Technology in Physical Fitness

Section 1: ***Physical Fitness Equipment***

Section 2: ***Online and Software-Based Fitness Tools***

Section 3: ***Video Games That Promote Physical Fitness***

SECTION 1
PHYSICAL FITNESS EQUIPMENT

To support and encourage continuous fitness activity, technology provides numerous avenues to record and monitor physical activity. High caloric intake and low physical activity are recognized as key contributors of obesity, diabetes and other chronic health conditions.

Whether you use physical activity devices, online monitoring tools or video games that promote physical fitness, each has benefits to assist the user to achieve a level of fitness. How you monitor your physical activity can vary from using basic to complex equipment or a simple and enjoyable interactive personal computer (PC) program you use alone or with friends.

Let's unlock the information about the different types of equipment available for increasing one’s physical activity.

EXERCISE EQUIPMENT

Machines available include full size equipment, such as:

- treadmills,
- elliptical machines,
- rowing machines, and
- bicycles.

To intensify the workout, most equipment comes with electronic controls and built-in exercise programs that vary speed and intensity over a workout.

60 minutes of exercise burns varying amounts of calories depending on the exercise program. For more information, visit http://www.health-and-fitness-sourse.com/burning-calories.html

Treadmill

Figure A-1 Treadmill

Note. From "Exercise Equipment", 2009, *Smoothfitness*. Retrieved November 6, 2009, from http://www.smoothfitness.ca/treadmills

This is the most popular piece of exercise equipment used in North America. The treadmill is the most natural form of exercise as it allows you to walk or run at your own pace.

Machines may have:

- motion control hands-free speed adjustment,
- wireless heart rate control,
- various levels of incline,
- iFit® workout technology,
- iPod® / MP3 connections, and
- LCD flat-screen television.

Treadmills are more versatile for home gyms as some can be folded for storage.

Elliptical Trainer

The elliptical machine provides exercise workouts similar to combining biking, stair-climbing and cross-country skiing workouts.

This machine provides moderate to intense low-impact workouts for your legs and to a lesser degree, your arms. If the machine has reverse motion, you then exercise your buttock muscles.

This multipurpose machine is gaining popularity.
Machines may have:

- pre-set programs,
- heart rate controlled workout programs,
- varying levels of resistance change automatically,
- allows for forward and reverse motion,
- iPod® / MP3 docking station with speakers, and
- multi-color LCD display.

Figure A-2 Elliptical Trainer

Note. From "Exercise Equipment", 2009, *Smoothfitness*. Retrieved November 6, 2009, from http://www.smoothfitness.ca/ellipticaltrainer

An elliptical trainer provides:

- low-impact workouts,
- upper-body workouts, and
- lower-body workouts.

An elliptical trainer can not be folded for storage.

For calorie burning workouts, the treadmill and elliptical trainer are your best choices.

Exercise Bike

Exercise bikes can come with ports may have:

- iFit® workout technology,
- iPod® / MP3 connections,
- heart rate technology, and
- Gamefit™ interactive fitness games.

Exercise bikes have been a popular form of exercise as they are simple to operate. They come with preprogrammed biking routines to provide various exercise workouts.

Figure A-3 Exercise Bike

Note. From "Exercise Equipment", 2009, *Smoothfitness*. Retrieved November 6, 2009, from http://www.smoothfitness.ca/exercisebike

Some equipment can be plugged into televisions and video games to let you interactively pedal through the visual courses.

A variation to the standard exercise bike is the recumbent bike. It is best suited for individuals with lower back pain. This form of bike allows you to multi-task (take phone calls, read, etc.) during your exercise workout.

Rowing Machine

A rowing machine allows you to burn calories in a low-impact workout. The areas exercised include:

- arms,
- legs, and
- torso.

Machines can have a built-in PC interface to support software accessories.

Figure A-4 Rowing Machine

Note. From Concept Rowing, 2009, *Concept2: The World's Best Rowing Machine*. Retrieved November 12, 2009, from http://www.concept2.com/us/default.asp

PERSONAL DEVICES

Personal devices can be as small as a pedometer, accelerometer and multi-sensor activity tracking devices. The mechanisms can be as basic as counting footsteps to recording steps and the force of the stride while monitoring the heart rate.

Basic Pedometer

The pedometer is used to count steps while an individual walks or runs during an exercise period. People use this type of equipment for counting the number of steps during a day.

Modern day pedometers can be divided into five categories:

- spring-suspended lever arm with metal-on-metal contact,
- magnetic reed proximity switch,
- pendulum,
- accelerometer, and
- Global positioning system (GPS).

Figure A-5 Pedometer

Note. From "Amazon.com", 2009, *SportLine 340 Strider Pedometer: Sports & Outdoors*. Retrieved November 13, 2009, from http://www.amazon.com/SportLine-SP2795BK-340-Strider-Pedometer/dp/B0006VWRX6

The pedometer works by pendulum movement as the balanced weight activates to vertical motion which records steps and shows a digital record.

Most pedometers are clipped to the belt to be used during a low-impact exercise such as walking.

10,000 steps a day is the magic number recommended to achieve an active lifestyle. – www.physiotherapy.ca

Pedometer Watches

Pedometer watches come in three different varieties, which include:

- separate sensor to detect your steps and send data to a watch,
- GPS to measure the distance and speed you are travelling. It has a separate sensor. This system does not record the step count, only the distance travelled, and
- watch sensor to detect the arm motion rather than the steps.

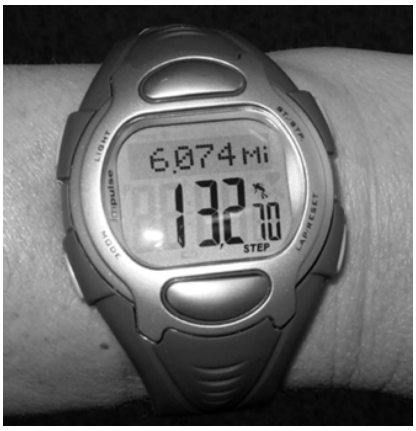

Figure A-6 Watch Pedometer

Note. From "Which Pedometer Design is Best?", by W. Bumgardner, 2009, *Heart Rate Monitor Pedometer Watch*. Copyright 2009 by W. Bumgardner. Retrieved November 13, 2009, from http://www.walking.about.com/od/pedometer1/ss/pedometerdesign_7htm?p=1

Accelerometer

Accelerometers are more than a pedometer because they use a precision motion sensor to measure calories burned during physical movement.

Figure A-7 Accelerometer

Note. From "thisnext", 2009, *Accelerometer–Measures Calories Burned From Physical Movement*. Retrieved November 13, 2009, from http://www.thisnext.com/item/75297326/6ECC67A9/Accelerometer-Measures-Calories

An accelerometer provides a quantitative measurement which counts:

- steps, and
- the force of a person's strides, providing more complex and precise measurements to analysis energy expended.

Did you know you can use your cell phone, iPod® and similar devices to record your exercise data?

List any device(s) you have. _____

_____

Advanced pedometers and accelerometers have been incorporated into modern cellular telephones and everyday devices including watches. These require you to stream the data to other sources.

The Nike+iPod® sport kit uses a small shoe sensor to record:

- steps,
- distance,
- time,
- pace, and
- calories expended.

The software is downloaded into an iPod® Touch or iPhone®. This sensor is placed in a special shoe or in your sock.

Figure A-8 Nike + iPod® Sports Kit Sensor

Note. From "Apple-Nike+iPod", 2008, *Nike+iPod*. Retrieved November 12, 2009, from http://www..apple.com/ipod/nike/

The iPod® Sports Kit sensor works with an iPod® Nano with a wireless receiver attached to the iPod® Nano. This receiver records the same functions as the iPhone® and iTouch®.

Figure A-9 Nike + iPod® Sports Kit Receiver Attached to iPod® Nano

Note. From "Apple-Nike+iPod", 2008, *Nike+iPod*. Retrieved November 12, 2009, from http://www..apple.com/ipod/nike/

You can download pedometer software to your iPhone®. The built-in accelerometer counts your steps.

The Nokia Sports® phone is more advanced in that it will record:

- steps,
- distance,
- pace, and
- calories expended.

More devices are being created to allow people to exercise and record their progress on electronic devices. List other devices similar to those presented that you have seen that have similar functions?

_____ _____

_____ _____

_____ _____

MULTI-SENSOR ACTIVITY TRACKING DEVICES

These devices record physical activities. Sensors are placed on various parts of the body and are exclusive to record different physiological measurements to provide a record of physical activities.

SenseWear Armband

The armband is a multi-sensor device, which is part of weight measurement and body monitoring solutions. It measures:

- skin temperature;
- physical movement;
- skin impedance, which reflects water content on body surface and constriction or dilation of vascular surface; and
- the rate at which heat is dissipated from the body.

This data can be used to calculate and report energy expenditure and physical activity.

BioTrainer Activity Monitor

This accelerometer-based device records both vertical and horizontal physical movement, recording the duration, intensity and frequency of physical activity.

Heart Rate Monitor

Figure A-10 Heart Rate Belt

Note. From "Vernier", 2009, *Exercise Heart Rate Monitor*. Retrieved November 16, 2009, from http://www.vernier.com/probes/her-bta.html

The exercise heart rate belt is used for an active individual to monitor the heart rate during exercise. The belt has a sensor but is not a stand alone device. The wireless transmitter sends information to a receiver plugged into the interface box on the machine being used.

It is important to collect activity data over multiple days and even weeks to get an accurate record of your exercise program and results.

SECTION 2
ONLINE AND SOFTWARE-BASED FITNESS TOOLS

If you are planning to document and analyze your daily physical activity, first check the device you are using for online support or software compatibility with your PC.

Most equipment can be linked to online or software programs which allow you to monitor your exercise program on a PC. The end result of the exercise program depends on the program you are using. The programs come in various workouts for all fitness levels and goals including:

- cardio,
- strength training,
- circuit training,
- fitness journals, and
- activity calorie calculators.

Many exercise machines have built-in workout technology. The level of exercise can be controlled by the machine depending on the program selected during the workout. A treadmill for example, has various levels of incline and the exercise bike has varying tension settings to simulate hills.

Figure A-11 Treadmill

Note. From "Exercise Equipment", 2009, *Smoothfitness*. Retrieved November 6, 2009, from http://www.smoothfitness.ca/treadmills

Many people use music to assist them during their fitness program. Using various types of music, a faster or slower pace can be maintained. When using equipment, an iPod® or MP3 can be connected to the machine with built-in speakers or just attached by an arm strap and headphones.

Fitness music programs can be obtained from online suppliers such as iTunes® or cadencerevolution.com. Other sources can be found online.

Want to learn more?

Visit www.cadencerevolution.com/index.php/2009/11/weekly-workout-142/. You will see a cycling workout with music.

Machines which use the iFit® workout technology, provide more variations of fitness workouts. Equipment comes with the port to insert the program required. The SD card with the program can be purchased from various companies. While a personal trainer verbally coaches you, the card controls the machine, to include adjusting:

- the speed and incline of the treadmill,
- the resistance of the elliptical, and
- the resistance of the bicycle.

Figure A-11 Card Reader

Note. From "iFit", 2009, *ifit.com.–Workout Sample Downloads*. Retrieved November 16, 2009, from http://www.ifit.com/workouts/downloads

Most software programs, including iFitness®, provide prepared workouts for beginners and more experienced individuals but you can create your own workout.

Varying routines are available to assist with:

- weight loss,
- strength,
- ab definition,
- golf program, or
- others.

The program logs, graphs and tracks progress. This type of program includes screens showing images of people doing over 230 exercises and includes full text instructions. Some programs include videos to show proper exercise execution. Timers are included to monitor the exercise and rest timings.

To track and store the exercise data, these types of programs include backup and restoration to the server.

Fitness programs are available for most equipment that have a built-in PC interface. This program can be ordered from companies and downloaded to a PC online or from a DVD. The range of data provided is similar to the SD card format. With video and audio capability, a personal trainer guides you through varying fitness programs.

Some commercially available software allows you to exercise in distance countries. Have you wanted:

- to walk,
- to run,
- to bike up the Alps; or
- to row:
  - distance waterways,
  - against others, or
  - with Olympic medalists?

Did you know?

Apps are program applications available from online resources such as iStore®.

The opportunity for personal fitness training continues to grow with the development of more Apps for the personal devices and DVDs. With continued development, the consumer options and needs provide more choices.

With a simple search on the Internet, numerous programs are available online. Whether you want to store the information with the organization or get assistance with your fitness activity, this information is found online.

Online services include:

- exercise workout online,
- workout training,
- fitness training,
- weight loss training,
- calories burned training,
- fitness calculator, and
- diet tracker.

The program you want to use may vary from those discussed here. Review fitness Apps online and choose the program best suited for your requirements. Some workouts are free and some require you to purchase the program.

SECTION 3
VIDEO GAMES THAT PROMOTE PHYSICAL FITNESS

Do you play video games? What are some of your favourite video games?

_____ _____
_____ _____
_____ _____

Computer games have been around for some time. From the comfort of a chair or couch, individuals have been able to play against a PC in various single player or team sports or adventure activities. However, little exertion of energy is involved in standard arcade games.

The newer generation of wireless-based computer platforms provides more elaborate and realistic games and activities. Computer games, like TV shows, come in various ratings, depending on the age of the user.

Do you know the rating of your computer games? Mark the rating (s) appropriate for you and then rate the games you listed at the start of this section.

EC	Early childhood, suitable for children age 3 and over.	_____
E	Everyone, suitable for children older than 6 and may contain a minimal amount of cartoon violence and / or mild language.	_____
E 10+	Everyone 10+, suitable for children over 10 and may contain fantasy violence and increased mild language and some suggestive themes.	_____
T	Teen, suitable for teenagers and may contain some blood and violence, crude humour, strong language and simulated gambling.	_____
M	Mature, not meant for children and should only be played by people older than 17. Contain greater amounts of violence, blood and gore, sexual content and stronger language.	_____
AO	Adult only and contains prolonged scenes of violence and / or sex.	_____

A system that makes advances using educational, physical and cognitive fitness games is being introduced into business and organizations. Although more research and development is needed to focus on using video games to provide specific cognitive, motor and educational goals, some off the shelf programs have been introduced and show progress in these areas.

With opportunities to de-stress using activity promoting computer games during lunch and work breaks, workers are showing more productivity and creativity. The gaming system has the user moving and exercising.

By combining video games with exercise, young people may be more active.

GAMING PLATFORMS

The Nintendo Wii™ has provided individuals with the opportunity to exercise with its use of interactive exergames. Wii Sports™ and Wii Fit™ have the player actively participating in sports as if playing real games including:

- boxing,
- tennis,
- baseball,
- golf,
- yoga,
- strength training,
    - push-ups,
    - stretches, and
    - ab exercises;
- aerobatics, and
- balance games,
    - skiing,
    - snowboard, and
    - walking a tightrope.

The intensity of the fitness workout depends on the game level achieved. Beginners start with the strength training exercise and graduate to the more demanding cardio exercises which include:

- running on a track;
- punching targets / a heavy bag;
- inline skating with jumps; and
- playing tennis.

Wii Fit™ shows your body age. As you progress, the body age and the chronological age should synchronize and you may even show a younger age.

As a motivator, Wii™ has the player create their own avatar. The avatar has customized hair colour, face shape, eye colour and more. The body shape represents the player's own. If the balance board is being used, it measures the weight and the player enters their own height. The game calculates their body mass index (BMI) and as weight is lost, the game adjusts the body shape.

Business executives, who use gaming platforms for exercise at work, create their own avatar for the program being used. Do you have your avatar created?

The PlayStation Xbox™ and Wii™ have young people up and moving to Dance Dance Revolution. The individuals move their feet as required on the dance pad while watching the actions of a character on a screen.

Stationary bikes have been connected to gaming systems such as PlayStation2™ requiring the player to peddle and stir with the handles to activate a car in the game.

Does activity promoting computer games make a difference in the energy (kj) expended? A study made by the Research Institute for Sport and Exercise Sciences in Liverpool, England, found the type of activity completed over a 60-minute period showed varying results. Baseline resting energy expenditure is 300 kj (72 cal).

Sports and Activities

- Sitting playing board games–400 kj (96 cal)
- bowling–800 kj (191 cal)
- tennis (doubles)–1330 kj (318 cal)
- boxing (punching bag)–1600 kj (382 cal)
- boxing (sparring)–2410 kj (575 cal)

Gaming Sports and Activities

- Xbox 360™ games–450 kj (107 cal)
- Wii Sports™ bowling–700 kj (167 cal)
- Wii Sports™ tennis–750 kj (179 cal)
- Wii Sports™ boxing–730 kj (174 cal)

The energy expended playing gaming sports and activities is noticeably lower than participating in the real activity.

The enhanced interactive effects of active gaming produces varying degrees of energy expended. The more active and fit an individual is, the more progress and advancement to the next level.

Many corps and squadrons are purchasing gaming consoles which use the active gaming platforms. Does your squadron offer any type of gaming programs? If so, describe the games and purpose and if not, what would you like to see at your squadron?

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

CONCLUSION

As you move to future education and / or work from organized activities provided by cadet training, the planning and scheduling of leisure time for fitness activities becomes your responsibility. With the advancement of technology and its use in the applications reviewed in this self-study package, motivation and technical assistance is available for the individual wishing to continue their fitness activities.

Whether the individual uses exercise equipment, small devices, online and software-based fitness tools or interactive exergames, it is the individual's responsibility to monitor and participate in their own program. Individuals can use the services of a fitness gym, YMCA, and personal gym to access numerous exercise equipment. Something as simple as walking and running using the smaller devices can be completed routinely without membership fees to a gym.

As you progress into future training and education, the benefits of continued fitness activity will assist you to maintain a healthy lifestyle.

Congratulations, you have completed your self-study package on EO C504.01 (Examine the Use of Technology in Physical Fitness Activities). Complete the following exercise and hand your completed package to the Training Officer / Proficiency Level Officer who will record your completion in your Proficiency Level Five logbook.

FINAL EXERCISE

What is your fitness activity? Do you use any device or program discussed in this self-study package? Mark an X in the box beside the equipment or program you use. If you do not presently use any of these pieces of equipment, mark an X in those boxes that interests you.

	Use	Interest
		

Figure A-12 Treadmill

Note. From "Exercise Equipment", 2009, *Smoothfitness*. Retrieved November 6, 2009, from http://www.smoothfitness.ca/treadmills

		

Figure A-13 Elliptical Trainer

Note. From "Exercise Equipment", 2009, *Smoothfitness*. Retrieved November 6, 2009, from http://www.smoothfitness.ca/ellipticaltrainer

Use Interest

Figure A-14 Exercise Bike

Note. From "Exercise Equipment", 2009, *Smoothfitness*. Retrieved November 6, 2009, from http://www.smoothfitness.ca/exercisebike

Figure A-15 Rowing Machine

Note. From Concept Rowing, 2009, *Concept2: The World's Best Rowing Machine*. Retrieved November 12, 2009, from http://www.concept2.com/us/default.asp

Use Interest

Figure A-16 Pedometer

Note. From "Amazon.com", 2009, *SportLine 340 Strider Pedometer: Sports & Outdoors*. Retrieved November 13, 2009, from http://www.amazon.com/SportLine-SP2795BK-340-Strider-Pedometer/dp/B0006VWRX6

Figure A-17 Watch Pedometer

Note. From "Which Pedometer Design is Best?", by W. Bumgardner, 2009, *Heart Rate Monitor Pedometer Watch*. Copyright 2009 by W. Bumgardner. Retrieved November 13, 2009, from http://www.walking.about.com/od/pedometer1/ss/pedometerdesign_7htm?p=1

Use | Interest

Figure A-18 Accelerometer

Note. From "thisnext", 2009, *Accelerometer–Measures Calories Burned From Physical Movement*. Retrieved November 13, 2009, from http://www.thisnext.com/item/75297326/6ECC67A9/Accelerometer-Measures-Calories

Figure A-19 Nike + iPod® Sports Kit Sensor

Note. From "Apple-Nike+iPod", 2008, *Nike+iPod*. Retrieved November 12, 2009, from http://www..apple.com/ipod/nike/

Figure A-20 Nintendo Wii™ Gaming Platform

Note. From "Sears", 2009, *Nintendo Wii Game System Console*. Retrieved November 12, 2009, from http://www..sears.ca/product/wii-8482-bundle/57542790?ptag=1