STATUS OF PATRON KNOWLEDGE OF EXERCISE EQUIPMENT AND MONITORING TECHNOLOGY AT THE BOWLING GREEN STATE UNIVERSITY STUDENT RECREATION CENTER

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ABSTRACT

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The purpose of this study was to determine the current knowledge of BGSU SRC patrons regarding exercise equipment and monitoring technology. The main objective of this study was to identify whether or not the patrons that use the facility know how to use the cardio equipment and their heart monitors correctly. To obtain this information, patrons were asked to fill out a survey when entering the Student Recreation Center. 48 patrons completed the survey and their results were tallied using SNAP, a survey program. The results showed that patrons knew how to use the cardio equipment but not the heart monitors located on the machines. They also did not know where to receive information about the machines or the heart monitors. Based on these results the researcher recommended informational packets for the machines and signage to be placed around the cardio area.

This thesis is dedicated to Duretta Cobbins

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CHAPTER 1: INTRODUCTION

Context of Problem

In over four years of working at the Student Recreation Center (SRC), the researcher had noticed that some of the patrons do not know how to use the exercise equipment or the heart monitors located on the equipment. Many patrons have also expressed the need (either through the researcher or through the use of the comments and suggestion box) for exercise monitoring technologies to be provided to the patrons of the SRC. Some patrons or students that use the SRC have physical ailments that need to be monitored, such as heart disease. Others would like to learn how to use some of the new and existing technologies offered in the field of fitness and health. Through research, the researcher has have found some of the more effective monitoring technologies to be located on ellipticals, treadmills, cycles, heart monitors, and more recently iPods. These machines would help to monitor user statistics and progress to achieve desired health results. Some of these machines, or their equivalent, can currently be found in the SRC.

Statement of Problem

The purpose of this study was to determine the current knowledge of BGSU SRC patrons regarding exercise equipment and monitoring technology.

Significance of Study

Over a four-year period of time at the SRC, the researcher formed great relationships with some of the patrons that workout at the facility on a daily basis. Many of these patrons have disabilities or health problems that require them to workout on a daily or weekly basis to improve their condition. The researcher believed it to be beneficial for both the SRC and the patrons to include or implement technologies that would aid them in their quest for a healthier lifestyle.

Objectives of Study

The objectives of this study were as follows:

- Identify whether or not the patrons that use the facility know how to use the exercise equipment and their heart monitors correctly.
- Make a recommendation based on the findings of this study as to whether or not there should be a training program implemented for the machines listed in the study.

Solving this problem will help the recreation center to increase patron knowledge of exercise equipment, update the SRC in the technology field, and help the users of this equipment to become healthier people. The SRC staff has been reluctant to update their technology due to factors including lack of knowledge, lack of funding for training, and time constraints. The survey designed can be the answer to each of the constraining factors mentioned. Within this thesis you will find some facts about health, technology, and various possibilities in solving the problem at hand.

Assumptions

The following were assumptions to this study:

- Patrons will answer honestly on the survey.
- Individuals participating in the survey are members of the SRC.
- Individuals participating in the survey use the cardio equipment.

Limitations

The following were limitations to this study:

- Participation in the survey is voluntary

- The survey is conducted during a low use period of the SRC (summer)

Definition of Terms

Merriam-Webster's Medical Dictionary (2006) defines these terms as follows:

- Arrhythmia - an alteration in rhythm of the heartbeat either in time or force. (p. 50)
- Atherosclerosis – a stage of arteriosclerosis involving fatty deposits (atheromas) inside the arterial wall. (p. 56)
- Cholesterol – a white crystalline substance, $C_{27}H_{45}OH$, found in animal tissues and various foods, that is normally synthesized by the liver and is important as a constituent or cell membranes and a precursor to steroid hormones. Its level in the blood steam can influence the pathogens of certain conditions, such as the development of atherosclerosis plaque and coronary artery disease. (p. 124)
- Coronary Artery – Either of two arteries that arise one from the left and one from the right side of the aorta and supply blood to the muscular tissue of the heart. (p. 153)
- Diastolic – The normal rhythmically occurring relaxation and dilation of the heart chambers, especially the ventricles, during which they fill with blood. (p. 190)
- Endorphin – Any of a group of peptide hormones that bind to opiate receptors and are found mainly in the brain. Endorphins reduce the sensation of pain and affect emotions. (p. 223)
- Epidemiologic – The branch of medicine that deals with the study of the causes, distribution, and control of disease in populations. (p. 227)
- High-density Lipoproteins (HDL) – A complex of lipids and proteins in approximately equal amounts that functions as a transporter of cholesterol in the blood. (p. 302)

- Hypertensive – Of or characterized by hypertension; Causing an increase in blood pressure. (p. 335)
- Kilocalorie (kcal) – used by nutritionists to characterize the energy-producing potential in food. (p. 99, 386)
- Low-density Lipoproteins (LDL) – a complex of lipids and proteins, with greater amounts of lipid than protein, which transports cholesterol in the blood. (p. 399)
- Morphine – A bitter crystalline alkaloid, $C_{17}H_{19}NO_3H_2O$, extracted from opium, the soluble salts of which are used in medicine as an analgesic, a light anesthetic, or a sedative. Also called morphia. (p. 471)
- Monoamines – An amine compound containing one amino group, especially a compound that functions as a neurotransmitter. (p. 467)
- Myocardial Infarctions – Destruction of heart tissue resulting from obstruction of the blood supply to the heart muscle, heart attack. (p. 482)
- Plaque – A deposit of fatty material on the inner lining of an arterial wall. (p. 581)
- Pyrogens – A substance that produces fever. (p. 629)
- Systolic – The rhythmic contraction of the heart, especially of the ventricles, by which blood is driven through the aorta and pulmonary artery after each dilation or diastole. (p. 744)

CHAPTER 2: REVIEW OF LITERATURE

There are many benefits to exercising. The main areas of focus for this thesis are the physiological and the psychological benefits of exercise. The physiological benefits include lower cholesterol levels, lower risk of osteoporosis, decreased body fat and blood pressure, a stronger immune system, and a lower risk for cardiovascular disease. The psychological benefits come into play when dealing with the self-efficacy factor and mental health issues such as depression, anxiety, and mood. Exercise produces positive results that will make individuals feel better about themselves and improve those results. The results make an individual want to continue to work out and it improves their retention.

People need to know what exercising can do for the body if done properly and continually. Therefore, it is important for individuals to know how to use the exercise equipment and why exercising with the proper monitoring equipment is important. This literature review contains background information on different conditions within the body that could be improved or maintained at a normal level with regular exercise. It also gives information on the 3 pieces of cardio equipment used in this study as well as some of the newer technology available to individuals.

Physiological Benefits of Exercise

Everyday we hear about how unhealthy Americans are getting. Unfortunately there is some truth to that rumor. “Obesity-related illness is the fastest growing killer of Americans. The good news is that it’s completely preventable through healthy eating, nutritious foods, and appropriate amounts of physical activity.”(Cong. Rep. No. 108-319, 2003) With the reports of poorer health and increasing cases of obesity in America, the advantage of increasing exercise programs seems

obvious. Some of these advantages of include a "decreased chance of heart disease and stroke, an increase in good (HDL) cholesterol, a decrease in bad (LDL) cholesterol, a lower risk of osteoporosis, a decreased percentage of body fat, an increase in lean muscle mass, lowering blood pressure, and improving the immune system" (Leith, 1998, p. 3).

Obesity

Obesity is a big issue in the United States. Kelly (2006) states:

> Results of the National Health and Nutrition Examination Survey (NHANES) for 1999-2000 indicate that an estimated 64 percent of U.S. adults are either overweight or obese, where overweight is defined as having a body mass index (BMI) of 25 kg/m^2 or more. Since 1980, the number of overweight children (ages 6 to 12) has doubled, and the number of overweight adolescents (ages 13 to 17) has tripled. (p. 4)

Like Kelly stated above, obesity is measured by an individual's body mass index (BMI). This can be done in a number of ways, but this thesis will only mention three. The first is using calipers. This device pinches the fat in a few areas of the body (usually the arm, thigh, and side) to take measurements that can then be compared to a standardized chart. Water displacement is another method of measuring BMI. In this measurement, the individual's dry weight will be taken first. He/she will then be weighted in the water using special equipment. The last BMI that will be mentioned in this thesis is DEXA, Dual Energy X-ray Absorptiometry. This x-ray will measure an individual's body fat and bone density.

So how does one fight obesity, through exercise. An individual should keep in mind the energy balance equation, which says energy in (food) equals energy out. This means you must give off more energy than you take in to decrease obesity. "Overweight and obesity occur when

the person consumes more than their average energy expenditure. Increasing physical activity can establish the negative physical energy necessary for weight loss" (Kelly, 2006, p. 65).

Body Fat

Body fat is another serious health issue that needs to be reviewed because it is one of the causes of obesity. Wiseman (2002) says, "obesity is almost always brought about by the intake of more energy (food) than is necessary for day-to-day living" (p. 7). When this happens, the extra energy is stored as fat. Body fat can be measured by taking the person's weight in kilograms and dividing it by his/her height in meters squared. This measurement reference is also called Quetelet's index. Using Quetelet's index, if a person's body fat is below 20 kilograms, he/she is probably too thin. If their body fat is at or between 20-25 kilograms, that is good. 25-30 kilograms is considered slightly overweight and 30-40 kilograms is considered obese. If their body fat is over 40 kilograms, that is considered gravely obese and the individual should seek immediate medical attention. Another way to measure body fat is by using an instrument called the caliper, to measure the thickness of the skin on the upper arm, the hip, and the shoulder blade.

To decrease body fat "many people attempt to lose weight and most are successful to some degree for a while, but after a year or so almost all are back to their original weight," (Wiseman, 2002, p. 9). Changing your diet and exercise is one of the best ways to decrease body fat. Diets that are designed to make a person lose weight fast are not safe or healthy for the body. "Unlike the very small effect that losing weight slowly has on general well-being, the debilitating effect of rapid weight loss can be very marked. People taking only about 1800 kcal/day (kilocalorie per day), which is near the resting metabolic rate, have a fall in metabolic

rate, a fall in pulse rate, a decrease in general activity, and a decrease in tolerance to cold," (Wiseman, 2002, p. 10). Losing weight at a rapid pace can also be emotionally trying. A person may become irritated and depressed. With daily exercise individuals will start to lose body fat and gain muscle mass. It is possible to turn fat into muscle, so you want to be sure to lose the body fat before building up any muscle. The reason being, when fat is turned into muscle, the muscle is not as defined and the area does not look as fit as most would desire. An example of this would be the abdominal muscles. If the individual does not loose the fat but starts working on tightening and building that muscle everyday, that area will become solid because the fat will turn into muscle and the desired six-pack will not be achieved. It is also good to know that muscle weighs more than fat, so you may gain more weight (good weight) over time. With the proper exercise techniques and proper dieting, losing body fat can mitigate obesity, and gaining muscle mass resulting in a healthier, fit, and toned person.

Cardiovascular (Heart) Disease

The next important health issue to consider is cardiovascular disease. "In the United States, cardiovascular disease causes half of all deaths as well as a great deal of suffering and disability. Coronary artery disease alone is responsible for 1.6 million myocardial infarctions per year, of which 500,000 result in death before hospitalization (Frontera, W. R., Slovik, D. M., & Dawson, D. M, 2006, p. 117)." Heart disease can be defined as any damage or abnormality of the heart, which includes coronary artery disease (clogging of the arteries). Some major risk factors are tobacco smoke, physical inactivity, high blood pressure, high cholesterol, obesity/overweight, diabetes, stress, and alcohol. There is also a possibility of electrical damage to the heart. Electrical damage occurs when the heart does not beat in a normal rhythm because

of a faulty circuit or additional electrical pathway. The big problem with electrical damage is that it causes arrhythmias and valve problems.

Why is exercising so important when dealing with heart disease? "Observational epidemiologic studies consistently have shown that persons with higher levels of physical activity experience lower risk of coronary heart disease (Leon, 1997, p. 67)." A decrease in heart disease is related to the length of time you exercise as well as how intense your workout may be. This can include brisk walks (uphill or level ground) climbing stairs, lifting or carrying light objects, home maintenance, sports, and among others. Physical exercise in relation to heart disease increases oxygen exchange helping to purify the blood and strengthen the heart muscle.

Cholesterol

Along with heart disease comes cholesterol. These two health issues are inextricably linked, which is why the issue of cholesterol needs more explanation. Cholesterol can be described as an "odorless, white, powdery, fatty substance," (Cooper, 1988, p. 8). Too much of it can cause atherosclerosis, which causes coronary heart disease. As mentioned above, there are LDL (low-density lipoproteins) and HDL (high-density lipoproteins) cholesterol. LDL cholesterol is considered bad because when there is an excess amount in the blood steam, it will build up in the artery walls. The arteries' main function is to give blood to the heart and brain. When the blood mixes with other substances, it creates plaque. Plaque is so thick and hard that it will clog the arteries. This process is also known as atherosclerosis. HDL cholesterol is considered good because it is said to protect against heart attacks. One viewpoint is that HDL carries cholesterol away from the arteries and to the liver, where it gets passed out of the body.

Another viewpoint is that HDL removes LDL from the plaque in the arteries, which slows down the atherosclerosis process.

As bad as cholesterol may sound, it is good for the body. Your body needs cholesterol for "membrane synthesis in your cells. Without it the cells of the body couldn't function. You couldn't even stay alive," (Cooper, 1988, p. 8). With proper exercise, the HDL levels of cholesterol will elevate and lower triglycerides levels, the chemical form of fat found in food and the body, which often accompany a lower risk of coronary artery disease. To specifically target cholesterol, aerobic exercise is recommended. Some examples of this are walking, swimming, running, and cycling.

Osteoporosis

Osteoporosis is another malady that regular exercise can improve. Winters-Stone (2005) defines osteoporosis as:

> A disease characterized by low bone mass and poor bone structure that develops over time and leads to increased risk of fracture. Nearly 10 million American women and men already have osteoporosis and another 34 million are at risk for developing the disease" (p. vii).

Some possible causes of bone loss are a decrease in calcium or vitamin D, decreased testosterone levels (in men), anorexia nervosa, some medical conditions, and a decrease in physical activity.

How does exercise improve this problem? Exercise helps to strengthen the bones, especially those that bear most of the body's weight. This is because it makes the skeleton stronger. Winters-Stone (2005) cited "swimmers and cyclists have bone mass values nearly equal to normally active people, whereas gymnasts, volleyball players, basketball players, and body

builders have bone mass values that are up to 30 percent higher than inactive people" (p. 36). Some examples of exercises for stronger (weight bearing) bones are walking, jogging, jumping, and stair stepping.

Blood Pressure

Blood pressure is important because "many epidemiological studies have reported an inverse relationship between the levels of habitual physical activity and resting blood pressure. Intervention studies have shown that regular physical activity in essential hypertensives can reduce systolic and diastolic blood pressure by approximately 10mmHg (Leon, 1997, p. 49)."

How is blood pressure defined? Blood pressure can be defined as the force of blood pushing against the artery walls. If an individual has high blood pressure and is trying to lower it by exercise, endurance training is the key. A person should exercise at least 20 to 30 minutes every other day. This type exercise will elevate the heart rate, which is a factor in lowering blood pressure. Weight or resistance training has not been proven to be a way to lower blood pressure. Leon (1997) writes, "the minimal data that are available from hypertensives indicate that exercise training increases HDL-C and HDL_2-C levels and decreases the cholesterol/HDL-C ratio," (p. 115). Exercise for high blood pressure has also been found to reduce insulin levels and improve body composition.

Immune System

The immune system has the shortest explanation, but is an issue that should be explained. "Exercise is said to improve the immune system,"(Mackinnon, 1999, p. 1). The immune system is the body's way of defending itself against disease, infections, and foreign substance. This system is composed of certain white blood cells and antibodies. "Moderate amounts of physical

activity (e.g., brisk walking) have been shown to reduce risk of upper respiratory infection, as well as enhance the function of cell of the monocyte-macrophage system and NK cells,"(Corbin & Pangrazi, 1999, p. 76). However, a word of caution should be included as intense exercising can cause suppression of the immune system.

Psychological Benefits

Questions may arise about why the psychological results of exercise are so important. The importance of the psychological benefits of exercise is that this is what helps an individual to continuously exercise. This want to continue to exercise plays a role in self-efficacy. If an individual believes exercise to be improving their physical and mental health, they will continue to do it.

Mental Health

Exercising on a regular basis is said to improve a person's mental health. Leith (1998) found there to be five theories, which are:

> The first theory is called the endorphin theory. This theory says endorphins are released into the blood stream during exercise. This chemical is also compared to morphine in that it makes you feel good, or improves your mood.
>
> The second theory is called the monoamine hypothesis. When you exercise with a low to moderate intensity, you release brain chemicals called monoamines into the blood stream that will improve your mood.
>
> The third theory is called the thermogenic hypothesis. This hypothesis has to do with the body warming during exercise. When the body warms, pyrogens are released into the bloodstream, which relaxes the muscles and makes one feel better.

> The fourth theory is called the distraction theory. This theory explains how exercise temporarily removes people from their day-to-day problems. It gives their minds something else to think about for that moment in time.
>
> The fifth and final theory is called the self-efficacy theory. This theory explains how exercising makes one feel as though they have accomplished something, which makes him/her feel better about him/herself. (p. 4)

Even though there are five different theories on how exercise improves mental health, it does show that there are many ways in which exercising can improve this issue. The importance of these five theories is that it will improve an individual's retention with exercise and enable them to achieve results.

Introduction to Exercise Machines

Another form of monitoring a person's statistics is through the use of exercise machines. People mainly use equipment to get into shape, lose weight, and/or to improve their fitness. Improving fitness will be the focus for using exercise machines such as ellipticals, cycles, and treadmills. The company chosen for this thesis, as an example of what to look for within a specific exercise machine, is Precor. They are a popular and trusted brand for exercise equipment within the United States. Another reason I am using this brand is because there are many Precor machines located within the Student Recreation Center.

Elliptical

The best elliptical to have for monitoring purposes is the EFX5.33 (Elliptical Fitness Crosstrainer). See appendix A for diagram. Some of the highlights of this machine are:

- SmartRate: Instant display of the actual heart rate keeps the individual in their target zone for improved cardio-training and weight-loss results.
- Touch heart rate monitor: Easy-to-use handgrip sensors monitor heart rate. Heart rate monitoring keeps the user in an aerobic workout and aid in weight loss.
- User IDs: Enter personal preference information, and then quickly and easily retrieve it for future workouts.
- Electronic readouts: Monitors workout time, calories burned and strides taken in a minute-by-minute, easy-to-read workout summary. Cross ramp incline and resistance levels are available at the touch of a button. Heart rate is monitored and displayed at the touch of the hand with new touch heart rate monitor system.
- Low impact: Exercise comfortably with ergonomically correct moving arms and stabilizing footplates, which reduce stress to the muscles, tendons and joints for a worry-free workout (EFX Elliptical Fitness Crosstrainer, 2006, ¶ 1).

This elliptical has the ability to remember and monitor an individual's heart rate as well as their progress through a workout. It has different workout programs that cater to a persons needs, whether they are weight loss, testing fitness, or even heart rate. There are four other models of Precor ellipticals available, but not all of them have the main feature we want in these machines, which is a heart rate monitor. Even though some of the other models lack the heart rate monitors, they are still good machines to use to reach other health and exercise goals.

When choosing a machine to use to accomplish these goals, it is a good practice to choose the one that best meets the specific needs or exercise goals of that individual. Precor's three reasons for having such an effective workout on the elliptical are:

- Superior aerobic exercise with less impact. The unique elliptical motions minimizes impact to the joints and lower back while exercising the lower body muscles, the key to effective aerobic exercise.
- Lower rates of perceived exertion. Minimizing impact workouts on the EFX seem easier than other aerobic exercises. This invites more vigorous exercise for better, quicker results.
- True ease of use. Just get on and go. The EFX closely simulates natural movement; so comfortable begins from the moment exercising starts (Elliptical Fitness Crosstrainers, 2006, ¶ 3).

Using an elliptical can be very beneficial in the realm of monitoring the heart rate and keeping a fit and healthy body. It is a good alternative to the treadmill or the cycle if an individual has a medical condition that keeps him/her from using those machines.

Cycle

The second exercise machine in the Precor family is the cycle. See appendix B for a diagram. These cycles, like the elliptical, are a good exercise machine for at least these three reasons. They are as follows:

1. They are easy to use. Precor cycles are designed with the easy-to-read, navigable consoles that make sense. With the QuickStart feature, an individual can begin exercising with a touch of a button. With Touch Heart Rate monitoring, determining the heart rate is as easy as placing the hands on the handlebars.

2. Pre-programmed courses. The most successful exercise program is the one that users stick with over time and Precor cycles help in that endeavor by offering programs that are challenging and motivating.
3. Self-powered. All Precor cycles are self-powered so that they can be placed anywhere on the floor. With the generator system used by Precor, the Precor cycle will continue to function even if the battery is dead (Cycles, 2006, ¶ 3).

Along with giving reasons why the cycle is a good machine, I also want to list some of the features of a specific cycle in the Precor family. There are four models to choose from. The Precor cycle with the latest technology and the most features is the C846i-R Experience Series. Some of the features included in this machine are:

- CSAFE Compatible
- Heart Rate Telemetry
- QuickStart
- Tap Control
- Touch Heart Rate

For those not comfortable exercising on the elliptical, a cycle is a good alternative. Cross-training using a variety of machines is an option as well. The important thing is to get all the features and functions needed to help improve health and fitness.

Treadmill

The last machine I will talk about is Precor's treadmill. See appendix C for a diagram. This machine can be used to walk, run, or jog. Whichever method of exercising feels most

comfortable or fits with an individual's workout is the one to choose. Why choose a Precor treadmill? For the following reasons:

1. Ground Effects Impact Control System: Their patented system absorbs the shock of impact while walking or running. Reducing impact lowers the risk of injury to lower back, knees, shins, and ankles. In addition, Ground Effects controls lateral motion, providing an increases sense of security.
2. Exercise variety with pre-programmed courses.
3. Ease of use.
4. Low maintenance: While these treadmills require basic care, the running deck does not because it is self-lubricating. And because the deck is reversible, its life is doubled (Treadmills, 2006, ¶ 4).

Just like all other Precor machines, there are a variety of models to choose from in the Treadmill category, six to be exact. The machine I will list the highlights for is the M9.57, the latest creation in Precor Treadmills. These highlights include but are not limited to:

1. Display featuring Tap Control: Tactile paddles control speed and incline, confirming user input. The multiple feedback options make it easy to monitor workouts.
2. Touch heart rate monitor: Easy-to-use handgrip sensors monitor heart rate during workouts.
3. Biofeedback center featuring SmartRate: Shows calories and actual heart rate in relation to exerciser's target zone for weight loss and cardio training.
4. -3 – 15% incline ramp: Simulating running uphill and downhill, the M9.57 allows users to exercise different muscles at different inclines/declines (M9.57, 2006, ¶ 2).

Once again, if a person is unable to exercise using this machine, choose a less exertive machine like the elliptical or one where standing is not required for the entire workout, like the cycle. There are many machines and brands of exercise machines to choose from. As long as they have all the specifications required by the individual, he/she should be good to go. The best advice to give about buying a machine is to choose the latest version. All the latest and most updated features will be integrated into that machine. Also, you will not have to upgrade for a long time.

Introduction to Technology

In a world full of health issues, it is important to understand the benefits of using the technology available to help monitor a person's statistics. One highly recognized health problem is cardio vascular disease. When working out, it is very important to pay close attention to your heart rate, which is why a section on heart monitors and exercise machines that can warn you of a potential health hazard while you work out are included. These monitors are also a great way to keep track of the workout progress. It is also very important to exercise in order to decrease or improve health issues, which is another reason why I have a section on exercise equipment. It is important to know what is available when attacking health issues. The machines and monitors I have researched are heart rate monitors (general), ellipticals, cycles, treadmills, and iPods.

Heart Rate Monitor

Heart rate monitors come in many different forms. Some are installed in exercise machines, while others may be in watches or even shoes. Just as they come in a variety of forms, they are also produced by a variety of manufacturers. The manufacturing company gets chosen based on your heart monitor preference. This is not very important unless there is a favorite or

trusted brand in mind. Another aspect of these monitors is the various functions included in the different products. They include:

1. Stopwatch feature: It's convenient to be able to glance at both your heart rate and your exercise time on one device.
2. Set a target rate, with alarm: This allows you to enter the upper and lower limits for your target heart rate (see below). On some models, you can set both a visual signal (light) and an audible one (beep) when you go out of range.
3. Accumulated time in and out of range: If you want to know exactly how much time you spent in target range, you'll need this feature.
4. Memory: Some monitors simply recall your workout time and how much time spent in the target range. Others can play back minute-by-minute measurements, that display how the heart rate climbed during each speed interval and dropped as the user eased up to recover.
5. Download to a computer: Some manufacturers offer interface cables and software to allow download of a detailed playback of the workout on a personal computer enabling entry into a digital training log (Heart Rate Monitors, 2002, ¶ 4).

In order to receive the correct results, an individual must first learn how to use the monitor correctly. Cardiosport uses the zone technique within the parameter of the goals a person set for his/herself. The zone technique refers to keeping your body within a certain heart rate zone when exercising. The four workout zone techniques Cardiosport uses are: the healthy heart, weight management, aerobic, and anaerobic threshold heart rate zone.

1. The healthy heart rate zone is for beginners that have the goal of improving overall fitness, losing weight or reducing stress. Exercise should be within the zone of 50-60 percent of an individual's maximum heart rate.
2. If you already exercise regularly but are aiming to lose body fat, exercise in the weight management zone which is 60-70 percent of maximum heart rate. Build up to a work out of an hour continuous exercise.
3. If the goal is to improve aerobic capacity or athletic performance, exercise in the aerobic zone, which is 70-80 percent of maximum heart rate.
4. Competitive athletes may need to add interval-training sessions during the week in the anaerobic threshold heart rate zone, which is 80-90 percent of maximum. This high intensity exercise helps train muscles to handle lactic acid (How to use a HRM effectively, 2005, ¶ 1).

Now that the use of a heart rate monitor has been explained, it is time to explore at least one form of these monitors. The form, which is also the main form, I am focusing on is the watch. The Polar Company has two models of a heart rate monitor (HRM) watches from which to choose. They are the Polar FS3 and Polar FS1. Of course one model has more features than the other, but the main features include:

- Water resistance (up to 50m)
- Alarm (visual and audible)
- Recording (average heart rate and total exercise time)
- Stop watch

Why mention these watches in the review? The reason is "Polar HRMs are one of the easiest and accurate ways to *continuously* monitor an individual's heart rate," (Why Heart Rate Monitors, 2006). The easier the monitor is to use, the better.

Another good company for HRM watches is the Cardiosport Company. This company categorizes their watches into three different ranges. They are the:

1. GO Range: Small size with big performance. The GO range has three models, three color schemes, and one great digital technology.
2. GT Range: Four models full of patented technology, a color graphical display on GT2, advanced stopwatch features on GT3 and the flagship GT5 model with USB interface and Cardio Fitness Manager PC software.
3. Fusion Range: Three popular models with mid size watch cases starting at an outstanding value. The Fusion 30 includes our advanced calorie algorithm for those who want to lose some weight as well as getting fitter (Products, 2005, ¶ 1).

Some of the features included on these watches are digital and coded wireless transmission, calorie counter, stopwatch, and memory recall. One good aspect about this company is the variety of products they offer. Their products range in price, size, and features to suit consumers' needs.

iPod

The iPod is one of the newer inventions in exercise health. When people think of iPod, they think about music because it is an mp3 player. Apple has taken their product and moved forward into the area of fitness. iPod has teamed up with Nike to create a mechanism that can monitor an individual's distance when he/she runs. Unfortunately, a heart monitor is not included

in the software, so a HRM watch will still need to be worn. The basis of this new technology is that it will measure running distance while playing an individual's favorite tunes. In order to do this he/she will need to purchase or own:

- Specialized Nike shoes: These shoes have a specially built in pocket located in the insole for the Nike + iPod sensor.
- iPod nano: This is the only iPod this technology is currently built for
- Nike +iPod Sport Kit: This is the software that will allow the sensor that was put into the shoe to communicate with the iPod. The sensor uses a sensitive accelerometer to measure the runners' activity; it then wirelessly transfers this data to the receiver on their iPod nano (Get in Gear, 2006, ¶ 2).

Along with the specifications just listed, the following provides a little more insight to how this product works. The following is a list of features with explanations about addition information on the iPod/Nike Combo. Some of the additional features include:

- Connection: The iPod nano will transfer the runner's workout data to the Internet when connected to the computer. It sends his/her information to nikeplus.com (This site keeps all of your stats and can be checked by run, week, or month).
- Compete: The runner can also compete with other users using the Nikeplus website. Just challenge, run, and sync the data.
- Workout Mixes: These are routines developed for Nike + iPod based on time or distance or the workout. Each routine offers coaching, motivational, and training tips over a continuous mix of music (Stay in sync, 2006, ¶ 2).

This combination is one of the newer technologies available in the fitness world. But it does not benefit a person unless he/she wants to have more information about how long or far they've run and how he/she has or has not improved. A heart monitor still needs to be worn in order to keep up with the body's vitals.

Conclusion

When trying to improve the physiological and psychological health benefits, an individual must understand how monitoring technologies will benefit their workouts. There are many ways to create or strive towards a healthy lifestyle, but regular exercise is the key. There are many types of exercises that can be done and many different pieces of equipment that can be used. For this thesis, the researcher is specifically pointing to three pieces of cardio equipment and heart monitors. All of technologies listed in this thesis are useful when trying to maintain or create a healthy lifestyle or improve fitness. It is important to remember to learn the proper techniques when working out. Also, an individual should make sure to read or pay attention to any instructions he/she is informed on exactly how and what is available when it comes to these monitors and machines. Remember, the machines and monitors listed are not the only ones available for consumer use, but they are a good start and come with the essentials needed to begin a healthy lifestyle.

CHAPTER 3: METHODOLOGY

This chapter contains information about the design of the research that took place for this thesis. Included is an example of survey questions as well as an example of the layout chosen for the survey, which was created using SNAP. A Gantt chart of past and upcoming events for this thesis and a proposed budget are included as well.

Restatement of the Problem

The purpose of this study was to determine the current knowledge of BGSU SRC patrons regarding exercise equipment and monitoring technology.

Research Design

This study employed a quantitative exploratory research design. The researcher administered a self-developed survey that would yield measurable results on whether or not the SRC needs an information packet to explain how to properly use the machines. The selection of patrons to be surveyed was done using a random sampling method. The results produced from this survey served as the basis for recommendations for the researcher.

Sampling Procedures

The researcher surveyed patrons that use the SRC using a random sampling method. The sample population included demographics such as age range, gender, class (student, faculty, community member) The reason for using this method was so that a good age range of patrons that use the facility are included in the test. It would not be entirely accurate if just one group or age range were chosen for the test. Every third patron that enters the SRC was asked to complete the survey using the computer the researcher had provided at the front desk. After the number of participants had been met, the results were calculated and used for recommendations.

Data Collection Instrument

An electronic survey was given, by the researcher, to a random sample of patrons at the SRC over the course of a week. This survey was given at the front desk, where most of the patron traffic is located. The reason for surveying patrons at the front desk was because it would be easier to approach the patrons rather than interrupting them during their workout. The survey was administered in the afternoon because that is when the SRC gets a reasonable amount of patron traffic during the summer. The survey given to these patrons was composed of a series of questions that included demographics, heart monitor knowledge, and knowledge about health and cardio machines. This survey was created using a software program called SNAP. SNAP is a web accessible program that creates a survey for the user when questions are entered. When the researcher is ready to view or use the results of the survey, SNAP will tally all of the results. The ultimate goal of these questions was to find out how much patrons knew about ellipticals, treadmills, cycles, and the heart rate monitors located on them. Some of the questions that were asked are as follows:

- Where is the heart monitor located on the elliptical?
- Treadmills are effective machines for?

As stated above, the researcher administered the survey at the front desk. In order to collect the results in a timely manner, patrons had to start and finish the survey all at once. No save option was included for participants to go back later to complete the survey because they may not have time or may not come back to finish.

Procedures of Data Analysis

The researcher collected all of the surveys and tallied up the results at the end of the specified deadline. The results helped to determine the proposed solution that would solve the problem stated in the beginning of the thesis and in this chapter.

Calendar of Events

	April	May	June
Complete draft of Chapters 1-3			
Topic Approval Meeting			
HSRB Approval (If needed)			
Create Survey			
Administer survey			
Collect and analyze data.			
Report Findings in Chapter 4			
Complete Chapter 5			
Thesis Defense			
Make necessary changes to the document			
Submit completed thesis			

Budget

No expenses would be incurred for this project.

CHAPTER 4: RESULTS

Purpose of Survey

This study was conducted to determine the knowledge level of patrons that utilize the cardio equipment in the SRC. The survey questions focused on patrons' knowledge level of the heart monitors, machine use, machine safety, and general demographic questions. The results of this survey would provide the SRC staff insight on changes or additions that should be made to the cardio corner to better aid patrons in their use of the equipment as well as the monitors located on them.

Survey Results

Demographic Responses

The total number of respondents for this study was 48. Respondents were asked to participate in the survey when they entered the SRC. 100% of the respondents asked completed the survey. These 48 respondents also selected yes to question 1 and question 2 (see appendix E). It states that they agree to the risk and are willing to participate in the survey. By selecting yes, respondents were allowed to continue on with the survey. The following results are demographic questions that respondents were asked to answer after the first 2 questions. As shown in Table 1, a majority of respondents that took the survey were students. This is a representative of the SRC population throughout the year.

Table 1

Membership Status (n = 48)

Member Type	Respondents #	Respondents %
Student	43	89.6
Community Member	5	10.4

The respondents that selected student as a membership status were taken to question 4. 95.3% of those students surveyed reside off campus, as shown in Table 2.

Table 2

Student Residence (n = 43)

Response	How to use Equipment	Where to Receive Information
Yes	47	24
No	1	24
No Response	0	0

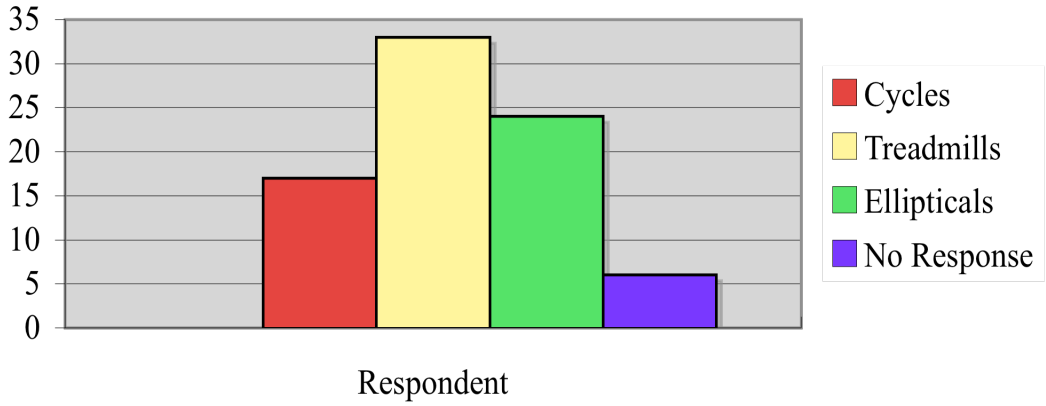
29 of the respondents surveyed are males (60.4%) and 19 respondents were females (39.6%).

The rest of the questions focused on patron knowledge of the cardio equipment and heart monitors. A portion of the questions are in the yes or no format while the other portion asks questions that have right and wrong answers.

Question 6 starts the knowledge portion of the survey, in which responses were 43 (89.6%) respondents use the cardio equipment in the SRC and 5 (10.4%) respondents do not use the equipment. Next, participants were asked which piece of cardio equipment they used in the SRC. 17 (35.4%) respondents use the cycles, 33 (68.8%) use the treadmills, 24 (50%) use the ellipticals, and 6 (12.5%) of respondents surveyed did not respond, as shown in Figure 1.

Figure 1

Most Utilized Cardio Equipment (n = 80)



Heart Monitor Responses

Heart monitors are located on all of the cardio equipment, which is why the respondents were asked about them. They were first asked the location of the monitors. 46 (95.8%) answered correctly by selecting hand rails. 1 respondent (2.1%) selected finger clip, 0 respondents selected feet guards, and 1 (2.1%) respondent did not respond. Respondents were also asked if they knew how to use the heart monitors. The results show only 60.4% of patrons surveyed know how to use the heart monitors on the machines. In conjunction with this question, respondents were asked about the function of heart monitors in question 9. 31 (64.6%) respondents answered the question correctly, as shown in Table 3.

Table 3

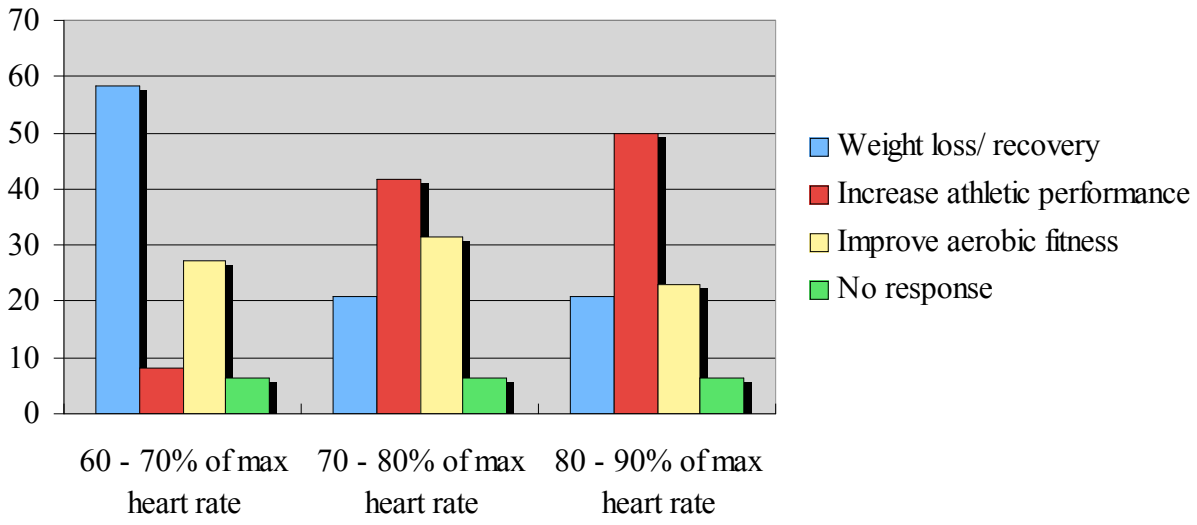
Heart Monitor (n = 48)

Functions	Responses #
Monitor heart rate	15
Maintain a certain heart range	1
Be used in any workout	0
All of the above	31
No response	1

Respondents were asked about receiving information on the heart monitors, questions 19 – 20. 58% of respondents knew where to receive information about the heart monitors, and 45.8% of these respondents wanted information about how to use the technology. Questions 21 - 23 focused on patron knowledge on the use of heart monitors, specifically when dealing with heart rate zones. As explained in the literature review, using heart rate zones is a technique that can be used during a workout. Keeping your heart rate within 60-70 percent of the maximum heart rate is for weight loss, stress reduction, and/or improving overall fitness. Seventy to eighty percent of the maximum heart rate is to improve aerobic fitness. Eighty to ninety percent is to increase athletic performance. For question 21, 58% of respondents answered correctly. Question 22, 31% of respondents answered correctly and for question 23, only 50% of respondents answered correctly. All of these results can be seen in Figure 2.

Figure 2

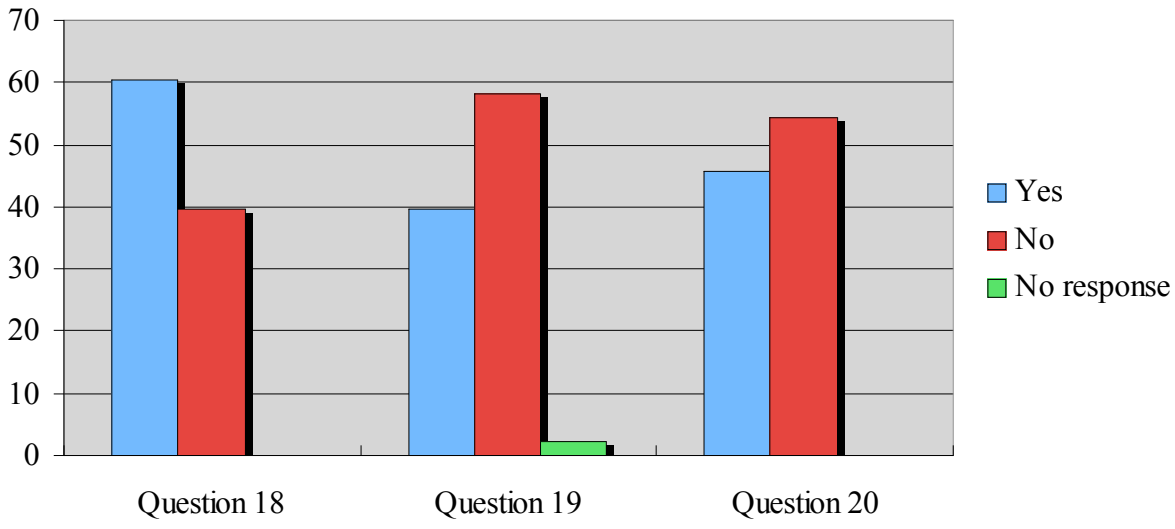
Heart Rate Zones (n = 48)



Almost half of the patrons surveyed didn't know how to use the monitors; over half did not know where to get the information, and a little under half wanted the helpful information, as shown in Figure 3.

Figure 3

Results of Questions 18-20 (see appendix E) (n = 100%)

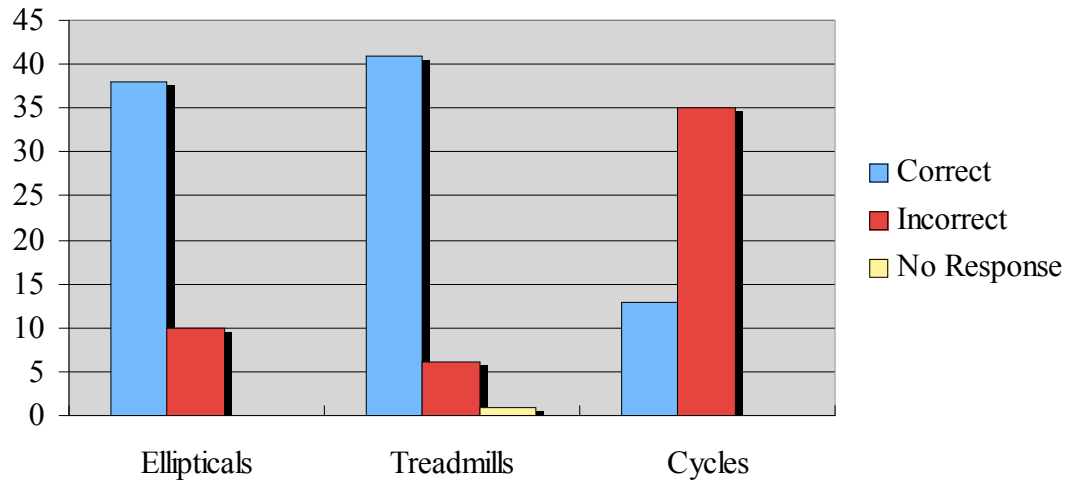


Cardio Equipment Responses

The survey results revealed 89.6% of the respondents who used the SRC used the cardio equipment. However, a small percentage of respondents knew the best uses for select pieces of equipment. This statement refers to questions 13 – 15. Results show that 79% of the respondents know the best uses for ellipticals, 85% for the treadmills, and only 58% for the cycles. Figure 4 shows a comparison for questions 13-15 of the number of respondents that answered correctly or incorrectly.

Figure 4

Comparison of Correct/Incorrect Answers (n = 48)



Respondents were also asked two general information questions about the cardio equipment in questions 16 and 17. The results showed that 47 (97.9%) respondents knew how to use the cardio equipment and 24 (50%) respondents knew where to get information about cardio equipment in the SRC, as shown in Table 4 highlights these results.

Table 4

Patron Knowledge of Cardio Equipment (n = 48)

Response	How to use Equipment	Where to Receive Information
Yes	47	24
No	1	24
No Response	0	0

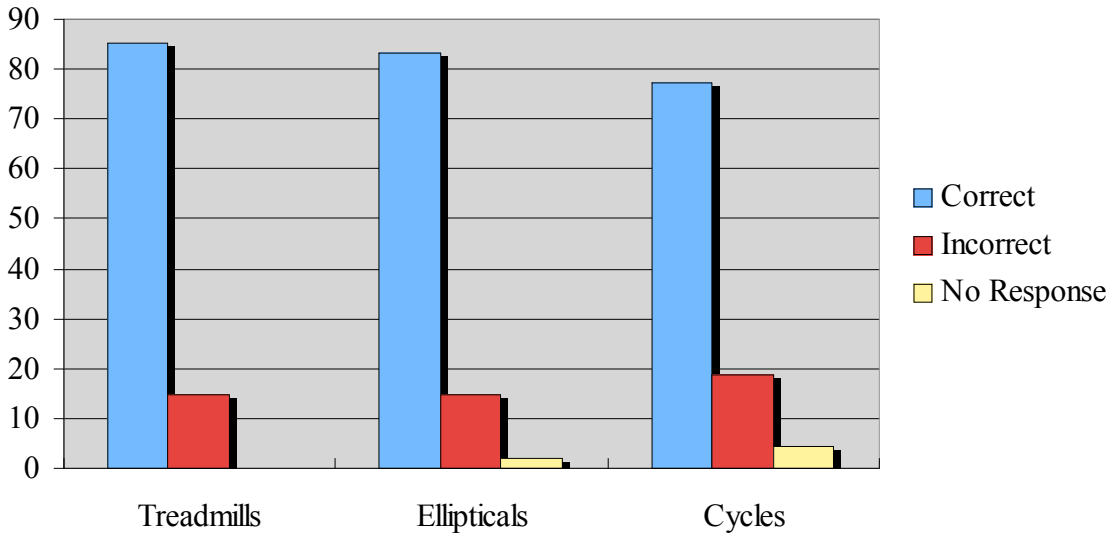
Cardio Equipment Safety Responses

Respondent knowledge of the safety features of the cardio machines as well as their functions were explored in questions 10 to 12. Respondents were asked questions about how to

stop each machine if they started to show any danger signs (faintness, dizziness, blurred vision) while working out. For the treadmill, 41 (85,4%) respondents answered correctly, 40 (83.8%) answered correctly for the elliptical, and 37 (77.1%) of respondents answered correctly for the cycle, as shown in Figure 5.

Figure 5

Correct/Incorrect Comparison for Cardio Equipment (n = 100 %)



CHAPTER 5: RECOMMENDATIONS

Based on the survey demographics, this study was a representative of patron usage throughout the academic year. From the results of this study, the researcher concluded that a large number of patrons do use the cardio equipment in the SRC. They also knew where the heart monitors were located on the machines. The results of this study have shown what a number of patrons did and did not know about the cardio equipment and heart monitors attached to them. For example, patrons knew the uses for treadmills and ellipticals. One reason may be because they have higher usage numbers than the cycles. When patrons used the equipment on a regular basis, they learned how it benefited their workout and what the machine could be used for in their workout. Another reason may be that patrons liked those machines more or found them more effective in their workout.

Based on the findings of this study, the researcher recommended a training program not be implemented for the cardio equipment and heart monitors. The results of question 20 (see appendix E) show that over half of the respondents do not want information on the cardio equipment and heart monitors. Based off of these finding, it would be hard to get a good number of people to take a class that teaches them how to use the equipment, unless it was mandatory. Without a high number of patrons taking the class, it would eventually get cancelled.

Results showed the cycle to be the only piece of cardio equipment that was not highly used or known about. Patrons may have preferred not to use those machines or they were not the machines of choice in the cardio equipment. Another reason may be that an elliptical or treadmill was available for use and patrons decided to use those machines first. Also, ellipticals and

treadmills are now trendy pieces of equipment. This is shown by the high numbers of users on these machine rather than the cycles within the SRC.

Reasons for the results given in chapter 4 could be that there were currently no signs or any informational packets/booklets in the cardio area for patrons to read if they did not know how to use a certain aspect of the machine. On the other hand, patrons may have not wanted the information because they did not want to read information as they used the machine. Or, they may have thought that if information was provided, it would be in book form and may have taken away time from their workout. The location of information for the machines is not written down or advertised anywhere in the SRC, which may be another possibility for patrons lack of knowledge on where to get the information they needed for the machines.

The questions asked in the survey, when compared against each other, produced the following recommendations.

1. To increase knowledge of the cardio machines and heart monitors the SRC should create a one page pamphlet or flyer about each machine. Within this pamphlet/flyer should be information about the machine and the benefits of using it. Another flyer should be made just for the heart monitors. This flyer would give information about their uses, benefits, and locations on the machines. These flyers should be located at the front desk or on the cleaning carts located in the cardio corner.
2. Increasing awareness of where information can be found about the machines could be done with another set of smaller flyers. Also to be included on the flyers would be a contact person with a number and/or an area to go and ask questions if a patron needed help with any of the cardio machines. The flyers should be placed at the front desk where

patrons could pick them up on their way in and out. Patrons know that the front desk is another area where all information can be found for the SRC.

3. Signs are another way to increase awareness and expand the knowledge of patrons. The larger signs could be placed on the walls while smaller signs could be placed on the ledge in front of the cardio equipment. They would be primarily to tell how to use the machine and where to go to find help for the machine if needed.
4. Small, 3-page booklets could be made to hang off the front of the machines. These booklets would give a quick guide on the machine/heart monitor and their uses, functions, use, and safety issues to be aware of.
5. A personal trainer could be on staff at the busy times of the day to walk around and answer questions if asked. This way the patron would get personalized attention and could be taught step-by-step the many functions of the machine, including the heart monitor. There is already a training component of the cardio equipment set up when dealing with personal trainers. When patrons' sign up for a personal training session, the trainers take the patron through all of the machines in the SRC and teach them about the functions on each machine. This is another way to increase the knowledge of the machines and the heart monitors located on them.

Future Studies

For future studies on the Student Recreation Center, the following is recommended:

1. This study should be replicated to see if the knowledge of patrons has increased with recommended changes. More questions could be asked about the changes to

further reassure the SRC of their useful or non-usefulness. Also, the number of patrons surveyed could be increased.

2. Replicate this study using a different group of machines, such as the free weights and/or machine weights. Another area of the SRC could also be tested such as the pool or group exercise classes using this study.
3. Conduct a study to see what patrons want to see added or subtracted from the SRC. Completing this type of study will create a student needs assessment that can be given to the professional staff for future implementation.

Summary

There are a lot of areas within the Recreational Sports that could benefit from a study such as this one. Recreational Sports is a big field that keeps expanding and updating each year. There are always opportunities to do a study that would benefit a specific area within the department, such as this one, or a much general study that would benefit the department as a whole. Studies such as this one could also be implemented at other colleges and universities to improve their Recreation Centers.

This study is also a good start for the fitness industry. Fitness companies could use the results of this study and others studies in the recreation field to improve and update current designs for their equipment. They could also use it as a starting point for future designs in the fitness industry. Another way the industry could use this study would be in their research for how to provide training for their equipment, old and new. This study can be used in a number of ways, anywhere from industry to other thesis writings/projects. It is a great start for the department of recreation as well as all the industries involved with this area.

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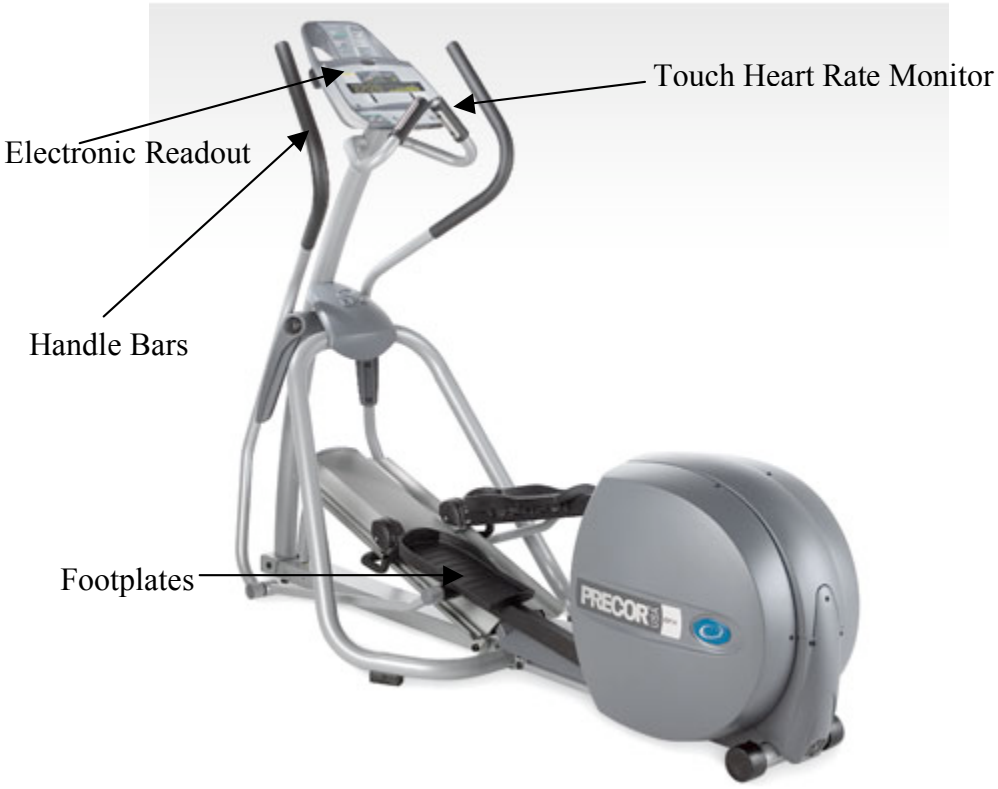
APPENDIX A

Precor EFX5.33 Elliptical



APPENDIX B

Precor C846i-R Cycle

APPENDIX C

Precor M9.57 Treadmill

APPENDIX D

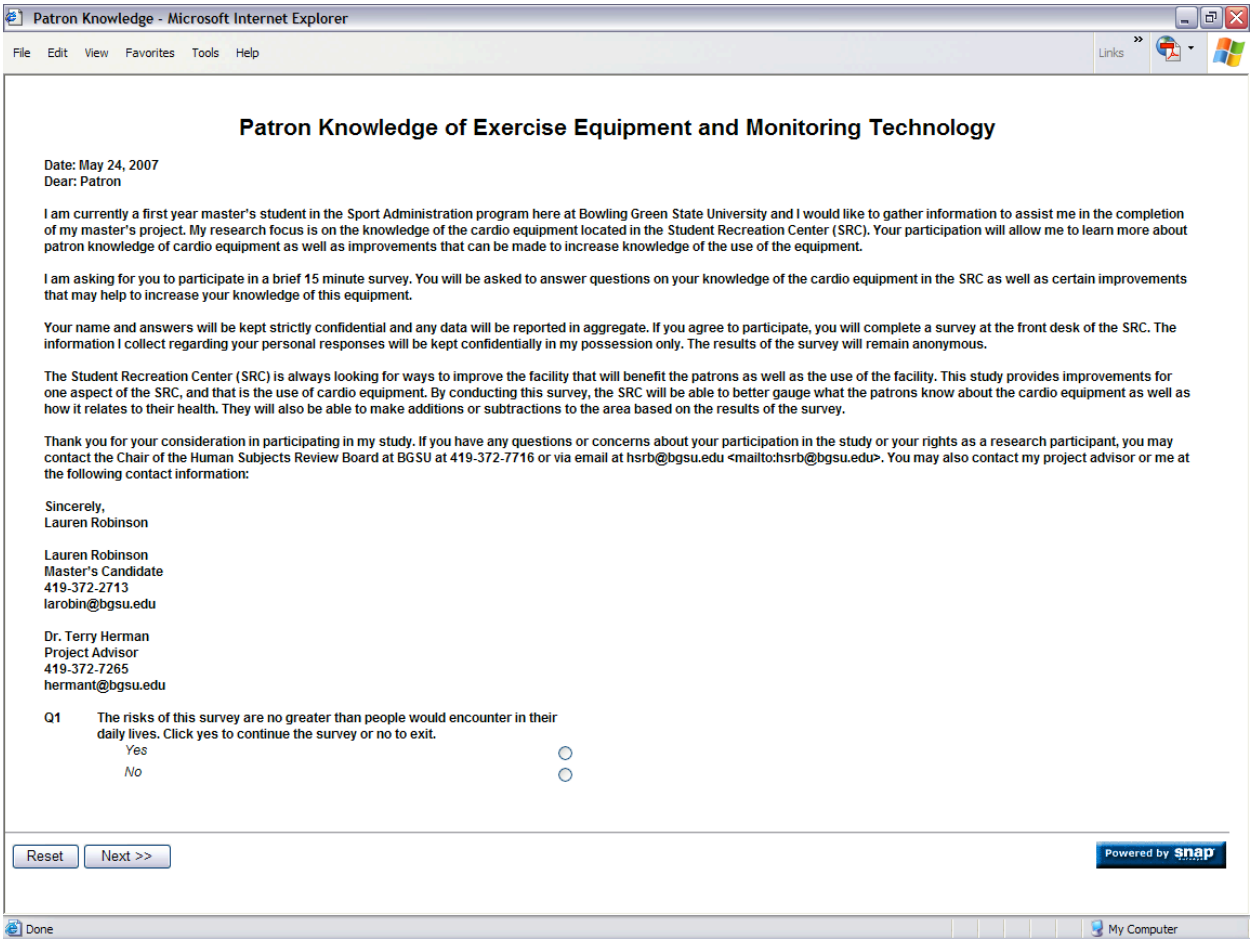
Student Recreation Center Usage Numbers (past 10 years)

YEAR	#DAY	M–F TOTAL	M–F AVG	#DAY	SA–SU TOTAL	SA–SU AVG.	#DAY	MONTH TOTAL	MONTH AVG.
1997	246	272437	1107.47	77	49108	637.77	323	321545	995.50
1998	247	281485	1139.62	75	55355	738.07	322	336840	1046.09
1999	249	255299	1025.30	73	47754	654.16	322	303053	941.16
2000	249	245568	986.22	77	44892	583.01	326	290460	890.98
2001	241	264525	1097.61	71	40165	565.70	312	304690	976.57
2002	246	303295	1232.91	73	54582	747.70	319	357877	1121.87
2003	248	329456	1328.45	73	68567	939.27	321	398023	1239.95
2004	247	305407	1236.47	72	67507	937.60	319	372914	1169.01
2005	248	329596	1329.02	95	62633	659.29	343	392229	1143.52
2006	231	333356	1443.10	75	38189	509.19	306	371545	1214.20
TOTAL	2452	2920424	1191.04	761	528752	694.81	3213	3449176	1073.51

APPENDIX E

SNAP Survey Questions

SNAP Survey – Page 1



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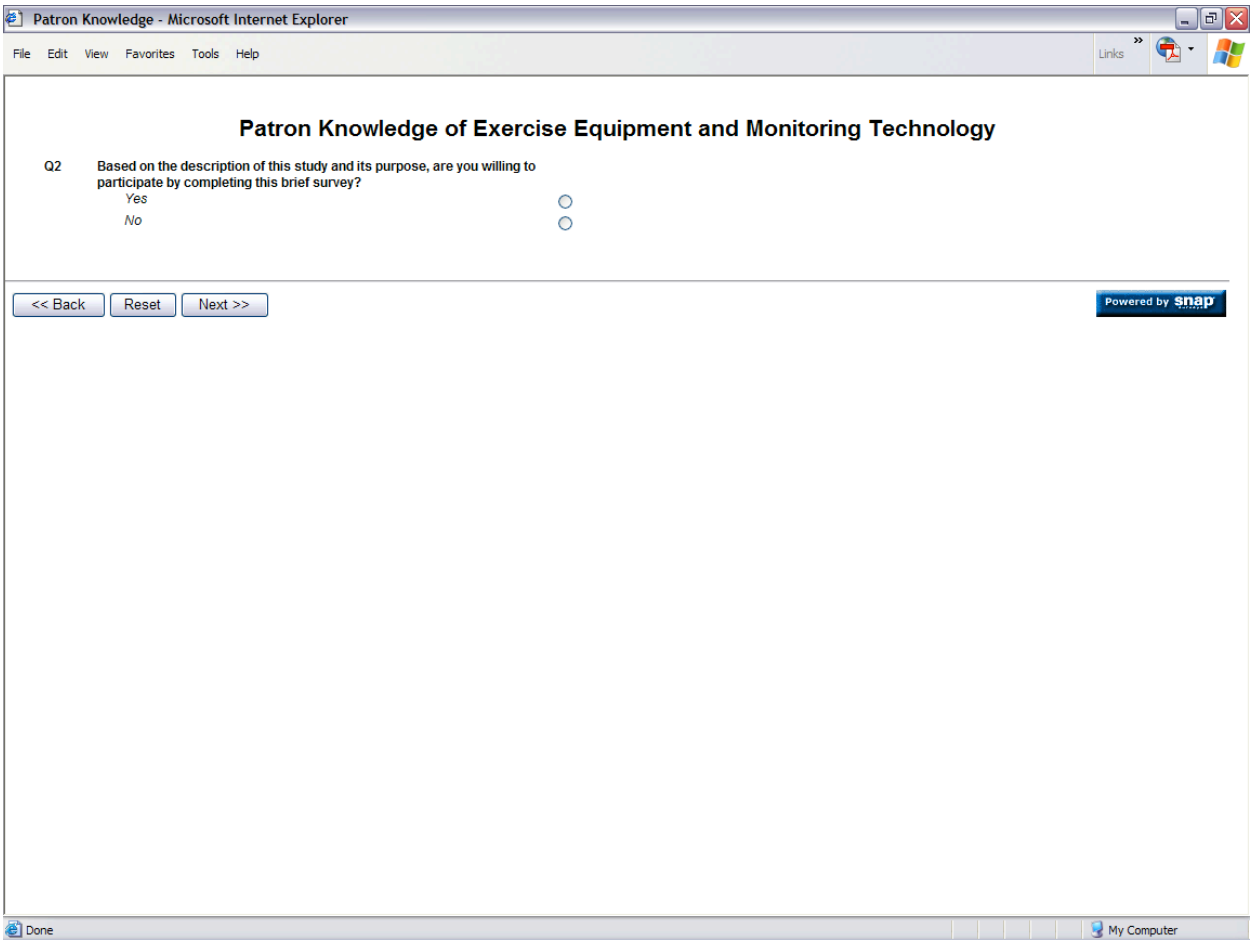

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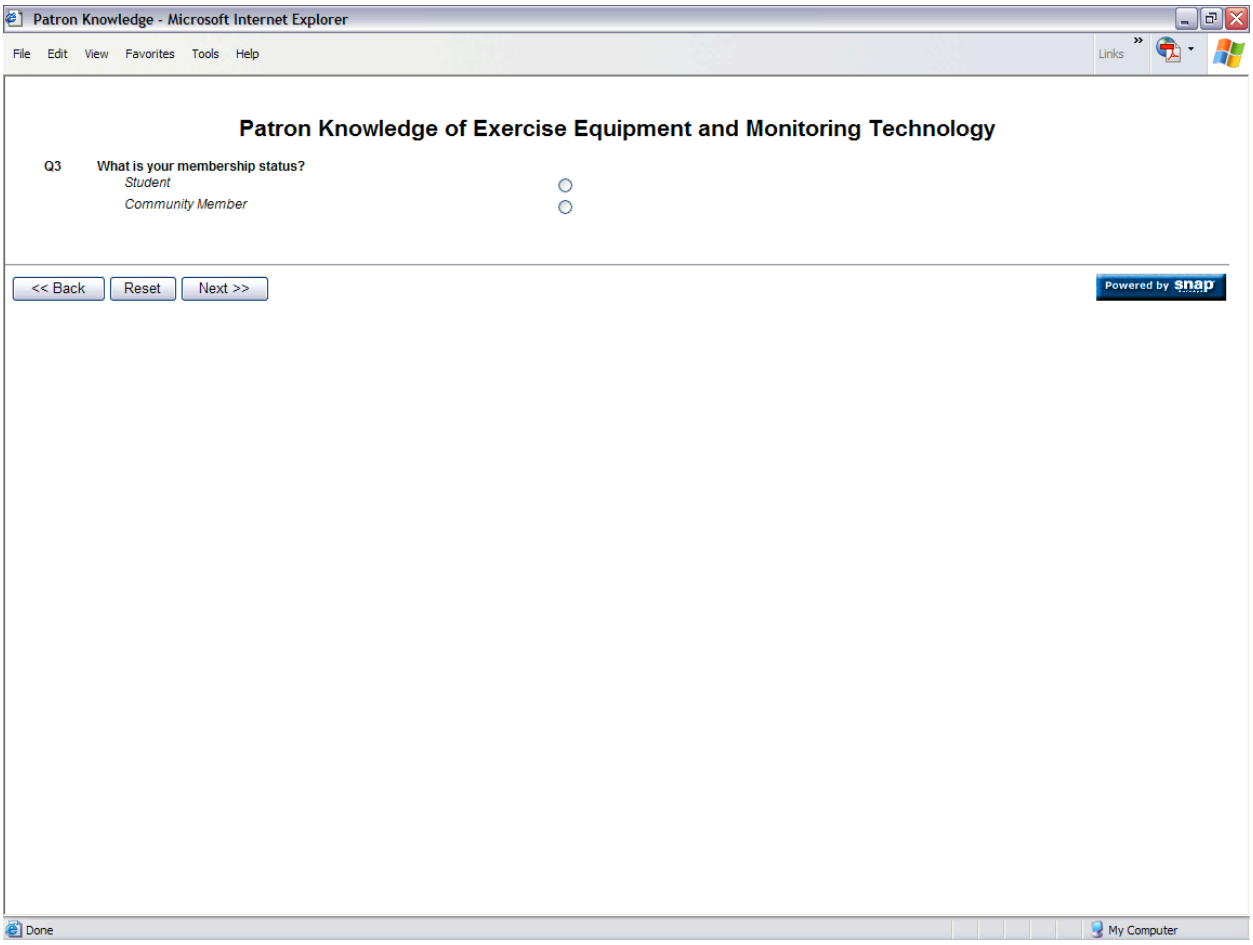

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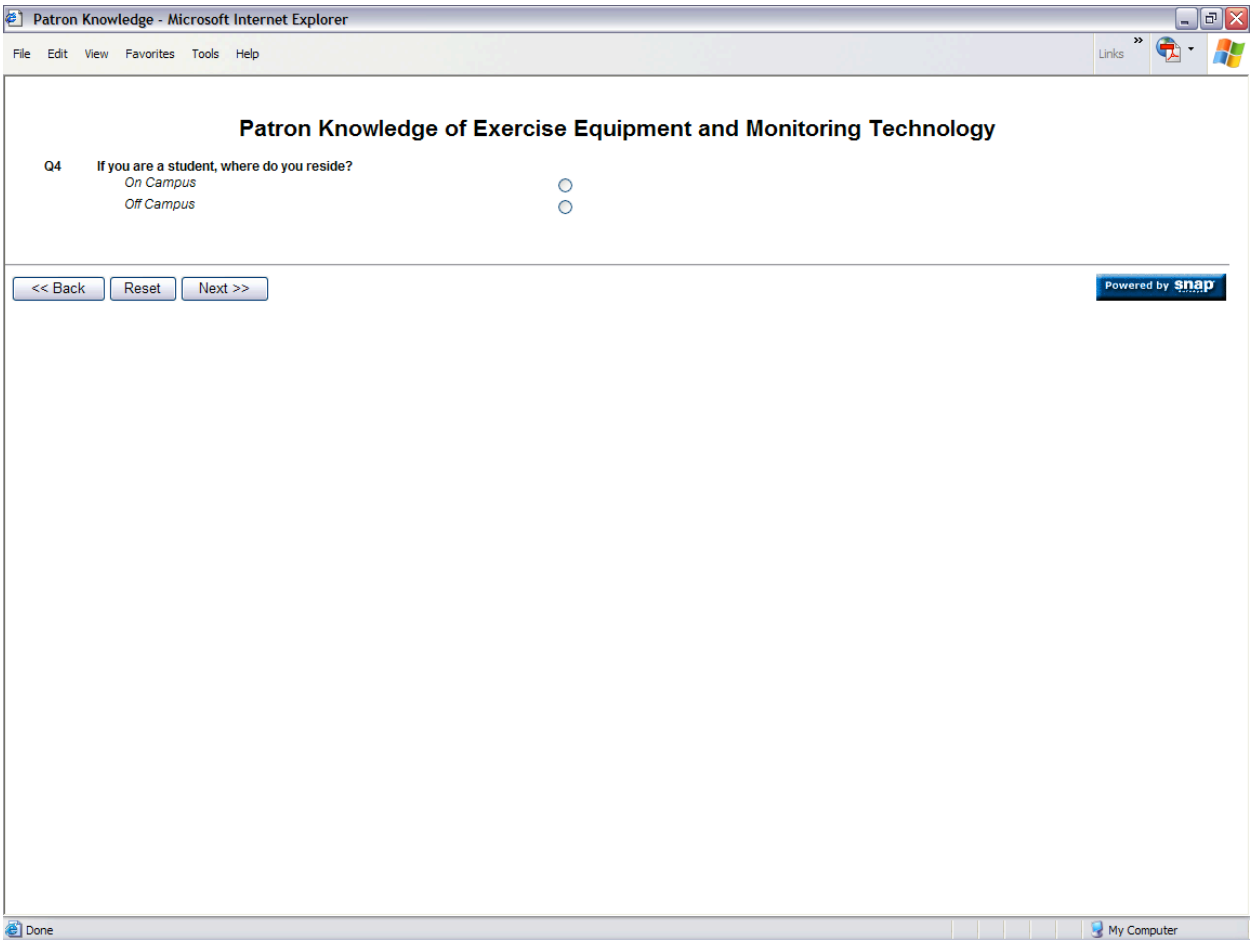

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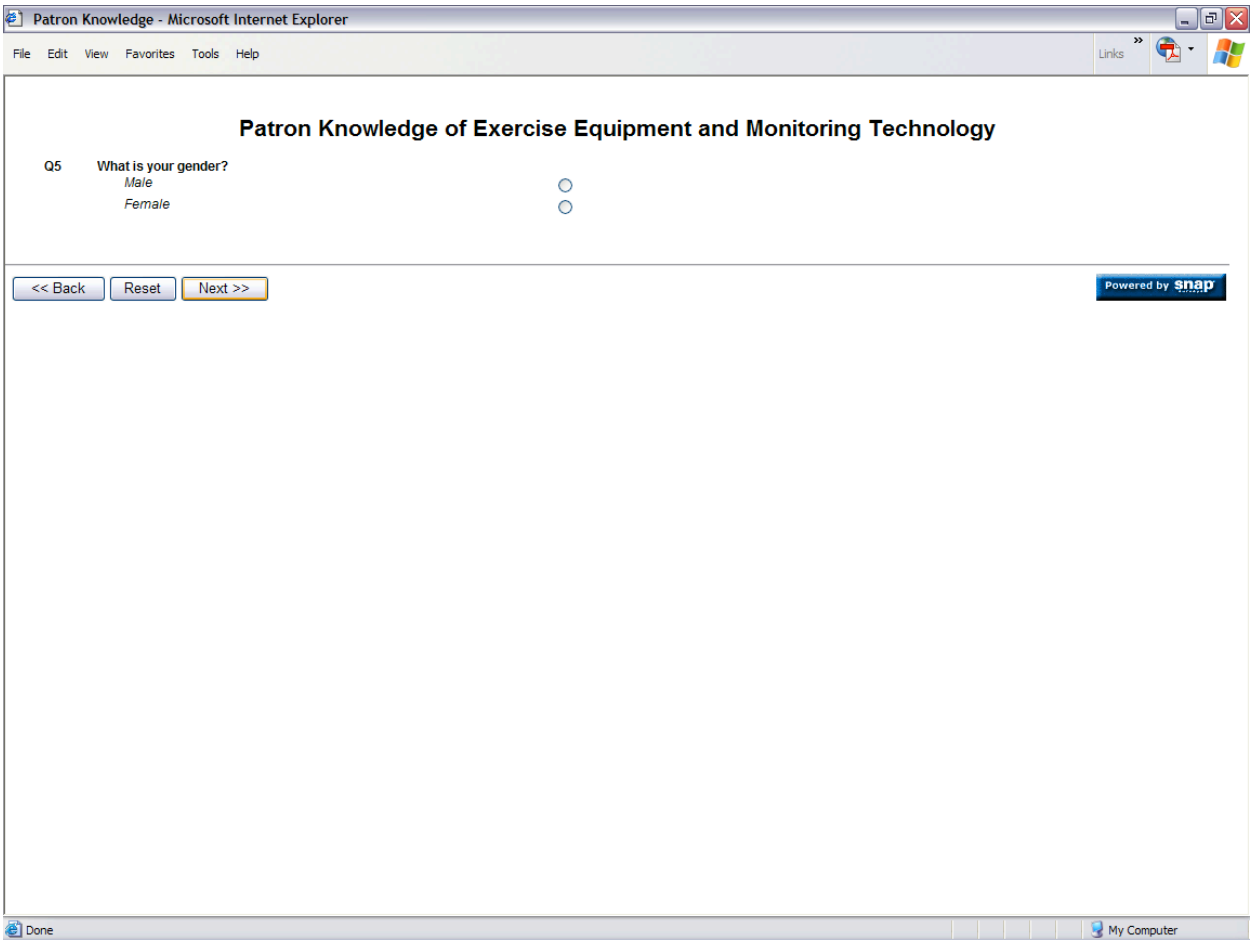

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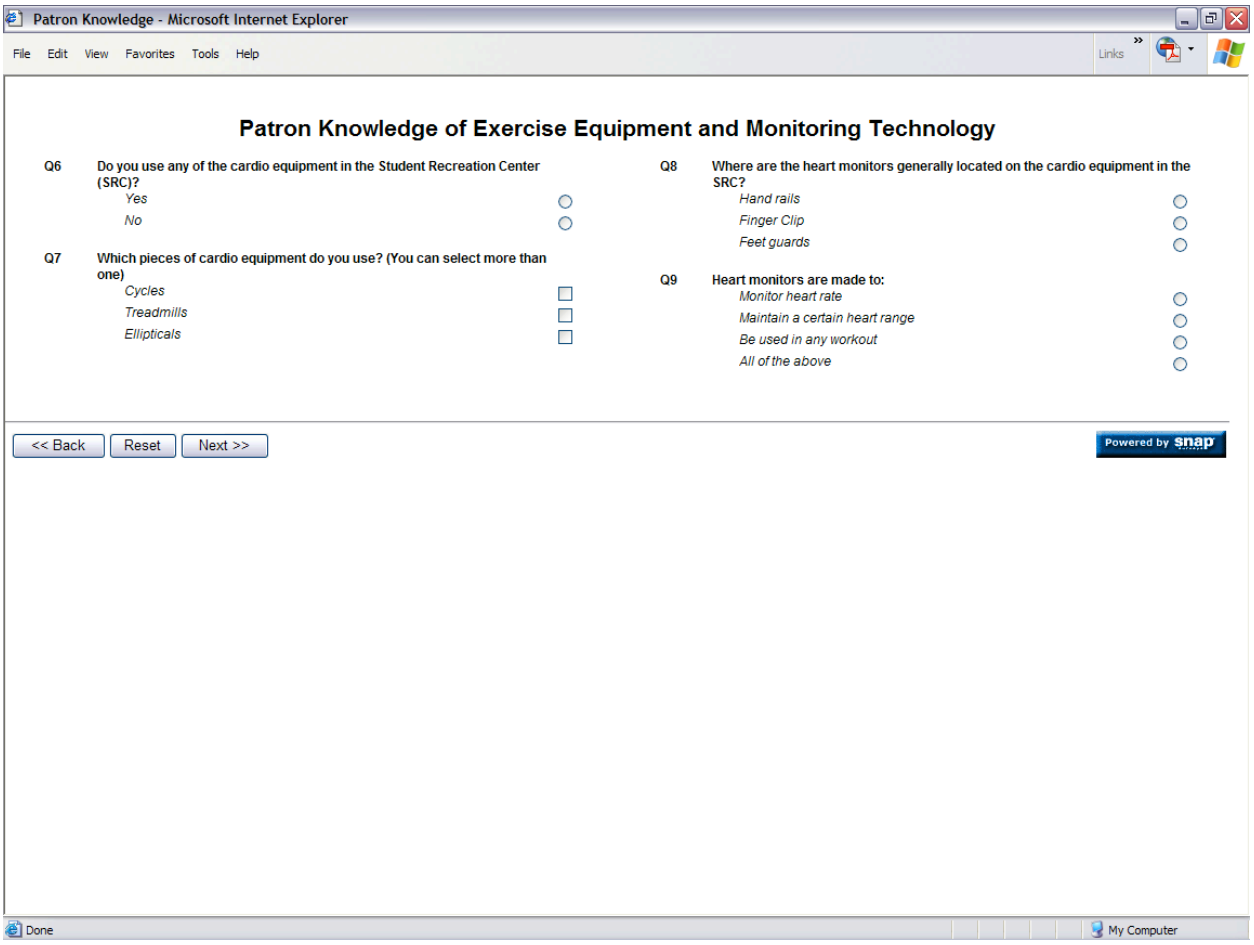

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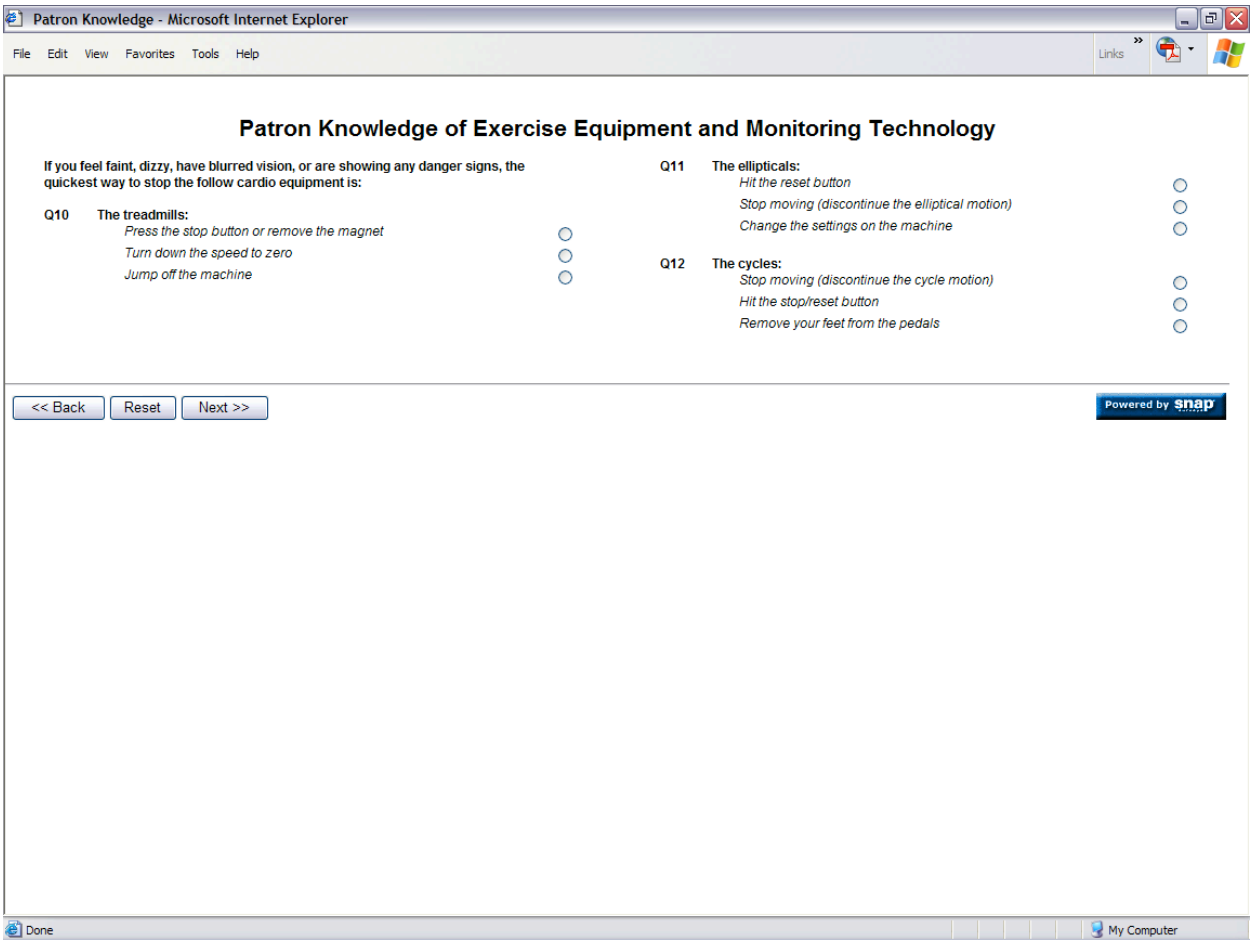
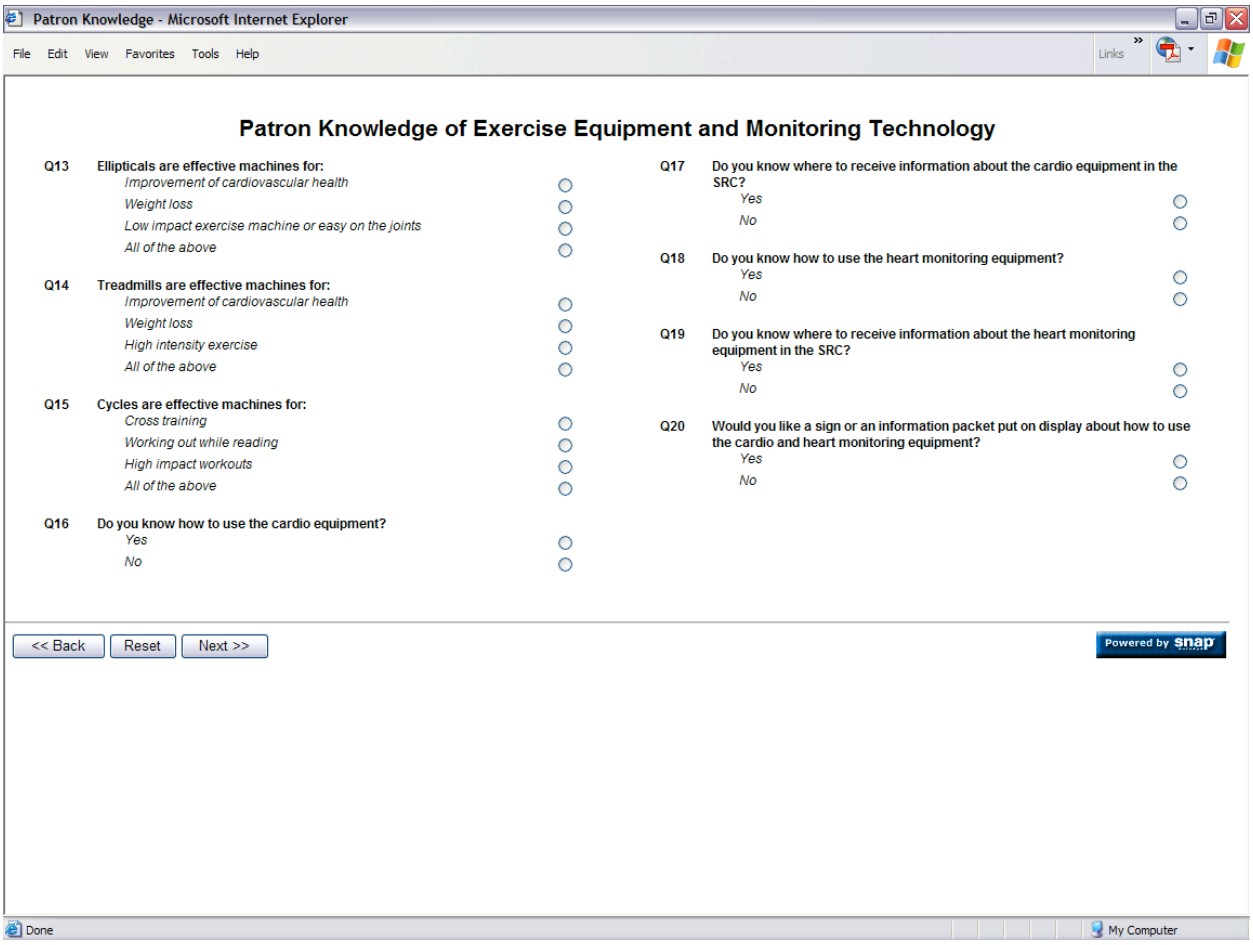
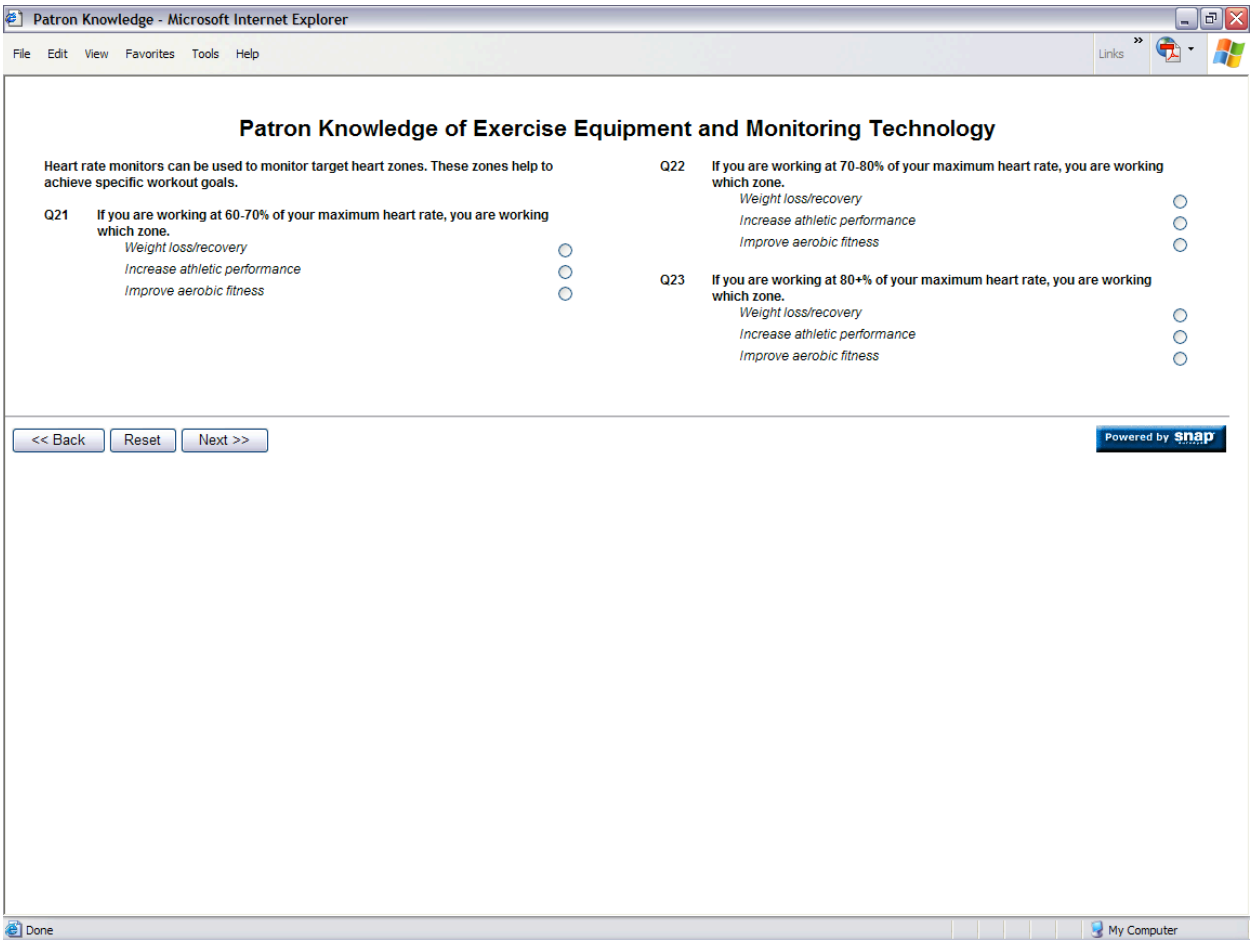


SNAP Survey – Page 8



SNAP Survey – Page 9



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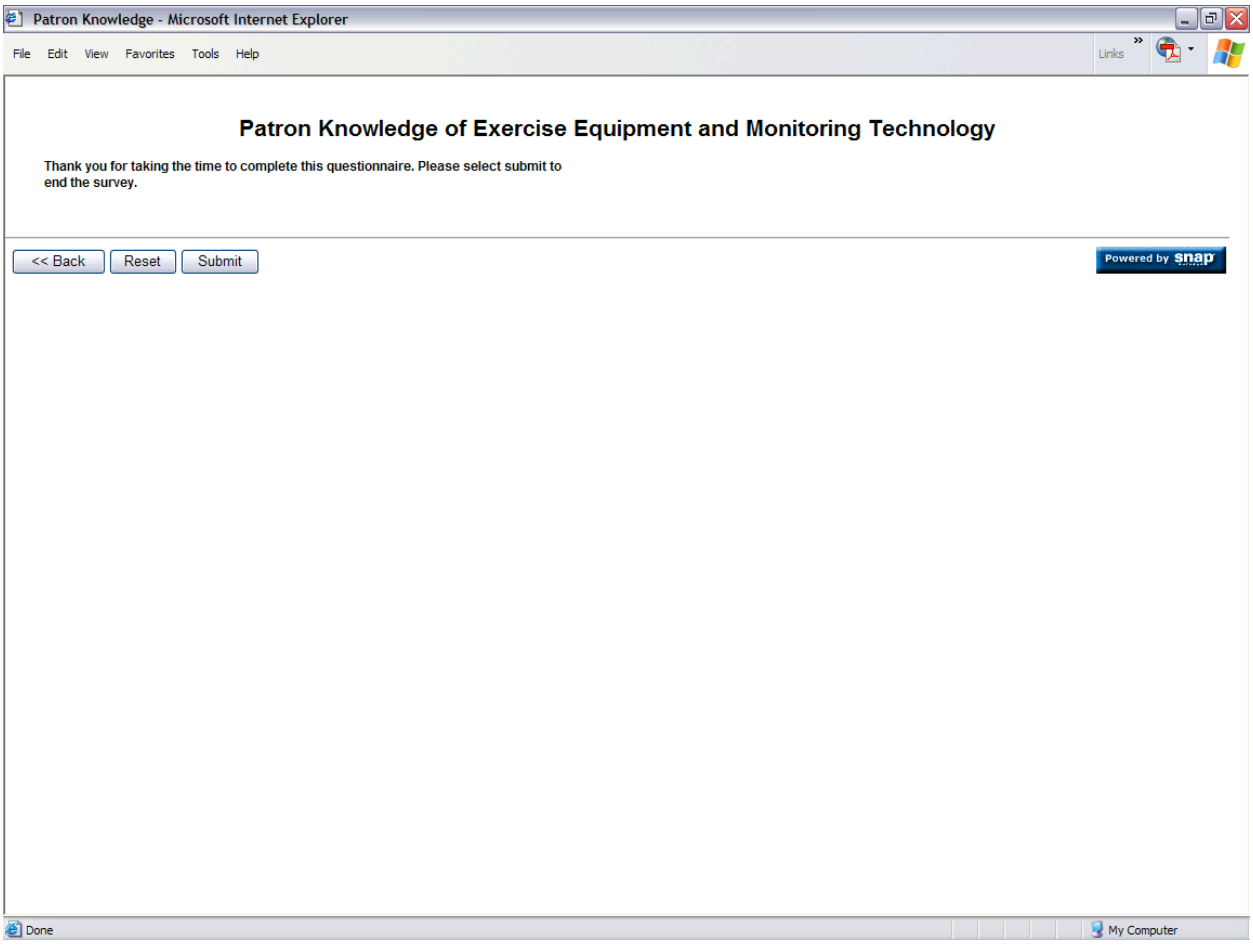

APPENDIX F

HSRB Letter

05/17/2007 11:53 4193726916 RESEARCH COMPLIANCE PAGE 01

BGSU
Bowling Green State University

Office of Research Compliance
201 South Hall
Bowling Green, OH 43403-0183
Phone: (419) 372-7716
Fax: (419) 372-6916
E-mail: harb@bgsu.edu

May 17, 2007

TO: Lauren Robinson
Career & Technology Education

FROM: Richard Rowlands
HSRB Administrator

RE: Human Subjects Review Board Project No.: H07T295GX2

TITLE: *Status of Patron Knowledge of Exercise Equipment and Monitoring Technology at the Bowling Green State University Student Recreation Center*

REVIEW DATE: May 17, 2007

RESEARCH CATEGORY: Exempt #2

The BGSU Human Subjects Review Board (HSRB) has completed its initial review of your project involving research with human subjects.

The HSRB has determined that **modifications/clarifications addressing the items noted on the attachment to this memo are required** before final approval can be granted.

Please submit the requested modifications/clarifications, at your earliest convenience, to the HSRB c/o the Office of Research Compliance, 201 South Hall (**Note** - submit only materials revised in response to the required modifications/clarifications - do not resubmit materials that have not changed - there is also no need to include this notification, as the Office of Research Compliance has the original in the project file).

The HSRB will review the modifications/clarifications and notify you when the project has been given final approval. Please remember that no subjects may be recruited nor data collected until final approval has been granted by the HSRB.

If you have any questions, please contact the Chair of the HSRB or me at 372-7716.

Comments:

CC: Dr.Terry Herman

Post-it® Fax Note 7671	Date 5/17/07	# of pages ▶ 2
To Lauren Robinson	From Rick Rowlands	
Co./Dept. CETE/SRC	Co. ORC	
Phone #	Phone # 2-7716	
Fax # 2-8954	Fax # 2-6916	