Long
Grip	Low	
Singles side line	Middle	
Point	Wide	
Fault	Short	
Good	15	
Single boundary line	Doubles boundary line	

Teacher Performance Evaluation Sheet

Please review the provided material on the serve and the clear before viewing the student performances on the CD ROM. The CD is broken down into two sections; 1- the serve, and 2- the clear. Keep in mind that the age level of these students is between 12 and 14. They are presently either in grade 7 or 8 (cycle one high school). You are asked to evaluate the student's technical execution of the serve or clear and not whether the birdie has or would enter the opponent's court, after being struck.

Please indicate each student's performance by circling their execution level from 1 – being terrible to 5- being excellent.

Thank you once again for your time in completing this video analysis.

The Serve

Student #1	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #2	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #3	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #4	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #5	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #6	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #7	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #8	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #9	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #10	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #11	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #12	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #13	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #14	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #15	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5

Student #16	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5

The Clear

Student #1	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #2	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #3	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #4	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #5	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #6	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #7	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #8	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #9	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #10	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #11	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #12	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #13	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #14	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5
Student #15	Terrible	Poor	Good	Very Good	Excellent

	1	2	3	4	5
Student #16	Terrible	Poor	Good	Very Good	Excellent
	1	2	3	4	5

School Consent form

Study title: A blended online instructional approach for Physical Education

Investigator: Robert D.M. Taylor
Department of Education, Concordia University
1455 De Maisonneuve Blvd W., Montréal Que, H3G 1M8

Robert Taylor, who is a Maters student at the University of Concordia and a teacher at MacDonald High School, has requested the participation of four physical education classes in a research study at this institution. The title of the research is **"A Blended Online Instructional Approach for Physical Education."**

The purpose of the research is to test the effectiveness of a blended learning approach in a physical education class. Four groups are involved in the study at the cycle one high school level. All participants will complete a participant profile questionnaire either online or on paper and be assigned to one of the two control or two experimental groups. Members of the study will either have access to the badminton theory during the session. Once the badminton section has been completed two tests will be administered, one practical and one written. At the end of the study all groups will have access to the badminton website.

Risk and Benefits

The research and ethics committee of the Department of Education at Concordia University Institutional Review Board have approved this study. There are no evident risks inherent in it, aside from the usual risks associated with regular badminton play or physical activity.

There is no financial remuneration for participation in the study.

The possible benefits of participating in the study are: increased understanding of the sport of badminton, increased performance in the sport of badminton and increased physical activity.

All information, data and videotapes from the study will be kept confidential. Participants' code numbers and not names will be used to identify students (if at all) and will be kept by Robert D. M. Taylor. All information derived from the study will be used for this research purpose only and may be published or presented at conferences without disclosure of participants' names or identity. All participants can be informed of the results of study at the end, if requested.

disclosure of participants' names or identity. All participants can be informed of the results of study at the end, if they so request.

Names and details for all other researchers involved (e.g., co-investigators, collaborators, research associates, research assistants, supervisors – please specify role)

Title of Research Project:

"A Blended Online Instructional Approach for Physical Education"

2. Granting Agency, Grant Number and Title OR Contractor and Contract Title (if applic.):

Lester B. Pearson School Board

4. Brief Description of Research:
For funded research, please include one-page summary; otherwise, include a brief overall description. Include a statement of the benefits likely to be derived from project. You can address these questions by including the summary page from the grant proposal.

Because class time allotted for physical education has been reduced 50 percent in the past decade, teachers need to find ways to get more value from classroom sessions. This study explores the potential of blended learning for doing so. Specifically, this study explores whether students can learn the technical skills associated with badminton from online materials viewed as homework assignments, so that they can use class time exclusively for practice. To make this assessment, this study will use a quasi-experimental design in which one male and one female section of students in a Cycle One physical education class that I am teaching in a Quebec high school tries this blended approach, and one male and one female section of a Cycle One physical education class of a Quebec high school follow the traditional classroom format. Students will be pre- and post-tested, and scores will be compared to assess the relative effectiveness of the blended approach against the traditional classroom method.

I will present the findings in the form of a written Thesis report.

5. Scholarly Review of Proposed Research:
Complete the Scholarly Review Form (SRF) if you are conducting non-funded or contract bio-medical research or any other non-funded or contract research involving more than minimal levels of risk.

We are not conducting a research involving more than minimal levels of risk.

Part Two: Research Participants

1. Sample of Persons to be Studied:

Students of High school:

*Ranging in ages between 12 to 14 years old , attend Macdonald High School, and are assigned to one of four Cycle One Physical Education classes. Class sections have between 20 and 30 students each at the time this request is being made. The number of students in each section is 23 in PED 100-01, 21 in PED 100-03, 30 in PED 204-03 and 27 in PED 204-05.

2. Method of Recruitment of Participants:

I will be conducting the study with four sections of physical education that I teach. I am recruiting two of the grade 7 sections that I teach and two of the grade 8 sections. One seventh grade and one eighth grade section will be experimental groups; the others will be control groups. I will inform students of the study during their introduction to the class and again during the first week of October. Request for signed permission forms will be given out during class time, to be returned to me prior to the commencement study date.

3. Treatment of Participants in the Course of the Research:

A brief summary of procedure, as well an account of the training of researchers/assistants.

Procedures that students of four classes will follow while participating in the study:

The badminton section will take between four to six weeks to complete. During this time, two control groups will receive regular physical education instruction during class times as per the norm and two experiment groups will receive regular physical education instruction during class times as per the norm, as well as will access an internet website as needed.

1. The researcher will meet with students and explain the purpose of the study
2. Participants consent: students will be requested to receive signed from their parents to participate in the research and video taping
3. Classes will be divided into control group and experiment group
4. Researcher will conduct an orientation class for the experiment group
5. Students will be given a pre-study questionnaire
6. The unit on badminton will commence
7. Students will receive a practical skills test
8. An additional random selection of five students from each class will be selected to be videoed for skill analysis
9. Students will be given a post-study written test
10. Students in experiment group will be given a post-study questionnaire to provide feedback as to the usability of the badminton website.

Each group will have access to the same information for the final test. The extra information that appears on the badminton website will be available for all students after the study is complete

Part Three: Ethical Concerns
Indicate briefly how research plan deals with the following potential ethical concerns:

1. Informed Consent:
   Written consent form or written draft of oral protocols must be attached; see instructions and sample.

2. Deception:

The researcher must both describe the nature of any deception and provide a rationale regarding why it must be used to address the research question – i.e., is it absolutely necessary for the design? Deception may include the following: deliberate presentation of false information; suppression of material information; selection of information designed to mislead; and selective disclosure.

There will be a form of deception during the study. The form of deception that will be used is the suppression of information. This is due to the fact that only two groups will have access to the badminton website. This deception is imperative to the research question of whether or not this form of instruction is more viable than the existing system in place. At the end of the study all material will be available to all groups to access without restrictions. No participants will be penalized or disadvantaged by their grouping assignments in the written or practical assessment. A group normalization scheme will be in place to off set any low or rogue marks and bring them to normalization.

3. Freedom to Discontinue:

Participants will be informed in writing that they are free to discontinue at any time.

4. Assessment of Risks to Subjects' Physical Wellbeing, Psychological Welfare, and/or Reputation:

This includes low-level risk or any form of discomfort resulting from the research procedure and how it will be dealt with. When it is called for, you should indicate arrangements that have been made to ascertain that subjects are in "healthy" enough condition to undergo the intended research procedures. You should be able to indicate clearly the kinds of risks that may be involved and the action to be taken if someone is unexpectedly put at risk as part of the research efforts.

So as to insure no student mark will be adversely affected by participating in the study. A normalized mark will be applied if a student falls below the class average.

This research procedure will not include any low-level risks or any discomfort for the subjects. Parents will give their written consent for the subjects (students) to participate.

5. Protecting and/or Addressing Participant "At Risk" Situations:

The subjects will not be placed in any 'at risk' situations.

6. Post-Research Explanation and/or Debriefing:

At the end of the study Participants will receive debriefed on the study results and all material will be available to all groups to access without restrictions. Parents as well as students can receive written interpretations of the data if requested.

7. Confidentiality of Results:

The researcher will know the participants throughout the study; however, in order to protect the confidentiality of the students each will be assigned a numerical code to insure their identity will not be disclosed in the final report.

8. Data Handling:

Please describe the path of your data from collection to storage to its eventual destruction/disposal. Include specific details on data handling, data storage (format and location), who will have access, and disposal/destruction method.

Data will be collected in electronic and or paper form and analyzed using a spreadsheet application. It will be stored in a computer file for analysis, in the researchers' hard drives. A backup of the data will be kept on a portable drive in a secured file cabinet, at the high school. It will not be destroyed until after the thesis defense.

9. Other Comments:

Bearing in mind the ethical guidelines of your academic and/or professional association, please comment on any other ethical concerns which may arise in the course of this research (e.g., responsibility to subjects beyond the purposes of this study).

Signature of Principal Investigator: _____

Date: _____

This is to state that I agree to participate in a program of research being conducted by, Robert Taylor of Educational Technology of Concordia University.

A. PURPOSE

The purpose of the research is to test the effectiveness of a blended learning approach in a physical education class. By using this approach I hope to increase the amount of time a student has practicing, performing and playing the sport, thus increasing the amount of time they are actively engaged.
Four groups are involved in the study at the cycle one high school level. All participants will complete a participant profile questionnaire either online or on paper and be assigned to one of the two control or two treatment groups. Members of the study will have access to the badminton theory, during the session. Once the badminton section has been completed two tests will be administered, one practical and one written. At the end of the study all groups will have access to the badminton website.

B. PROCEDURES

The research will be conducted at MacDonald High School, 17 Maple Ave, Saint Anne-de-Bellevue, Montréal. The participants are Cycle 1, grades 7 and 8, students. The participants will be known as one of the four following groups: A control groups or a treatment groups in which students will be required to participate in Physical education classes as per the school norms and check and complete, as required, information, assignments and test that will be posted, by the teacher.

There are no risks or discomforts involved in this study.

C. CONDITIONS OF PARTICIPATION

- I understand that I am free to withdraw my consent and discontinue my participation at anytime without negative consequences.
- I understand that my participation in this study is voluntary:

In order to protect the confidentiality of the students, their identity will not be disclosed in the final report.

- I understand that the data from this study may be published.