The Use of Heart Rate Monitors in High School Physical Education

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**Abstract**

Physical educators frequently use heart rate monitors to improve student motivation in hopes to increase overall student performance during exercise. Action research conducted in a Team Sports physical education class determined the impact of heart rate monitors over manual heart rate checks. Participants in both the control group and the experimental group completed heart rate monitor tests before and after the research was conducted to determine knowledge on heart rates and heart rate monitors. A general survey was completed by all participants to determine how physically fit the Team Sports class was. Teacher observations were completed by the researcher throughout the research study to compare participants using the heart rate monitors to participants performing manual heart rate checks. Analysis of data collected determined that heart rate monitors improve student participation and offer motivation in physical education class. Heart rate monitors are the key to keeping students healthy and maximizing their time in class. Heart rate monitors will be integrated into all physical education classes to help fight childhood obesity and to get students that live sedentary lifestyles active. The researcher’s goal is to graduate all students with the skills and knowledge needed to live a physically active lifestyle.

**Introduction**

**Problem Statement**

Students throughout the United States are suffering from childhood obesity, diabetes, and heart disease. Some of these students do not have a positive role model at home to guide them to make healthy choices. Often times, students consider school their safe place and a place where they can escape from the problems at home. Each educator has a role to play in student’s lives and the physical educator’s job is to provide them with the knowledge and skills needed to live a physically active lifestyle.

Technology integration in physical education class shows students and teachers the data collected during exercise. Heart rate monitors allow for students to exercise in their target heart rate zone. It is recommended that students exercise vigorously for 20 minutes, five days a week. Many students do not exercise after they leave school; therefore, it is important to maximize their time in physical education class. With the use of heart rate monitors, students have the ability to exercise in their target heart rate zone for 20 minutes every day in physical education class. Data collected in this study will hopefully show that students put forth more effort when they are using a heart rate monitor during exercise compared to when they are not. In today’s world, with the diseases that are affecting children, it is important that physical educators are able to collect data to ensure maximum participation in class.

**Purpose and Rationale**

The Unified School District of Antigo recently received a federal grant for the physical education department. With this money, technology was integrated into physical education classes. Pedometers, PDA’s, Elite books, and heart rate monitors were a few pieces of technology that the district purchased. Prior to this grant, students in the district had little experience with technology in physical education class. The teachers are now using heart rate monitors for nearly all classes and the students have been excited about the new equipment. Data will be collected from a class where half of the students are exercising using heart rate monitors while the other half exercises without the use of heart rate monitors. Prior to the integration of heart rate monitors, students will learn what it means to exercise in a target heart rate zone, how to calculate maximum heart rate, and how to apply it to everyday exercises.

There are students in high school who are athletic individuals. They appear to be working hard in physical education class when in reality they are not entering their target heart rate zone. There are also students who appear to be exercising lightly but in reality they are in their target heart rate zone based on their maximum heart rate value. When both of these students are in class the physical educator can be easily fooled, however, with the use of heart rate monitors, the educator can visually see the data and know whether or not the student is exercising in their target heart rate zone. This technology will greatly benefit physical education classes and hold students reliable for their exercises in class which will hopefully result in overall healthier students.

**Review of Literature**

The purpose of this study was to determine the impact that the use of heart rate monitors have on student motivation and performance in high school physical education. The researcher’s prediction was that students would be more motivated to exercise in their target heart rate zone when they were using a heart rate monitor compared to when they were exercising without the use of a heart rate monitor. Through the use of heart rate monitors, students exercised in their target heart rate zone for 20 minutes or more of physical education class. This study held students reliable for exercising in their individual target heart rate zone and also allowed the researcher to recognize who was and who was not exercising to their maximum potential.

Many school districts purchased heart rate monitors within the past five years and students have had the opportunity to use them to enhance their physical education class. The Unified School District of Antigo is a relatively poor community and was unable to purchase this technology until the district fortunately received a federal grant in the summer of 2010. Thanks to grant money the district now has heart rate monitors to use in physical education classes at the high school and middle school. The researcher hopes that the heart rate monitors will aid in keeping students healthy and promote individual lifelong fitness in physical education. In the past five years there have been multiple journals and articles written discussing the use of heart rate monitors in physical education. The areas that will be explored in depth will be technology’s impact on physical education, student motivation in physical education, childhood obesity, and physical activity levels in youth, and the benefits of heart rate monitors.

**Technology’s Impact on Physical Education**

Physical Education, just as any subject taught in school, is adjusting and adapting to the ever-changing world of technology. Technology in physical education gives students the opportunity to understand how physical activity is affecting their bodies and that all students are different. Heart rate monitors allow students to understand that their target heart rate zone is different from the student standing next to them. Technology allows students to be individuals rather than competitors, which will hopefully lead to living a physically active lifestyle. There was a good explanation of when technology was first integrated into physical education class in the *American School Board Journal* in an article written by Naomi Dillon (2008) which states, “In the old days, almost everybody used the presidential Fitness Test. So they used to compare everybody to everybody in class. If you were an athlete, great, but there wasn’t a lot of incentive if you weren’t (pg. 33).” Since this time, physical educators have searched for ways to hold students responsible for their own health. The question was posed, “how do I get well and fit and how do I stay well and fit for the rest of my life (Dillon, 2008, pg. 35)?” Not all students are the same, but they all have one characteristic in common, all students must exercise to live a physically active and healthy lifestyle. Naomi Dillon (2008) states,

From the popular pedometer to the cutting-edge heart rate monitor, devices can provide instant feedback to both the instructor and the student. So, for schools, the question is how to use the power of technology to drive students toward a healthier lifestyle. From pedometers and heart rate monitors, to computerized assessment programs and video exercise games, more and more educators are exploring and turning to technology to improve the health and wellness of their students. (pg. 34)

In addition to purchasing and integrating technology into the lives of the students, the physical educator must be competent in how to use the newest technology. Marianne Woods, Grace Karp, Miao Hui, and Dana Perlman (2008) state in their article, *Physical Educators’ Technology Competencies and Usage* that they conducted a survey to “examine K-12 physical education teachers’ perceptions of ability and usage of technology” (pg. 296). Participants were asked how and why they utilize technology, challenges they face in implementing technology, and where they learned to use technology (Woods et al., 2008). Results from the survey showed high levels of perceived competency with many forms of technology but differences based on gender, teaching level, and years of experience (Woods et al., 2008). The researcher would guess that teachers newly graduated from college would have greater competency in technology than veteran teachers. Also, teachers that have continued their education would most likely be more competent and well-rounded in the world of technology. Unfortunately, according to the survey, low competency levels were shown for website creation, PDAs, heart rate monitors, and body composition analyzers (Woods et al., 2008). This survey shows that there are many characteristics playing a role in technology use in physical education.

**Student Motivation in Physical Education**

In order for students to perform in physical education class the teacher must offer some type of motivation. Based on the educator, that motivation may be a variety of teaching strategies, methods, or the use of equipment. Students may be motivated through the use of technology if they understand how to use the piece of technology and understand what the information means. When discussing heart rate monitors the physical educator must first teach the students the definition of resting heart rate, target heart rate zone, and maximum heart rate. It is important that students understand what these phrases mean so that they can relate it to their data. Students must also learn how to work a heart rate monitor, how to read the results, and understand what the figures mean. Heart rate monitors can be very motivating because once students understand the basics they can exercise while wearing a heart rate monitor and perform in their target heart rate zone. The numbers on the heart rate monitor will tell students if they are exercising hard enough or if they need to put forth more effort. In an article titled, *Motivational Climate and Students’ Emotional Experiences and Effort in Physical Education*, written by Vassilis Barkoukis, Timo Jaakkola, Jarmo Liukkonen, and Anthony Watt (2010) it states that “research has demonstrated that intrinsic motivation and self-determination are related to persistence in physical activity (pg. 295).” Students need to be challenged in physical education so that they are able to find activities that they truly enjoy. Not all students enjoy a competitive game of basketball but instead they enjoy cross-country skiing or biking. The physical education teacher must help students with self-motivation and offer a variety of lifelong activities in class. Barkoukis, Jaakkola, Liukkonen, and Watt (2010) state,

School physical education plays an important role in the development of a physically active lifestyle. This is because of its potential to provide positive experiences of engagement in physical activity for the whole student population. Reliable knowledge is, therefore, required about the motivating role of PE to students’ involvement in physical activity. The classroom environment may affect students’ motivational regulations, which, in turn, influence intention to participate in out-of-school or leisure- oriented physical activities. Furthermore, when children have positive experiences from their involvement in PE, it is more likely that they become regular participants in physical activity as adults. (pg. 296)

The researcher’s goal as a physical education teacher is to graduate all students with the skills and knowledge needed to live a physically active and healthy lifestyle. This cannot be accomplished without figuring out how each student is motivated. Heart rate monitors are an excellent source of motivation, and the researcher feels that they will make an impact in physical education class.

**Childhood Obesity and Physical Activity Levels in Youth**

*Phys Tech*, an article written by Naomi Dillon (2008) states “for today’s students, technology has made life easier and more exciting. It has created more opportunities for learning. At the same time, the Internet, instant messaging, video games, and cell phones have contributed to a generation that is far less active and more obese than ever (pg. 35).” Childhood obesity is at an all-time high and it is predicted that by the end of 2010 child obesity will be at 20% (Dillon, 2008, pg. 35). It is interesting that technology is making our children lazy but also has the opportunity to keep our children moving. When students resort to video games and Internet they are not getting any physical activity but when they are using pedometers and heart rate monitors they are being held responsible for their physical activity. Cynthia Bascetta (2006), author of *Childhood Obesity: Factors Affecting Physical Activity* conducted a survey showing that obesity rates for children 6-11 years old are estimated to have increased from 15.1% in 1999 to 18.8% in 2004 (pg. 2). Obesity results from an imbalance between the amount of energy consumed and the amount of energy expended. Children and their parents can influence both energy consumed through diet and energy expended through physical activity (Bascetta, 2006). Cynthia Bascetta (2006) states,

In our October 2005 report, we surveyed experts on the key strategies to include in the design or implementation of a program to prevent or reduce childhood obesity. The program strategy identified by experts as most important was increasing physical activity. (pg. 2)

Ken Royal (2008) author of *Playing with Heart*, has taken childhood obesity in Fargo, North Dakota into his own hands. Students are no longer being awarded by winning a game but for exercising inside their target heart rate zone. Students should not be compared to one another, but instead each should have their own goals and the teacher should guide them to achieve those goals. Royal (2008) states, “The use of heart rate technology allows us to apply direct formative feedback. Students get results immediately and can apply the results to their personal goals and lifestyles (pg. 20).”

**The Benefits of Heart Rate Monitors**

Heart rate monitors are an excellent teaching tool in physical education because they keep the students reliable. The teacher can look at a student’s heart rate monitor and see if they are exercising in their target heart rate zone or not. Students who know that they have to exercise in that zone for 20 minutes will know whether or not they are putting forth enough effort. Some students may look like they are not working hard enough in physical education class when in fact they are exercising in their zone. Phil Lawler, a physical Education teacher at Madison Junior High School, uses technology everyday in his classes. Phil likes the idea that “every student now gets credit for what they do, not how fast or how far they run (pg. 20).” Without the use of a heart rate monitor, educators cannot know how hard students are working. This can be unfair to some students and may be dangerous to others. In her book Teaching Middle School Physical Education*,* author Bonnie S. Mohnsen (2008) encourages teachers to “use heart rate monitors to collect data during aerobic workouts, to compare heart rates for different activities, and to determine fitness levels by analyzing the recovery heart rates (pg. 38).”

In order for the students to exercise properly it is important that they are working at an appropriate intensity. Christine Varner (2007) author of *Personal TRAINER on your wrist* states that “you still have to do crunches, but now you have help reaching your goals. High-tech toys can lead us down the path to a sedentary lifestyle, so it’s only fair that some high-tech toys help reverse the trip. These devices record and measure your workout, and even provide a much-needed shot of motivation (pg. 3).”

**Summary**

In the article, *Heart Rate Monitors Promote Physical Education for Children* by Jan Tipton and Allan Sander (2004) it states that “national health and fitness data suggests that a significant percentage of children are not on a pathway to leading healthy, physically, active lifestyles. Many children are leading sedentary lifestyles due to a lack of opportunity, success, or self-motivation in physical activity. Programs that highlight the use of heart rate monitors offer a wonderful potential to counteract a lack of support (pg. 49).”

As a physical education teacher, the researcher feels responsible for motivating students to be healthy individuals. The researcher strives to teach students to be healthy by participating in activities that they enjoy. Students can exercise in their target heart rate zone no matter what activity they are participating in. It is important to teach students the basics of a heart rate monitor so that they may become self-motivated learners. Heart rate monitors in physical education help to keep students reliable and also motivate them to exercise at a level that will benefit them as an individual.

**Methodology**

The purpose of this study was to see if the use of heart rate monitors in physical education class affects overall student performance. This action research produced data through the use of teacher observations, tests, surveys, and through discussion and applied knowledge to lessons by the researcher and participants. Heart rate monitors allowed the researcher and the participant to see if they are exercising in their target heart rate zone. This study showed whether or not heart rate monitors offer motivation to participants in physical education class.

The researcher first completed and passed the CITI training before seeking approval from the Institutional Review Board (IRB) of Marian University. This approval (Appendix A) was granted after the researcher created, perfected, and submitted the research question to IRB. Site permission was granted by the principal at Antigo High School (Appendix B) and permissions and assents were obtained from parents (Appendix C) and students (Appendix D). The purpose of the approval from IRB and the permissions from the principal, parents, and students was to ensure safety of all participants involved in the research study.

**Setting**

The research study took place at Antigo High School in Antigo, Wisconsin. With an enrollment of approximately 1,033 students in ninth thru through twelfth grades, the makeup of the school is primarily Caucasian and socially economically lower-to middle- class. Students come from the city of Antigo, population of 8,560, and the surrounding area which encompasses most of Langlade County, and parts of Shawano and Marathon Counties. Antigo High School staff consists of 83 instructional staff members and 43 support staff members. Administration includes one principal, one assistant principal, and one dean of students. Students at Antigo High School take one semester of physical education in ninth grade, another in tenth grade, and a third semester either during eleventh or twelfth grade, resulting in one and a half credits of physical education.

**Participants**

The participants in this study were enrolled in Team Sports, a physical education course offered to eleventh and twelfth grade students at Antigo High School. The curriculum for this class consisted of competitive and non-competitive team sports such as speedball, football, softball, volleyball, basketball, and ultimate Frisbee. Participants have the choice of seven physical education electives in their junior and senior year; therefore, most of the participants enjoy the class because they chose to take it. The class consisted of 30 students, eight of whom were female students and 22 of whom were male students. All 30 students chose to participate in the study; therefore, the researcher conducted the study with two groups with 15 participants in group A and 15 participants in group B.

The first group, group A, consisted of four females and 11 males. This group consisted of 15 Caucasian participants. One participant was identified as a student with emotional/ behavioral disorder (EBD). Group A was the control group in the research study and the participants exercised in physical education class without the use of heart rate monitors. Participants calculated their target heart rate and checked their heart rates by completing heart rate checks periodically throughout the hour. Participants in group A were coded using letters (1A, 2A, 3A, etc.).

The second group, group B, also consisted of four females and 11 males. Just as the students in group A, group B consisted of 15 Caucasian participants. One participant was identified as a student with a cognitive learning disability (CD). Group B was the experimental group in the research study and the participants exercised in physical education class while using heart rate monitors. Participants in group B were coded using letters (1B, 2B, 3B, etc.).

**Instruments**

Four means of gathering information were used to conduct this research study: pre-heart rate monitor test, post-heart rate monitor test, general fitness survey, and teacher observations. The pre-heart rate monitor test (Appendix E), designed by the researcher was intended to test the participant’s knowledge on heart rate monitors. Prior to taking this test, participants had no information given to them regarding target heart rate zone, maximum heart rate, or resting heart rate. Participants were tested on their ability to take their own pulse and what the numbers meant. The researcher used this test to pick a starting point for teaching participants about heart rate monitors based on the knowledge that they knew.

The post-heart rate monitor test (Appendix F), was given to participants after the lessons had been taught and participants had used heart rate monitors. Participants answered the questions based on their individual resting heart rate, maximum heart rate, and target heart rate zone. Participants not only should have known the meaning of the words but also understood that each participant is different and they all have different numbers depending on gender, height, weight, age, and athletic ability. The test also provided feedback on how motivated the participants were while exercising with the use of a heart rate monitor.

The general fitness survey (Appendix G), showed the researcher where the participants were at in terms of physical fitness. The survey was anonymous; therefore, participants were extremely honest. The researcher learned whether participants usually sweat or breathe hard in physical education class and whether being physically fit was important to them as an individual. The survey also asked participants to state whether they were involved in school sporting events and what grade in school they were. The answers to these questions helped the research have a starting point when working with heart rate monitors. It also helped the researcher know what to expect in terms of target heart rate zones. If participants are inactive outside of school they will most likely have a low target heart rate zone.

Teacher observations (Appendix H) helped the researcher throughout this study to visually see how the participants reacted to exercising while using a heart rate monitor. The researcher has taught physical education for three years and continuously looks for new ways to motivate students. Group A and Group B were observed using identical rubrics. The rubric allowed each group to receive points ranging from one to four. The researcher looked for the amount of effort put forth in each group and the number of participants participating in each group. The researcher observed how well the participants knew what the heart rate numbers meant and if they could calculate their own target heart rate whether they were exercising with a heart rate monitor or not. Lastly, the researcher observed how many participants exercised in their target heart rate zone during the majority of the physical education, Team Sports class.

**Procedure**

Prior to the heart rate monitor research study, participants completed an anonymous general fitness survey (Appendix G) created by the researcher. The results from this study gave the researcher an idea of how physically active participants were and how much they exercise outside of physical education class. The survey results showed the researcher the percentage of participants that sweat or breathe hard in physical education class. The results from this survey offered the researcher background knowledge on how physically fit the Team Sports class was at the beginning of the research study. The survey took participants about 10 minutes to complete. It took about twenty minutes for the researcher to tabulate the results.

On a subsequent class day, participants completed the heart rate monitor pre-test (Appendix E). The participants were tested on their knowledge on heart rate monitors before they had instruction from the researcher. The results from this test showed the researcher how well the participants knew heart rate terminology and how to calculate a target heart rate zone. Each individual had a different target heart rate zone and it was important for the participants to understand why certain individuals have higher or lower target heart rate zones than others. After completion of the pre-test, the researcher taught the participants how to take their pulse and calculate their target heart rate zone without the use of heart rate monitors. Participants were then taught how to use the heart rate monitors and what all of the numbers meant that appeared on the watch. Participants learned what their individual resting heart rate, maximum heart rate, and target heart rate zone were. By knowing these numbers the participants were able to exercise to their maximum potential without putting themselves at risk by overexerting themselves.

Throughout the research study, the researcher conducted teacher observations (Appendix H) on both the control group (group A) and the experimental group (group B). The researcher observed the effort and participation put forth by each group. This showed the researcher if the use of heart rate monitors motivated participants in group B more so than the participants in group A. Both group A and group B were taught how to calculate their individual target heart rate zones, resting heart rate, and maximum heart rate. The observations showed if one of the groups was more motivated during physical education than the other. Lastly, the researcher observed the number of participants in each group that exercised in their target heart rate zone. This was observed by looking at the heart rate monitors worn by the participants in group B and asking the participants in group A to record their heart rate periodically throughout the hour by checking it manually throughout the class period.

At the end of the research study, the participants completed a heart rate monitor post-test (Appendix F) that was similar to the pre-test given at the beginning of the study. The test asked participants to define terms such as target heart rate zone, maximum heart rate, and resting heart rate. Participants were asked to explain why each participant had a different target heart rate zone. Factors such as age, athletic ability, and gender were possible answers. Participants also were asked to write their individual target heart rate zone, maximum heart rate, and resting heart rate. Lastly, participants were asked if they enjoyed using heart rate monitors in physical education class. The test scores gave the researcher feedback on the use of heart rate monitors in physical education class.

**Findings and Conclusions**

The purpose of this study was to examine the impact of heart rate monitors on overall performance in physical education class. The objective was to see if students were motivated to exercise in their target heart rate zone more so when they used a heart rate monitor rather than taking their pulse manually. After analyzing data collected from a general fitness survey, pre and post heart rate tests, and teacher observations, the researcher found that students who wore a heart rate monitor while exercising in physical education class were more likely to exercise in their target heart rate zone versus a student who did not wear a heart rate monitor. Using a heart rate monitor is much more efficient than figuring heart rates manually. Although the majority of participants benefitted from using a heart rate monitor, some students still lacked motivation in physical education class. In order to solve this problem, when the researcher asked to see their heart rate monitor, they were motivated to get their heart rate higher so they did not lose daily points.

**Pre-Heart Rate Monitor Test**

The Pre-Heart Rate Monitor Test (Appendix E), which all of the participants completed prior to the study, revealed some disheartening information of their overall knowledge of heart rate monitors. First of all, none of the 30 participants had ever exercised while using a heart rate monitor prior to this study. This information gave the researcher an idea of where to start when teaching about heart rates and target heart rate zones. Questions two, three, and four were asked to see if participants could correctly define the terms target heart rate, maximum heart rate, and resting heart rate. Of the 30 participants only four of them, 2.2%, were able to define these three terms correctly.

The researcher was pleasantly surprised with the participant’s responses to the question “Does everyone that is the same age have the same target heart rate zone?” A far greater number responded “no” than the researcher anticipated, but when asked “why?” none of the 30 participants answered correctly. Table 1 shows the responses:

Table 1

**Does everyone that is the same age have the same target heart rate zone?**

|  |  |
| --- | --- |
| **Response** | **% of Students Responding** |
| YES | 29% |
| NO | 71% |

The researcher was intrigued by the responses to the question “Do you think that you will work harder in PE class while using a heart rate monitor?” The majority of the participants selected “no” as their answer to question number seven. Table 2 shows the responses:

Table 2

**Do you think that you will work harder in PE class while using a heart rate monitor?**

|  |  |
| --- | --- |
| **Response** | **% of Students Responding** |
| YES | 28.2% |
| NO | 71.8% |

The participants answered the pre-test questions honestly and the results showed the researcher that teaching about heart rate monitors would need to start with basic information. At this point the researcher hoped that the post-heart rate monitor test given at the end of the study would show greater participant knowledge on the topic of heart rate monitors and heart rates.

**Post- Heart Rate Monitor Test**

At the end of the research study, participants were given a Post- Heart Rate Monitor Test (Appendix F). Throughout the research study, the researcher taught participants how to calculate their target heart rate zone, maximum heart rate, resting heart rate, and how to manually take their pulse. Throughout the research period participants were expected to use this information everyday in physical education class, whether they were in the control group or the experimental group. The data collected from this test surpassed the researcher’s expectations. Nearly all participants were able to answer the questions correctly which was a significant improvement compared to the results from the Pre-Heart Rate Monitor Test. First, the question asking participants “Did you enjoy using a heart rate monitor in class?” determined that participants enjoyed exercising while using a heart rate monitor. Of the 15 participants in the experimental group, 13 of them answered “yes” to the question. The two participants who answered “no” to the question noted that they had to work harder; therefore, they did not enjoy using the heart rate monitor.

In questions two, three, and four, participants were asked to define the terms target heart rate zone, maximum heart rate, and resting heart rate. Whether participants were in the control group or the experimental group, the majority were able to define these important terms. Table 3 shows the responses:

Table 3

|  |  |  |
| --- | --- | --- |
| **Question** | **% that answered correctly** | **% that answered incorrectly** |
| #2- Define target heart rate Zone | 96% | 4% |
| #3- Define maximum heart rate | 91% | 9% |
| #4- Define resting heart rate | 92% | 8% |

The question “Does everyone that is the same age have the same target heart rate zone?” showed an increase in knowledge from the pre- heart rate monitor test. All 30 participants answered “no” and when asked “why?” 90% of the participants answered correctly. Answers accepted were gender, athletic ability, age, weight, and height.

When participants were asked “Did you feel that you worked harder in PE class while you were using a heart rate monitor?” the results varied. The researcher was hoping for 100% of the participants to answer “yes” but that was not the case. Of the 15 participants answering the question, only 11 (73.3%) of them answered that they worked harder in class when using a heart rate monitor. Table 4 shows the responses:

Table 4

**Did you feel that you worked harder in PE class while you were using a heart rate monitor?”**

|  |  |
| --- | --- |
| **Response** | **% of Students Responding** |
| YES | 73.3% |
| NO | 26.7% |

Overall, the researcher was very pleased with the results from the post-heart rate monitor survey. The goal was to see an increase in scores from the beginning of the research to the end. The participants were graded on both the pre and post heart rate monitor tests. Some of the questions were not graded because they were opinion questions. The average score increased 26% from the pre-test results to the post-test results. The average score for the pre- test was 37.8% and the average score for the post- test was 96.4%. Figure 1 shows the increase in scores from the pre-test to the post-test.

Figure 1

*Figure 1.* % of students answering questions correctly in pre and post heart rate monitor test

**General Fitness Survey**

At the beginning of the research study, participants were asked to complete the General Fitness Survey (Appendix G). The survey was designed to show the researcher how physically fit the physical education class was as a whole. The survey consisted of six questions, surveys were anonymous, and no letter grades were given for this portion of the study. Data was collected and the results varied depending on the question. Both the control group and the experimental group took the survey.

**Question 1: I participated in a school sports activity during 2009-10 school year?**

The majority of the participants answered “yes” to this question which was not a surprise to the researcher. Both Group A and Group B had a number of athletic individuals and the majority of the participants in the class participate in at least one school sporting event throughout the school year. The researcher hopes that this continues into the 2010-11 school year so that sport team numbers remain high. Nine of the participants were not involved in school sports, five of those participants were in Group A and four of those participants were in Group B. Overall, 21 of 30 participants (70%) were involved in a school sports activity during the 2009-10 school year.

**Question 2: I participate in a personal fitness program?**

18 of the 30 participants (60%) in the research study responded yes to this question. A personal fitness program includes activities such as keeping a log of their exercise, exercising daily, being on a sports team, logging their eating habits, and working with a trainer or dietician. Of those 18, 33% of them were in group A and 66% of them were in group B. Of the 12 participants that responded “no”, 42% of them were in group A and 58% of them were in group B.

**Question 3: I participate in fewer physical activities during the winter months?**

The researcher asked participants this question to see if they are getting the same amount of physical activity in the winter months as they are the rest of the year. The data showed that 16 of the 30 (53%) participants answered “yes” to the question, meaning that they participate in fewer physical activities during the winter months. 56% of those participants were in group A and 44% were in group B. 14 of 30 (47%) participants answered “no” to the question, meaning that they did not participant in fewer physical activities during the winter months. 43% of those participants were in Group A and 57% of those participants were in group B.

**Question 4: Did you exercise more THAN 225 minutes(3 hours and 45 min.) of moderate to vigorous exercise=increased heart rate, heavy breathing, perspiration(sweating) this week(including time with your family, by yourself and during PE class)?**

This question was important to the researcher because it showed how many participants do in fact exercise the recommended time in physical education class. When the research study began, participants had been in class for two months. This gave the researcher an idea of the motivation levels in the class and how hard each participant worked when they were in physical education class. The researcher was very pleased with the responses to this question. 22 of 30 (73%) participants responded “yes” to the question and eight of 30 (27%) participants responded “no” to the question. Of the participants that responded “yes” 55% were in group A and 45% were in group B. Of the participants that responded “no” 33% were in group A and 67% were in group B. It was nice to know that the majority of participants were exercising outside of physical education class either by themselves or with their families.

**Question 5: Do you breathe hard and sweat during most gym classes?**

When asked this question, 24 of 30 (80%) of participants answered “yes”. Of those 24 participants, 46% were in group A and 54% were in group B. Six participants out of 30 answered “no” to the question. Of those six, 67% were in group A and 33% were in group B. The data collected from this question also showed the researcher how many of the participants were willing to work hard in physical education class. The researcher hoped for a high percentage of participants answering “yes” to this question and was very pleased with the outcome.

**Question 6: What grade are you in?**

The physical education- Team Sports class consisted of students in eleventh and twelfth grade. To give the researcher the most information possible, participants were asked to circle their grade on the survey. 13 of 30 (43%) participants were in eleventh grade and 17 of 30 (57%) participants were in twelfth grade. Of the participants in eleventh grade, 55% were in group A and 45% were in group B. Of the participants in twelfth grade, 53% were in group A and 47% were in group B.

Figures 2 and 3 show the results of the survey comparing group A to group B. Each chart shows questions one through five, including how many students answered yes and no to each question. Both group A and group B had 15 participants that took the survey which equaled 30 total surveys conducted for the research study.

Figure 2- Group A

*Figure 2.* Group A Survey Results

Figure 3- Group B

*Figure 3.* Group B Survey Results

**Teacher Observations**

Group A was the control group in this study and they did not exercise while using heart rate monitors. Instead, they manually checked their pulse throughout the class period and compared it to their target heart rate zone. Participants in group A calculated their target heart rate zone in the classroom and were encouraged to exercise in their target heart rate zone during the majority of the class period. Participants told the researcher their individual target heart rate zone and it was recorded on a coded spreadsheet. All participants checked their heart rate periodically throughout the class period and verbally told the researcher if they were or were not exercising in their target heart rate zone. Participants also recorded their average heart rate during each of the six observation days. The researcher would like to believe that all participants in Group A were honest but there was the chance that some of the participants were not telling the truth about their heart rate. There is no way of knowing if the participants did indeed exercise in their target heart rate zone when they reported that they had.

Group B was the experimental group in this study and they exercised everyday while using a heart rate monitor. Participants in group B calculated their target heart rate zone in the classroom and were encouraged to exercise in their target heart rate zone throughout the majority of the class period. Participants told the researcher their individual target heart rate zone and it was recorded on a coded spreadsheet. All participants checked their heart rate monitor periodically throughout the hour and verbally told the researcher if they were or were not exercising in their target heart rate zone. Participants also recorded their average heart rate during each of the six observation days. The researcher followed up on the information by checking the participant’s heart rate monitor to see if they were indeed exercising in their target heart rate zone. If they were not, the researcher encouraged them to put forth more effort until they were exercising in their target heart rate zone.

The researcher used the Teacher Observation Form (Appendix H) to observe both group A and group B. The same form was used for observing each group. Both group A and group B were observed six times throughout the research study. Each group was observed in four areas which included effort, participation, knowledge, and heart rate zone. Each group was given a score ranging from one being poor to four being excellent in each of the four areas.

Group A, the control group, averaged an overall score of 12 out of 16 possible points. 10 points in observation one, 12 points in observation two, 13 points in observation three, 12 points in observation four, 13 points in observation five, and 13 points in observation six. In the control group, it was difficult to know for sure if participants were exercising in their target heart rate zone. The heart rate area was based off of the participants word alone, therefore may not be completely accurate. The researcher found that the majority of group A put forth effort in physical education class and participated in all activities. 60-75% of group A proved to be competent in the target heart rate zone and also 60-75% of group A exercised in their target heart rate zone during class. Although 60-75% of participants were exercising in their target heart rate zone most of the time, there were two weeks that only 40-55% of participants reached their target heart rate zone. The following chart shows Group A over the course of six observations. Scores did not fluctuate much from observation one to observation six.

Figure 4- Group A

*Figure 4.* Group A Teacher Observations

Group B, the experimental group, averaged an overall score of 14 out of 16 possible points. 14 points in observation one, 15 points in observation two, 14 points in observation three, 14 points in observation four, 13 points in observation five, and 12 points in observation six. The researcher found that group B showed better competency in the knowledge area than group A. This could be caused by participants in group B having to enter data into their heart rate monitor. Group B scored in the three and four category each week for every observation. 60-75% of participants in group B exercised in their target heart rate zone, was well-rounded in heart rate knowledge, and put forth effort in calculating their maximum heart rate, resting heart rate, and target heart rate zone. In most cases, 80-100% of participants in group B were participating for the entire class period. Overall, participants in group B scored higher than participants in group A. The following chart shows group B over the course of six observations. Scores did not fluctuate much from observation one to observation six.

Figure 5- Group B

*Figure 5.* Group B Teacher Observations

**Conclusion**

Students in physical education need motivation. The research done in this study has shown that heart rate monitors offer motivation to students. Based on the results from the pre and post heart rate monitor tests, participants learned how to take their pulse, how to calculate their individual target heat rate zone, maximum heart rate, and resting heart rate. The researcher felt that all participants benefitted greatly from this knowledge. Group B wore the heart rate monitors and each participant understood how to use them and how to get their data from them. The researcher observed that participants checked their heart rate monitor periodically to see if they were exercising in their target heart rate zone. Overall, the researcher believes that heart rate monitors offer motivation in physical education class.

Prior to this study, the researcher thought that heart rate monitors would offer motivation in physical education class. Students simply need to be educated in how their body works and what is safe in terms of exercise. Once students understood these concepts, the heart rate monitor offered motivation. It is important that students understand why they need physical activity in their lives and how their body is impacted by it. The researcher had a positive experience with heart rate monitors and will continue to use them in other physical education classes.

Prior to this study, the researcher found many articles with information on heart rate monitors in physical education and motivation in physical education. In an article found by the researcher prior to this study, Phil Lawler, a physical Education teacher at Madison Junior High School, uses technology everyday in his classes. Phil likes the idea that “every student now gets credit for what they do, not how fast or how far they run (pg. 20).” The research has proven to be true in this study because students do need to be motivated and heart rate monitors are an excellent tool to hold students accountable and to offer instant feedback. Technology is ever changing and it is important to keep up with the students. Another piece of literature found prior to this study, Teaching Middle School Physical Education*,* by author Bonnie S. Mohnsen (2008) encouraged teachers to “use heart rate monitors to collect data during aerobic workouts, to compare heart rates for different activities, and to determine fitness levels by analyzing the recovery heart rates (pg. 38).” Throughout this research study, participants were asked to wear heart rate monitors for a number of different activities and they did indeed teach them which activities were better cardiovascular workouts. When educators integrate technology into their classes, the students stay interested. The use of heart rate monitors in physical education classes are an excellent tool to connect with the students and to ensure that they get the most out of their physical education experience.

**Reflection and Action Plan for Educational Change**

**Reflection**

At the start of the action research study, the researcher intended to determine if the use of heart rate monitors in physical education class would effect student performance. As a result of this study, the researcher concluded that the use of heart rate monitors in physical education class offered motivation to students when exercising and increased overall student performance. The experimental group in the study wore heart rate monitors when exercising in class. Students participated in a number of different activities while wearing heart rate monitors. Students were required to record their average heart rate; therefore they strived to stay in their target heart rate zone. Since the students knew that the researcher could check their heart rate watch to get the truth, they mostly wrote down their accurate heart rate. This was an excellent tool because the researcher knew that students were exercising in a healthy zone. Students did not know when the researcher was going to ask them to record their heart rate; therefore they were encouraged to stay in their target heart rate zone for the entire lesson. The majority of the experimental group exercised in their target heart rate zone, which was a huge success for the researcher. By seeing these results, it’s proved that heart rate monitors are a motivational tool in physical education class.

Another equally important determination that was made during this study was that heart rate monitors increase overall student performance in physical education class. The tool was excellent because students knew that they were being graded on their performance. The difference in using heart rate monitors compared to manual heart rate checks is that there was proof of how hard the student was working during exercise when using a heart rate monitor. A student may have looked like they were working hard but were not in their target heart rate zone due to facts such as gender, athleticism, and age. It is important that students understand what their target heart rate zone means to ensure safety while exercising. Heart rate monitors are an essential tool in physical education class.

The researcher thought that if students were comfortable with heart rate monitors in the classroom, they would have no problem using them in the gym. The researcher learned a valuable lesson when many of the students asked how to activate the heart rate monitors in the gym on the first day of data collection. The researcher knew then that more time should have been spent in the classroom to ensure that student’s understood. The researcher became frustrated during the first couple data collection days because much activity time was wasted due to helping students with heart rate monitors. If the researcher would have known this information, another day would have been spent in the classroom to let students try out the heart rate monitors more than just once.

An obstacle that the researcher faced throughout the action research study was balancing time between teaching the students a new topic, keeping the classes fun and interesting, and also collecting data. The researcher was overwhelmed with the experience but the students reacted very well. Students were interested in the researcher’s masters program and were excited to be a part of it. The researcher credits the great class for putting forth much effort in learning about heart rate monitors and being excellent participants in class. Having an uncooperative class would have made the action research study much more stressful; therefore the researcher was fortunate to have had a class that helped the study to be a success.

**Future Plan of Action**

Through this action research study the researcher learned a great deal about heart rate monitors. The ultimate goal is to make all students feel comfortable with using heart rate monitors. The researcher will teach all of the classes what the terms maximum heart rate, target heart rate zone, and resting heart rate mean. Students will understand that no two people have the same target heart rate zone and they will know how to calculate their own. The researcher will continue to use the pre and post heart rate monitor tests to show where instruction needs to start with the teachings in each class. The researcher found that the post test results reveal how much information the students retained. The researcher hopes that students will remember this information for their three physical education classes. It is information that will carry with them throughout life because it is essential that students understand how exercise affects their bodies and what is safe in terms of exercise.

The researcher will continue to share findings with co-workers in the physical education department so that all are on the same page with technology. The researcher works with a young staff that are all willing to adapt to new technology, therefore heart rate monitors will become required in all classes. It will be a challenging transition but once the students understand that it is part of the curriculum they will grow accustomed to wearing them. Not only do the students need to wear them every day but the teachers must commit to checking the heart rate monitors periodically throughout the class period. If teachers choose not to then there is no motivation for the students to exercise in their target heart rate zone. If the three physical education staff members work together, high physical activity levels will be achieved in all classes. A research question for further study could involve the length of time heart rate monitors are worn during a class period. The researcher could study if students are more active for a short time or if they remain active for the entire class period while wearing a heart rate monitor. Student’s health is the number one goal of physical educators and heart rate monitors are a tool to help find and maintain success.

**Summary**

Technology is ever changing and it is the educators’ responsibility to keep physical education classes as new and exciting as possible. Technology is becoming the key to education and if the educator chooses not to integrate it the students suffer. The researcher is a physical education teacher who plans to integrate technology into classes as often as possible. From pedometers, to I-pods, to heart rate monitors the researcher will strive to provide more technology in classes. When teaching athletic training some form of technology will be used every day whether it is the LCD projector, smart board, cell phones, or computer lab. The researcher has witnessed many teachers who choose not to learn the newest strategies for technology integration. The students suffer in the classroom because of this and the researcher will not be a teacher who falls into the trap of teaching the same subject matter every year and using the same educational tools. Education is ever changing and the researcher will strive to stay current on the subject matter from year to year.

The researcher learned a lot from this action research project. The importance of heart rate monitors in physical education and the impact of keeping class new and exciting were two of the lessons learned by the researcher. As an educator, the researcher is a continuous learner who will continue to conduct research in classes. The researcher felt that all of the hard work paid off when students were seen exercising in their target heart rate zone and were excited to show the teacher their heart rate monitor. The researcher has also learned to be honest with the students on trying out new ideas such as exercises, games, or technology. Students were all eager to try out new things and many students offered suggestions. The researcher will take a great deal away from this action research project and it has offered the motivation needed to always be a continuous learner, which is what all students deserve.

**References**

Bascette, C. (2007). Childhood Obesity: Factors Affecting Physical Activity: GAO-07-260R. *GAO Reports*, 1. Retrieved from MasterFILE Premier database.

Dillon, N. (2008). Phys Tech. *American School Board Journal, 195(3),* 32. Retrieved from MasterFILE Premier database.

Furger, R. (2001). The New PE Curriculum: An Innovative Approach to Teaching Physical Fitness. *Edutopia* [On-line]. Available: <http://www.edutopia.org/new-p-e-curriculum>

Liukkonen, J., Barkoukis, V., Watt, A., & Jaakkola, T. (2010). Motivational Climate and Students Emotional Experiences and Effort in Physical Education. *Journal of Educational Research, 103(5)*, 295. Retrieved from MasterFILE Premier database.

Mohnsen, B. (2008). *Teaching Middle School Physical Education. Champaign, IL:* Human Kinetics.

Royal, K. (2008). Playing with Heart. *District Administration, 44(2)*, 20. Retrieved from MasterFILE Premier database.

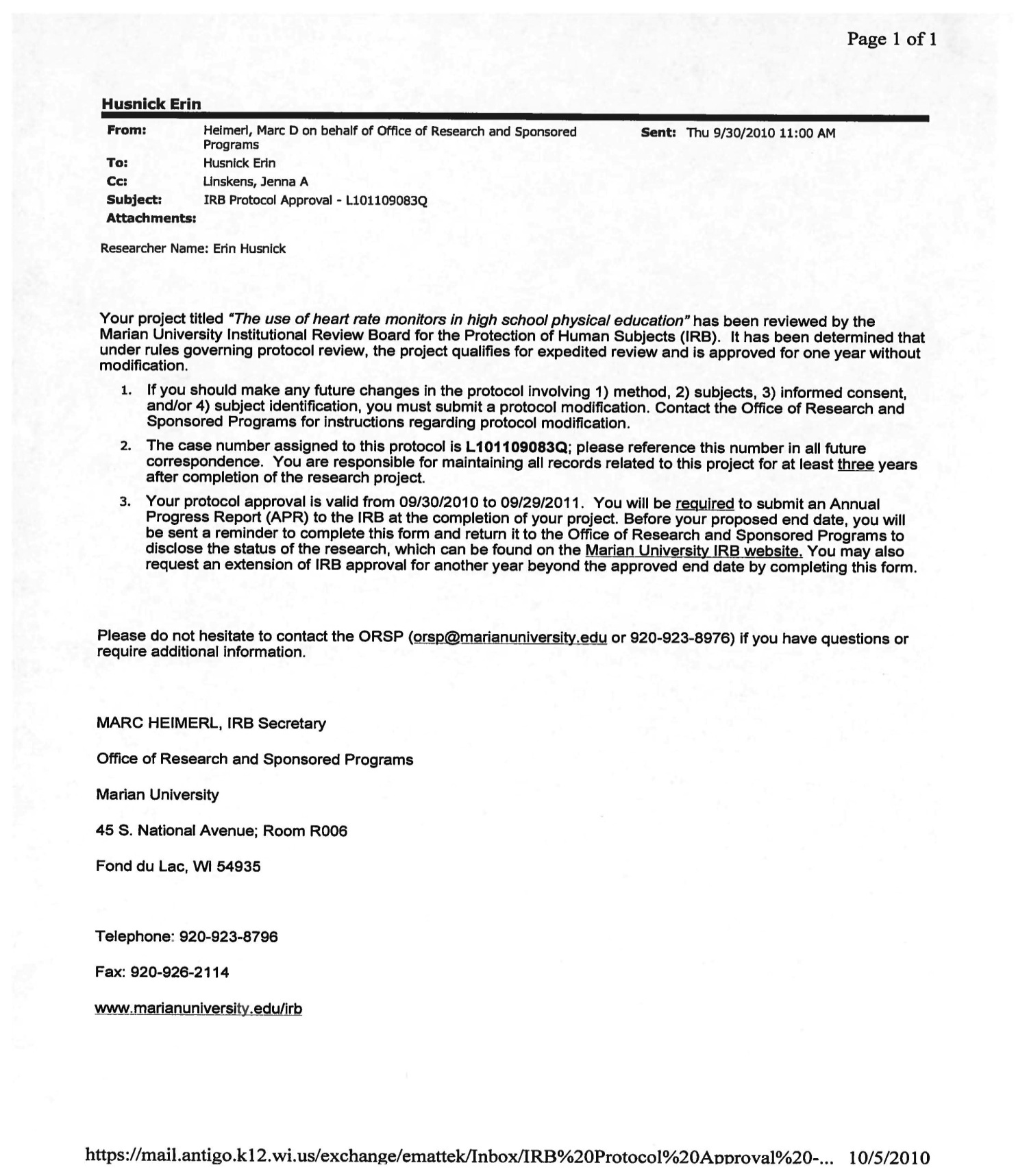
Tipton, J. & Sander, A. (2004). Heart Rate Monitors Promote Physical Education for Children.

*Teaching Elementary Physical Education, v15 n1,* 14-16. Retrieved from ERIC database.

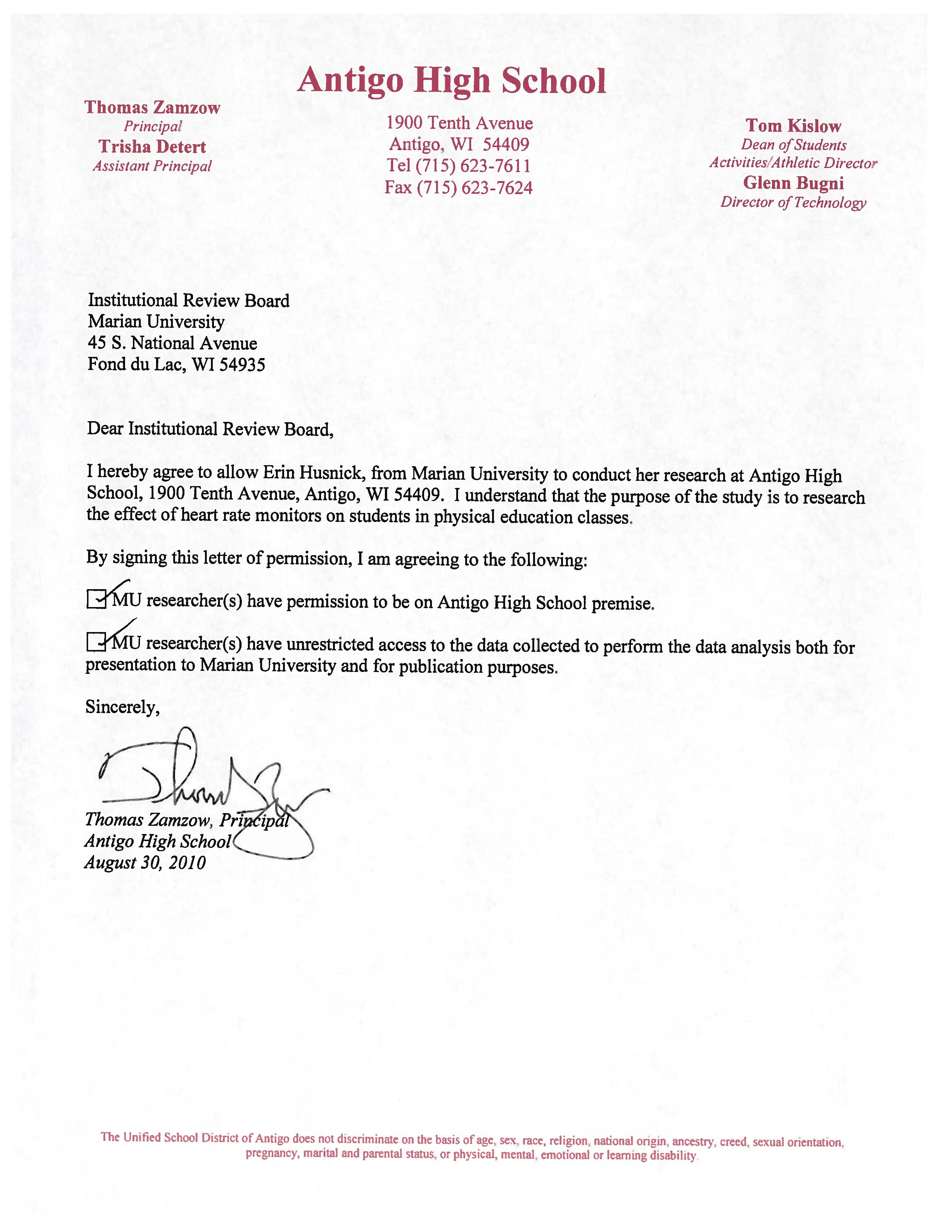
Varner, C. (2007). Personal TRAINER on your wrist. *Kiplinger’s Personal Finance, 61(2),* 109. Retrieved from MasterFILE Premier database.

Woods, M., Karp, G., Hui, M., & Perlman, D. (2008). Physical Educators’ Technology Competencies and Usage. *Physical Educator, 65(2),* 82. Retrieved from MasterFILE Premier database.

**Appendix A- IRB Approval**



**Appendix B- Principal Permission**



**Appendix C- Parent Permission**

*Marian School of Education*

**Study Title:** The use of heart rate monitors in high school physical education

**Researchers:**

* *Erin Husnick,* [*ehusnick@antigo.k12.wi.us*](mailto:ehusnick@antigo.k12.wi.us)*, 715-623-7611 ext. 1740*
* *Jenna Linskens, Instructor, Marian University School of Education, (920)540-7629, jalinskens67@marianuniversity.edu*

You are being asked to allow your child to take part in a research study carried out by Erin Husnick and Jenna Linskens. Please read this form carefully, taking as much time as you need. Ask the researcher to explain anything you don’t understand. This study has been approved for human subject participation by the Marian University Institutional Review Board (IRB).

You may refuse to give permission, or you may withdraw your permission for your child to be in the study, for any reason. Your child will also be asked if he or she would like to take part in this study. Even if you give your permission, your child can decide not to be in the study or to leave the study at any time.

**What is this research study about?**

This research study is being done to identify if students exercise at a higher level while utilizing a heart rate monitor in physical education class compared to not using heart rate monitors in class.

We are asking your permission for your child to be in the study because your child is enrolled in my physical education course. Heart rate monitors are part of the physical education curriculum and all students will exercise while using one in class. There are no physical, mental, or emotional reasons why your child cannot participate in this study. Taking part in the study will take about two months.

**What will my child be asked to do if he or she is in this research study?**

If your child takes part in the study, he or she will be asked to contribute data taken from the heart rate monitors each day after physical education class is finished. Each student will wear a heart rate monitor in physical education class every day, I am asking for your permission to use the data for my research project. Students will be taught how to use a heart rate monitor, how to collect data, and what all of the figures mean. Students will understand the impact of physical activity on their bodies through the use of heart rate monitors. Everyday students will be wearing a heart rate monitor for forty minutes and this will occur for the entire semester. I am comparing student performance with the use of heart rate monitors to student performance without the use of heart rate monitors. Students will be participating in surveys and questionnaires to collect accurate information on heart rate monitor information. These questionnaires and surveys will remain anonymous and confidential throughout the semester. Your child may refuse to answer any question in any test, quiz, questionnaire, or survey. I will be comparing last year’s FITNESSGRAM results and PEP grant survey results to current results taken from this study.

**Are there any benefits to my child if he or she is in this research study?**

If your child takes part in this study,they will be more likely to use a heart rate monitor in the future. Students will understand the meaning of a resting heart rate, target heart rate, and maximal heart rate. Students will calculate their individual target heart rate and strive to perform in that area during physical education class. This will maximize your student’s time in physical education class to ensure a healthy level of fitness.

**Are there any risks to my child if he or she is in this research study?**

The potential risks to your child from taking part in this study are loss of time and inconvenience, loss of confidentiality, emotional discomfort or distress, and physical harm or discomfort. The overall potential risk level for each of these areas is not greater than minimal risk.

* To minimize the potential risk of loss of confidentiality, the surveys will be collected and placed in a secure location in a locked file drawer accessible only to the researcher. The student names will be removed from the surveys and a code (Student 1, Student 2, etc.) will be used as an identifier.
* To minimize the potential risk of loss of time and inconvenience, the researcher will be well-prepared, follow the usual classroom routines, and conduct quick surveys that will only take 5-10 minutes.
* To minimize the potential risk of emotional discomfort or distress, the participants will be told that they may choose to skip any question at any time.
* To minimize the potential risk of physical harm or discomfort, students will be allowed to take breaks as needed during physical education class when they are working in their target heart rate zone.

**Will information about my child be kept private?**

The data for this study will be kept private and confidential to the extent allowed by federal and state law. Each child will be coded with a number to ensure confidentiality. All questionnaires and surveys will be anonymous. At no time throughout this study will your child’s name appear in my research.

The results of this study may be published or presented at professional meetings, but your child’s name will not be used or associated with the findings. The data for this study will be kept for 3 years which is required by Marian University.

**Are there any costs or payments for your child being in this research study?**

There will be no costs to you or your child for taking part in this study.

**What are my child’s rights as a research study volunteer?**

Your child’s participation in this study is completely voluntary. Your child may choose not to take part in this study, choose not to answer specific questions, or leave the study at any time. The child will still take part in the regular physical education activities, but the child’s information will not be used in the study.

There will be no penalty or loss of benefits to which you or your child are entitled if you choose not to give your permission for your child to take part or your child withdraws from the study.

**Who can I talk to if I have questions?**

If you have questions about this study or the information in this form, please contact the researcher Erin Husnick by phone at 715-623-7611 ext. 1740 or by email [ehusnick@antigo.k12.wi.us](mailto:ehusnick@antigo.k12.wi.us). If you have questions about your rights or your child’s rights as a research participant, or would like to report a concern or complaint about this study, please contact the Marian University IRB Administrator at (920) 923-8796, or e-mail orsp@marianuniversity.edu, or regular mail at: Marian University ORSP, 45 S. National Avenue, Fond du Lac, WI 54935.

**What does my signature on this consent form mean?**

Your signature on this form means that:

* You understand the information given to you in this form
* You have been able to ask the researcher questions and state any concerns
* The researcher has responded to your questions and concerns
* You believe you understand the research study and the potential benefits and risks that are involved for your child.
* You understand that even if you give your permission, you child may choose not to take part in the study.

**Study Title:** The use of heart rate monitors in high school physical education

**Researchers:** Erin Husnick and Jenna Linskens

**Statement of Consent**

I give my voluntary permission for my child to take part in this study. I will be given a copy of this consent document for my records.

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Signature of Parent or Guardian Date

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Printed Name of Parent or Guardian

**Statement of Person Obtaining Informed Consent**

I have carefully explained to the parent of the child being asked to take part in the study what will happen to their child.

I certify that when this person signs this form, to the best of my knowledge, he or she understands the purpose, procedures, potential benefits, and potential risks of his or her child’s participation.

I also certify that he or she:

* Speaks the language used to explain this research
* Reads well enough to understand this form or, if not, this person is able to hear and understand when the form is read to him or her
* Does not have any problems that could make it hard to understand what it means for his or her child to take part in this research.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature of Person Obtaining Consent Date

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Printed Name of Person Obtaining Consent Person’s Role in Research study

**Appendix D- Child Permission**

Marian School of Education

**Study Title:** The use of heart rate monitors in high school physical education

**Researchers:** Erin Husnick and Jenna Linskens

My name is Mrs. Husnick. I am from Marian University*.* I and the other people listed at the top of this form are inviting you to take part in a research study. Your parent(s) know we are talking with you about the study, but it is up to you to decide if you want to be in the study. This form will tell you about the study to help you decide whether or not you want to take part in it.

**Why is this study being done?**

The purpose of the study is to help us learn about how heart rate monitors effect your performance in physical education. You will understand how physical activity affects your overall health through the use of heart rate monitors.

You are being asked to take part because you are enrolled in Mrs. Husnick’s seventh hour physical education class. You will be wearing a heart rate monitor while you exercise in class because it is required; it is up to you if you choose to be a part of this study. There are no physical, mental, or emotional reasons why you cannot be part of this study.

**What am I being asked to do?**

If you decide to be in the study, we will ask you to contribute data taken from the heart rate monitors each day after physical education class is finished. Your will wear a heart rate monitor in physical education class every day, I am asking for your permission to use the data for my research project. You will be taught how to use a heart rate monitor, how to collect data, and what all of the figures mean. You will understand the impact of physical activity on your body through the use of heart rate monitors. Every day you will be wearing a heart rate monitor for forty minutes and this will occur for the entire semester. I am comparing student performance with the use of heart rate monitors to student performance without the use of heart rate monitors. You will be participating in surveys and questionnaires to collect accurate information on heart rate monitor information. These questionnaires and surveys will remain anonymous and confidential throughout the semester. You may refuse to answer any question in any test, quiz, questionnaire, or survey. I will be comparing last year’s FITNESSGRAM results and PEP grant survey results to current results taken from this study.

**What are the benefits to me for taking part in the study?**

If you take part in this study,you will be more likely to use a heart rate monitor in the future. You will understand the meaning of a resting heart rate, target heart rate, and maximal heart rate. You will learn how to calculate your individual target heart rate and strive to perform in that area during physical education class. This will maximize your activity time in physical education class to ensure a healthy level of fitness.

**Are there any risks to me if I am in this study?**

The potential risks of taking part in this study are minimal. You may get tired while using a heart rate monitor in physical education class. You are free to take breaks as needed when working in your target heart rate zone.

**Will my information be kept private?**

The data for this study will be kept private and confidential to the extent allowed by federal and state law. Under rare circumstances your data may be reviewed by MU officials or people from the organization or agency that funded the study.

You will each be coded with a number to ensure confidentiality. All questionnaires and surveys will be anonymous. At no time throughout this study will your name appear in my research.

When we tell other people or write articles about what we learned in the study, we won’t include your name or that of anyone else who took part in the study.

The data for this study will be kept for 3 years.

**Are there any costs or payments for being in this study?**

There will be no costs to you for taking part in this study.

You will not receive money or any other form of compensation for taking part in this study.

**What are my rights as a research study volunteer?**

Your participation in this research study is completely voluntary. You do not have to be a part of this study if you don’t want to. There will be no penalty to you if you choose not to take part and no one will be upset or angry at you. You may choose not to answer any questions you don’t want to answer, and you can change your mind and not be in the study at any time. If you decide to not be in the study, you will still take part in the activity but your datawill not be used in the study.

**Who can I talk to if I have questions?**

If you have questions at any time, you can ask the researchers and you can talk to your parent about the study. We will give you a copy of this form to keep. If you want to ask us questions about the study, call or email

Mrs. Husnick, [ehusnick@antigo.k12.wi.us](mailto:ehusnick@antigo.k12.wi.us), 715-623-7611 ext. 1740

The Marian University Institutional Review Board has reviewed this study to make sure that the rights and safety of people who take part in the study are protected. If you have questions about your rights in the study, or you are unhappy about something that happens to you in the study, you can contact them at (920) 923-8796 or orsp@marianuniversity.edu.

**What does my signature on this consent form mean?**

Your signature on this form means that:

* You understand the information given to you in this form
* You have been able to ask the researcher questions and state any concerns
* The researcher has answered your questions and concerns
* You believe you understand the research study and the potential benefits and risks that are involved.

**Study Title:** The use of heart rate monitors in high school physical education

**Researchers:** Erin Husnick and Jenna Linskens

**Statement of Consent**

I give my voluntary consent to take part in this study. I will be given a copy of this consent document for my records.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature of Participant Date

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Printed Name of Participant

**Statement of Person Obtaining Informed Consent**

I have carefully explained to the person taking part in the study what he or she can expect.

I certify that when this person signs this form, to the best of my knowledge, he or she understands the purpose, procedures, potential benefits, and potential risks of participation.

I also certify that he or she:

* Speaks the language used to explain this research
* Reads well enough to understand this form or, if not, this person is able to hear and understand when the form is read to him or her
* Does not have any problems that could make it hard to understand what it means to take part in this research.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature of Person Obtaining Consent Date

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Printed Name of Person Obtaining Consent Role in the Research Study

**Appendix E**

Heart Rate Monitor Pre-test

1. Have you ever exercised using a heart rate monitor before?

Yes No

1. What is the definition of target heart rate?
2. What is the definition of maximum heart rate?
3. What is the definition of resting heart rate?
4. List the 2 main body areas where you can take your pulse
5. Does everyone that is the same age have the same target heart rate?

Yes No

Why?

1. Do you think that you will work harder in PE class while using a heart rate monitor?

Yes No

Why?

1. List 3 factors that would affect a person’s heart rate

**Appendix F**

Heart Rate Monitor Post-test

1. Did you enjoy using a heart rate monitor in class?

Yes No

Why or why not?

1. What is the definition of target heart rate?
2. What is the definition of maximum heart rate?
3. What is the definition of resting heart rate?
4. List the 2 main body areas where you can take your pulse
5. Does everyone that is the same age have the same target heart rate?

Yes No

Why?

1. Did you feel that you worked harder in PE class while using a heart rate monitor?

Yes No

Why?

1. List 3 factors that would affect a person’s heart rate
2. How do you calculate maximum heart rate?
3. How do you calculate target heart rate?
4. What is your target heart rate?
5. What is your maximum heart rate?
6. What is your resting heart rate?

**Appendix G- General Fitness Survey**

**How Physically Fit is Mrs. Husnick’s 7th Hour?**

1. I participated in a **school sports** activity during 2009-10 school year?

**Yes** **No**

1. I participate in a personal fitness program?

**Yes**  **No**

1. I participate in fewer physical activities during the winter months?

**Yes** **No**

4. Did you exercise more THAN 225 minutes(3 hours and 45 min.) of moderate to vigorous exercise=increased heart rate, heavy breathing, perspiration(sweating) this week(including time with your family, by yourself and during PE class)?

**Yes**  **No**

5. Do you breathe hard and sweat during most gym classes?

**Yes** **No**

1. What grade are you in?

11th 12th

**Appendix H- Teacher Observation**

Teacher Observation- Group A Date:

4= Excellent 3= Good 2= Fair 1= Poor

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 4 Points | 3 Points | 2 Points | 1 Points |
| Effort   * Effort put forth as a whole group | 80-100% of Group A puts forth effort in checking heart rate, participating in the activity, and improving skills | 60-75% of Group A puts forth effort in checking heart rate, participating in the activity, and improving skills | 40-55% of Group A puts forth effort in checking heart rate, participating in the activity, and improving skills | Less than 35% of Group A puts forth effort in checking heart rate, participating in the activity, and improving skills |
| Participation   * Participation put forth as a whole group | 80-100% of Group A participates for the entire class period | 60-75% of Group A participates for the entire class period | 40-55% of Group A participates for the entire class period | Less than 35% of Group A participates for the entire class period |
| Knowledge   * Group knows their target heart rate zone, maximum heart rate, and resting heart rate | 80- 100% of Group A knows how to calculate their target heart rate, maximum heart rate, and resting heart rate | 60-75% of Group A knows how to calculate their target heart rate, maximum heart rate, and resting heart rate | 40-55% of Group A knows how to calculate their target heart rate, maximum heart rate, and resting heart rate | Less than 35% of Group A knows how to calculate their target heart rate, maximum heart rate, and resting heart rate |
| Heart Rate Zone   * Group as a whole is exercising within their target heart rate zone | 80- 100% of Group A is exercising in the target heart rate zone | 60-75% of Group A is exercising in the target heart rate zone | 40- 55% of Group A is exercising in the target heart rate zone | Less than 35% of Group A is exercising in the target heart rate zone |

Teacher Observation- Group B Date:

4= Excellent 3= Good 2= Fair 1= Poor

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 4 Points | 3 Points | 2 Points | 1 Points |
| Effort   * Effort put forth as a whole group | 80-100% of Group B puts forth effort in checking heart rate, participating in the activity, and improving skills | 60-75% of Group B puts forth effort in checking heart rate, participating in the activity, and improving skills | 40-55% of Group B puts forth effort in checking heart rate, participating in the activity, and improving skills | Less than 35% of Group B puts forth effort in checking heart rate, participating in the activity, and improving skills |
| Participation   * Participation put forth as a whole group | 80-100% of Group B participates for the entire class period | 60-75% of Group B participates for the entire class period | 40-55% of Group B participates for the entire class period | Less than 35% of Group B participates for the entire class period |
| Knowledge   * Group knows their target heart rate zone, maximum heart rate, and resting heart rate | 80- 100% of Group B knows how to calculate their target heart rate, maximum heart rate, and resting heart rate | 60-75% of Group B knows how to calculate their target heart rate, maximum heart rate, and resting heart rate | 40-55% of Group B knows how to calculate their target heart rate, maximum heart rate, and resting heart rate | Less than 35% of Group B knows how to calculate their target heart rate, maximum heart rate, and resting heart rate |
| Heart Rate Zone   * Group as a whole is exercising within their target heart rate zone | 80- 100% of Group B is exercising in the target heart rate zone | 60-75% of Group B is exercising in the target heart rate zone | 40- 55% of Group B is exercising in the target heart rate zone | Less than 35% of Group B is exercising in the target heart rate zone |

**Appendix I**

Average Heart Rate- Raw Data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Obs. 1** | **Obs. 2** | **Obs. 3** | **Obs. 4** | **Obs. 5** | **Obs. 6** |
| **A1** | 177 | 118 | 135 | 121 | 132 | 129 |
| **A2** | 120 | 110 | 112 | 125 | 133 | 129 |
| **A3** | 117 | 134 | 149 | 132 | 144 | 149 |
| **A4** | 121 | 135 | 165 | 157 | 166 | 149 |
| **A5** | 166 | 165 | 172 | 172 | 161 | 158 |
| **A6** | 132 | 182 | 155 | 157 | 148 | 162 |
| **A7** | 127 | 111 | 109 | 111 | 103 | 119 |
| **A8** | 101 | 103 | 100 | 104 | 112 | 114 |
| **A9** | 111 | 151 | 123 | 154 | 156 | 146 |
| **A10** | 121 | 123 | 119 | 116 | 129 | 131 |
| **A11** | 114 | 115 | 109 | 107 | 118 | 121 |
| **A12** | 151 | 145 | 167 | 158 | 159 | 150 |
| **A13** | 122 | 131 | 123 | 137 | 142 | 125 |
| **A14** | 118 | 129 | 127 | 119 | 131 | 126 |
| **A15** | 117 | 116 | 118 | 126 | 120 | 131 |
| **B1** | 145 | 137 | 125 | 167 | 139 | 156 |
| **B2** | 176 | 172 | 155 | 181 | 142 | 143 |
| **B3** | 157 | 154 | 166 | 177 | 149 | 146 |
| **B4** | 142 | 136 | 151 | 159 | 138 | 132 |
| **B5** | 169 | 166 | 159 | 162 | 155 | 132 |
| **B6** | 155 | 156 | 172 | 160 | 160 | 163 |
| **B7** | 163 | 172 | 162 | 174 | 178 | 162 |
| **B8** | 144 | 148 | 155 | 166 | 171 | 155 |
| **B9** | 171 | 177 | 154 | 182 | 159 | 157 |
| **B10** | 146 | 159 | 166 | 174 | 168 | 151 |
| **B11** | 143 | 151 | 173 | 152 | 161 | 144 |
| **B12** | 139 | 147 | 141 | 155 | 142 | 143 |
| **B13** | 122 | 119 | 137 | 149 | 132 | 123 |
| **B14** | 139 | 162 | 158 | 163 | 141 | 148 |
| **B15** | 128 | 134 | 133 | 122 | 139 | 128 |

**Appendix J**

Group Teacher Observations -Raw Data

**Group A**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Effort | Participation | Knowledge | Heart Rate | Total |
| Observation 1 | 3 | 3 | 2 | 2 | 10 |
| Observation 2 | 3 | 3 | 3 | 3 | 12 |
| Observation 3 | 4 | 4 | 2 | 3 | 13 |
| Observation 4 | 3 | 3 | 3 | 3 | 12 |
| Observation 5 | 3 | 4 | 3 | 3 | 13 |
| Observation 6 | 4 | 4 | 3 | 2 | 13 |

**Group B**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Effort | Participation | Knowledge | Heart Rate | Total |
| Observation 1 | 4 | 4 | 3 | 3 | 14 |
| Observation 2 | 3 | 3 | 4 | 3 | 15 |
| Observation 3 | 4 | 4 | 3 | 3 | 14 |
| Observation 4 | 3 | 4 | 3 | 4 | 14 |
| Observation 5 | 3 | 4 | 3 | 3 | 13 |
| Observation 6 | 3 | 3 | 3 | 3 | 12 |

**Appendix K**

General Survey- Raw Data

**Total Team Sports Class**

|  |  |  |
| --- | --- | --- |
| **Question #** | **Yes** | **No** |
| Question 1 | 21 | 9 |
| Question 2 | 18 | 12 |
| Question 3 | 16 | 14 |
| Question 4 | 22 | 8 |
| Question 5 | 24 | 6 |
| Question 6 | 13- eleventh grade | 17- twelfth grade |

**Group A**

|  |  |  |
| --- | --- | --- |
| **Question #** | **Yes** | **No** |
| Question 1 | 10 | 5 |
| Question 2 | 10 | 5 |
| Question 3 | 9 | 6 |
| Question 4 | 12 | 3 |
| Question 5 | 11 | 4 |
| Question 6 | 6- eleventh grade | 9- twelfth grade |

**Group B**

|  |  |  |
| --- | --- | --- |
| **Question #** | **Yes** | **No** |
| Question 1 | 11 | 4 |
| Question 2 | 8 | 7 |
| Question 3 | 7 | 8 |
| Question 4 | 10 | 5 |
| Question 5 | 13 | 2 |
| Question 6 | 7- eleventh grade | 8- twelfth grade |