Criteria A (Eugene, Joshua, Levina) Muscle Endurance

A. Preliminary Research

Muscle Endurance is the muscle's ability to endure stress for a longer time. Building muscular endurance does not only improve wellness, but decrease fatigue and injury. The aspects that one must focus on is stamina and the key to build muscular endurance is repetition. Muscular endurance are divided into four parts; power endurance, short-term endurance, long-term endurance and continuous tension.

Power endurance: the need of great strength repeated continuously with little or no break
Short-term endurance: activities that requires 30 seconds to 2 minutes of maximum effort
Long-term endurance: activities that last more than 2 minutes
Continuous tension: To remain immobile against resistance. (isometric contraction)

B. Define Problem

These days the seventh graders are mostly lacking of exercises, which makes their muscles less durable in facing activities that requires strength. Teenagers these days limits their activities with technologies.

> "While internet use has become a necessity in most developed countries, medical experts agree that technology addiction is a growing trend. More common among teens, technology or gaming addiction occurs when an individual has a compulsive need to engage with devices like smart phones or video games." (Tyler)

This leads to a social problem where they are isolated and limited in only interacting through screens (indirect way). By improving this problem, it will benefit their life because they no longer need to be dependent on others. In emergencies, they will have the ability to help around their society. To keep their health and body in good shape and by doing more exercises on muscle endurance they are able to participate in more activities that requires physical abilities (ex. hiking, sports team, community events, etc.) Handling their mental health also becomes an issue when students are too obsess with the use of technology; they tend to become restless.

Not only that, building muscular endurance is functional strength. In daily activities, muscle strength can be use for many things. As students muscle endurance is used in many different occasions, such as; carrying equipments, moving of tables, drama prop preparation or backstage, design technology class when bringing materials and when doing the activity, etc.

Training also result in a good body posture and healthier life that supports elderly age (prevents diseases). Muscle mass increases metabolic rate, which means muscle endurance training burns more calories.

> "According to an interview with Reuters Magazine with Dr. Judy Kruger, a Center for Disease Control and Prevention specialist in elder care, exercises that strengthen muscles can reduce the risk of falls and fractures, promote healthy bone density and improve balance and coordination, which can help prevent falls." (Doyle)

Added muscle mass also results in a higher daily level of energy. Provides more energy and longer stamina. Muscle endurance training also helps deal with both physical and mental stress. The result of improving muscle endurance, improve individual's confidence and self esteem. These will help students to have a better way in handling their time management and body language when presenting information during class. It will also support them to learn in becoming a leader and gain more respected values (IB learner profile, awards, etc). From the building confidence, students grades in presentation performance is more likely to increase.

> "According to the CDC, exercise associated with building muscle can help people sleep better and longer, which should improve energy levels throughout the day." (Doyle)

Muscle endurance training will help students in;

- Organizational skills: higher energy and longer stamina
- Collaborative skills/communication: interacting with others by gaining more confidence and self esteem
- Physical, psychological health: effective enough rest, and better physical ability

C. Design Brief

The equipment that we create must help the students in grade 7 (SPHISC) to improve by one level in their muscle endurance in 6 weeks of training time. The product must be finished within 2 weeks and must suit the physical abilities of children from age 12 and above, that will not damage their body growth,

D. Research Question(s)

1. Client Profile (Basic information, physical test abilities) -Levina, Eugene, Joshua
2. Tools, materials, skills needed to create the equipments -Eugene
3. Safety specification for fitness equipments -Joshua
4. Muscle endurance training program -Levina

E. Research

Research Question #1: Client's Profile (Miranda)

RESOURCE

Pranoto, Miranda. Personal Interview. 6 Dec. 2012.

RESOURCE ANALYSIS:

The information is valid because the interview was done personally, and it is accurate since the interview was just done recently. By doing a personal interview with the client herself, it's a primary resource that is reliable.

CONCLUSION: It is important to make a equipment that does not involve much of handling complicated tools. Programs would be more enjoyable for her if it involves speed and flexibility because she is confident with her skills. She would like to specifically build muscle around her arms. Her eating habits is controlled, but she lacks of exercise. During PE and activities. majority of the period is spent inefficiently. Need more exercise routine that does not take to much time and is entertaining.

INFORMATION ANALYSIS: The information gathered are important and is very useful in the making of my design specification and designs. From the information concerning her likes and dislikes, it will help motivate her to do exercises. By involving the skills that she's confident it, she would most likely feel excited in exercising. The specified body muscle part to improve helps me to focus in designing a more effective design. Even so, I still need to check her physical abilities at the moment. I need to test her muscle endurance in different sports, (running -muscle endurance of speed, gymnastic -muscle endurance of flexibility and basketball -reasons behind her weakness in handling equipments) In order to know that the data of her current condition is consistent, I would need to test her 2-3 times and interview about her physical abilities with her PE teacher.

Full Name: Miranda Pranoto
Date of Birth: 13 March 1999
Age: 12 years old (13 on March 2012)

Height: 153 cm
Weight: 51 kg

Favorite sport: Gymnastics and Running
Least favorite sport: Volleyball

Likes: Speed and Flexibility
Dislikes: Handling equipments (ex. ball)

Eating habits: 2-3 times a day
breakfast (milk, sometimes one bread)
lunch (main course)
dinner (light course)

*trying to cut out the carbohydrate, fat
*likes: poultry, vitamin, dairy

Exercise Routine: 3-4 times a week
Monday (PE 1 period)
Wednesday (PE 2 period)
Thursday (Activities: Basketball 1 period)
Saturday/Sunday (30 minutes running treadmill, speed 7-9)

Health Problems (if any): none

Which body muscle would you like to strengthen most?

a. shoulders
b. biceps
c. triceps
d. lower body
e. abdominal

Research Question #1: Client's Profile (Maria)

RESOURCE
Yolanda, Maria. Personal Interview. 6 Dec. 2012.

RESOURCE ANALYSIS
Information is very limited but it is valid because the data is taken from the target audience.

Name: Maria Yolanda
Weight: 41 kg
Height:
Age: 12
Hobby: reading
Like: laughing
Dislike: cockroach
Eating Habits:
Exercise Routine/ Sport: badminton, swimming
Health Problems:(choice)

CONCLUSION: Maria needs to perform check up to fill the height data and keep track on weight. Her physical ability seems to be average. Equipment should involve either badminton or swimming so that she is able to enjoy the program. It must be enjoyable for her. More information on the eating habits is important to keep track on the progress and more accurate data.

INFORMATION ANALYSIS: This information is important for designing and evaluating the product and program. Designing so that she will progress in having more interest in exercising and can stay in fit health. Program needs to be evaluated whether or not she enjoys the training sessions and is willing to continue the program, the effectiveness of the product.

Research Question #1: Client's Profile (Audrey)

RESOURCE
Angeline, Audrey. Personal Interview. 6 Dec. 2012.

RESOURCE ANALYSIS
Information reliable because it is a primary resource but there are still some other information that needs more details.

Name: Audrey Angeline
Weight: 40
Height: 151
Age: 13
Hobby: Playing Basket
Like: playing.
Dislike: worms
Eating Habits:on time
Exercise Routine/ Sport: Basketball
Health Problems:(choice)

CONCLUSION: The equipment designed for Audrey, should have a concept of game so that it will interest her. It would be more efficient and beneficial for her if the equipment is designed to improve her basketball skills. Since she likes basketball, it is not that challenging to persuade her to cooperate in the program.

INFORMATION ANALYSIS: The information is important in designing and evaluating. Designing an equipment that suits her and that she can enjoy. Evaluating on the productivity of the program and product.

Research Question #1: Client's Profile (Teguh)

RESOURCE
Teguh. Personal Interview. 6 Dec. 2012.

RESOURCE ANALYSIS
The information are valid but it is not complete. Doing a physical ability test on muscle endurance is required and further information his reason of dislike is important. The resource is valid because it is from the client himself.

Name: Teguh
Weight: 59-62 (not sure)
Height: -
Age: 12, becoming 13 this month
Hobby: papercraft
Like: planes
Dislike: PE
Eating Habits: 4 times a day
Exercise Routine/ Sport: none
Health problems: None

CONCLUSION: Teguh needs another check up on his weight and height. He dislikes exercising but likes eating, this is not good for his health. For his training it is important to start from the basics and the program needs to be entertaining so that he is willing to do the training. By designing an equipment that involves planes might interest him. Since he dislikes exercising, the client does not have a healthy physical condition. Increasing his level by one will be very challenging because he does not have the interest. Since he does not have health problems, that will help us to create various programs.

INFORMATION ANALYSIS: This information of the client's profile is useful for the designing stage. It guides us to a more specific equipment that the client will be satisfied with. In creating the design of the equipment and the program, from this information we know that it won't be easy to ask him to cooperate with us.

Research Question #4: Muscle Endurance Training Program

RESOURCE ANALYSIS:
All of the websites used concerning the programs and the basic information of muscle endurance is valid because they are all accurate when compared to more than 3 different sources. Even though some of the website are outdated, they still match with the most current articles that were published on the year of 2011.

The videos are also reliable and has been approved by the famous people in the body building group. Nick Jones as the body builder champion and Cathe's Television also produces a lot of other DVD series. There are also testimonies concerning the videos, with a high rate of effectiveness. Information also synchronizes with the other sources. It is objective because the information are gather from different point of views and have the same basic components in the training program.

CONCLUSION:
Training program must be done routinely around 3-4 times a week. Each training sessions are divided into 2-3 sets which involves the minimum of 50% resistance and at least 12 repetitions. Focus on one muscle group per training and specify the position that needs to be trained, so the required muscle parts can be identified.
The key to the program is intensity, duration and frequency. Weights needs set in low but high in repetitions and multiple sets on exercise.

INFORMATION ANALYSIS:
The gathered information is useful in the making of; design specification, design, plan, testing, and evaluating.
In design specification, information on the component of the program needs to match with the clients needs and condition.
Designing equipment that does not involve weight-lifting, but resistance and high in repetitions. From the specification, design needs to also meet the requirements of the specification.
Planning but not for creating the product, planning in testing the product. Making sure that the schedule with clients are set and is available, to make sure the clients are responsible in fulfilling the programs, this effect the data result of product's effectiveness.
Testing method is benefited by the information gathered because during the testing time, it is easier to analyze the product or program's weakness and the components to improve the design on.
Evaluation, to know wether the whole research result worked for the client and to know the effectiveness of combination between program set and equipment made.

*NOTE: Resources for the second research are all in part E. Resources because all of them were used in the process of answering this research question. Due to the spacing issue, it is placed in before the research result

Lifting heavy weights with low repetitions will develop strength. Dynamic muscular endurance is the opposite; higher numbers of repetitions with lower resistance.

CIRCUIT RESISTANCE TRAINING (Static Muscle Endurance)
Moving from one station to the next, usually set up in a circle.
Each station has different exercise which requires high repetitions but low in resistance. Intersection for each station is given about 15 seconds. There are more or less 10 stations and for each training, the circuit should be done for 2-3 times.

Cardiovascular Endurance
-depends on heart muscle, circulatory system and respiratory system. Running is the most common exercise to increase cardiovascular endurance.

Weight training components
-Intensity
-Duration
-Frequency
*if one of these 3 components is decreased, the left over components must make up for the decreased component by increasing its level of difficulty. (Decreasing intensity can not be made up by any of the two component)

MICRO-CYCLE
*teaching one part of the muscle one at a time. Progressing it with high intensity but low in volume. Used to let exerciser to adjust to the new program of circuit resistance program. Start from 2 and for keep increasing half a set for each program.

Programs for athletes used to a high-volume- program
(INTERMEDIATE-VOLUME TRAINING)
-Warm Up set
*50% of workout weight with 12-15 repetitions made
-2 Workout sets
*Workout weight increased 5-10% and a minimum of 12 repetitions for each set
*Both workout sets may be performed with the same weight (straight sets) or it may be increased by 5% of resistance from the first workout set.

STRENGTH ENDURANCE TRAINING
-High repetitions, lower weights and multiple sets of an exercise

Weights: <65%1RM Repetition Maximum
Repetitions: >16per set
Sets: >3
Rest between sets: +/- 20 seconds
Combined with cardiovascular sessions

Muscle Endurance -Nick Jones
-3 exercises per muscle group
-15 reps each set
-30 second rest in between

Muscle Endurance Format: Cathe's Television
1-3 times per week
-Warm up (6 min)
-Weight training (45 min)
-Abs (9 1/2 min)
-Stretch (4 min)

Research Question #2: Material, Tools and Skills needed to create equipment

RESOURCE

"How to Make an Outdoor Pull-up Bar." *Fitstream: DIY Fitness Equipment*. Web. 10 Mar. 2012. <http://www.fitstream.com/en/gb/articles/how-to-make-an-outdoor-pull-up-bar-a176>.

RESOURCE ANALYSIS

Resource is very limited but the information are reliable because it is applicable and there are prove of pictures.

INFORMATION

- 2 x 5x5 inch posts, 10-11 ft (depending on your height)
- 33 mm thick steel tube with welded brackets, made to measure (see "Bar Welds" section below for more information).
- 4 x 4 inch self-tapping bolts and washers (10mm thick)
- 2 x bag of quick dry postcrete
- Estimated 6 - 10 bags of ready mixed concrete (or you can mix it yourself)
- A small bag of gravel
- Fence paint to protect the wooden posts
- Red Oxide paint (tin or spray can) to prevent the bar from rusting.
- Spade
- Thick paint brush
- Spirit level
- Long rod or broom handle
- Tape measure
- Wheelbarrow or bin to mix concrete
- Drill with 9 mm and 10 mm drill bit
- Adjustable spanner

CONCLUSION

We can predict what kind of tools and material that we probably going to need to create the fitness equipment. At least we have an idea what we probably need and could prepare the rare equipment. The other thing is we know what good material to use, such as the spray that we need to use to prevent steel to rust. In the design spec we could add that the equipment isn't going to rust. In creating we know what kind of tools that we have less opportunity of getting confused or stuck because don't know what tools that we need. Most of the equipment that I found is mostly made from metal pipe and wood. They use metal and wood because it's strong and long lasting. Metal is more often used, because if we use wood there is chance that we could get injured. Measurement is an important aspect in order to make the equipment because it helps to make the equipment size as we expected. Use rubber so the equipment won't be slipper. The spray used for painting the equipment prevents steel from rusting. (Red Oxide Paint)

INFORMATION ANALYSIS

The information is useful when creating the design specification, design, planning and evaluation. We can predict what kind of tools and material that we probably going to need to create the fitness equipment (design). At least we have an idea what we probably need and could prepare the materials and tools (planning). Through this research, we can judge whether the equipment is durable. In creating we know what kind of tools that we have less opportunity of getting confused or stuck because don't know what tools that we need. We know what are the tools and materials required in order to create the equipment. By planning the needed tools and materials, we can safe some time during the creating process.

Research Question #4: Safety of Equipment

Resource

Aldous, Kyle. "Correct Use of Gym Equipment." *EHow*. Demand Media, 21 Jan. 2010. Web. 16 Mar. 2012. <http://www.ehow.com/way_5901342_correct-use-gym-equipment.html>.

"Exercise & Fitness." *Exercise Equipment Safety*. May 2011. Web. 16 Mar. 2012. <http://www.consumerreports.org/health/healthy-living/fitness/equipment/treadmills/treadmills/exercise-equipment-safety/exercise-equipment-safety.htm>.

"Freefall." *Trajectories*. Web. 16 Mar. 2012. <http://hyperphysics.phy-astr.gsu.edu/hbase/traj.html>.

"How to Ensure Your Home Gym Equipment Is Safe | StrongLifts.com." *StrongLifts.com: Gain Strength And Muscle While Losing Fat*. Web. 16 Mar. 2012. <http://stronglifts.com/how-to-ensure-your-home-gym-equipment-is-safe/>.

"How to Ensure Your Home Gym Equipment Is Safe | StrongLifts.com." *StrongLifts.com: Gain Strength And Muscle While Losing Fat*. Web. 16 Mar. 2012. <http://stronglifts.com/how-to-ensure-your-home-gym-equipment-is-safe/>.

"How to Make an Outdoor Pull-up Bar." *Fitstream: DIY Fitness Equipment*. Web. 10 Mar. 2012. <http://www.fitstream.com/en/gb/articles/how-to-make-an-outdoor-pull-up-bar-a176>.

"Initial Velocity Components." *The Physics Classroom*. ComPADRE. Web. 16 Mar. 2012. <http://www.physicsclassroom.com/class/vectors/u3l2d.cfm>.

Jodee. "Spring Forward into Fitness: Inspect Your Home Gym Equipment." *Inspect Your Home Gym Equipment*. Web. 16 Mar. 2012. <http://www.heartmart.com/blog/exercise/exercise-equipment-exercise/2284/spring-forward-into-fitness-inspect-your-home-gym-equipment>.

"Lesson 26: Projectiles Launched Horizontally." *Mr. Clintberg's Studyphysics!* Web. 16 Mar. 2012. <http://www.studyphysics.ca/newnotes/20/unit02_circulargravitation/chp07_2d/lesson26.htm>.

"Maintenance & Safety for Gym Equipment." *LIVESTRONG.COM*. Web. 16 Mar. 2012. <http://www.livestrong.com/article/288104-maintenance-safety-for-gym-equipment/>.

"Module 3: Horizontally Launched Projectiles." *Applications of Kinematics and Dynamics: Projectile Motion*. Web. 16 Mar. 2012. <http://homepage.usask.ca/~dln136/projectile/pages/module3.html>.

"Projectile Motion." *Regents Physics*. Web. 16 Mar. 2012. <http://www.aplusphysics.com/courses/regents/kinematics/regents_projectile_motion.html>.

"Real-life Applications -Projectile Motion." *Science Clarified*. Web. 13 Mar. 2012. <http://www.scienceclarified.com/everyday/Real-Life-Chemistry-Vol-3-Physics-Vol-1/Projectile-Motion-Real-life-applications.html>.

Sheahan, Kyra. "Risk Analysis of Gym Equipment." *EHow*. Demand Media, 06 Jan. 2011. Web. 16 Mar. 2012. <http://www.ehow.com/facts_7741311_risk-analysis-gym-equipment.html>.

Stone, Joe. "Maintenance & Safety for Gym Equipment." *LIVESTRONG.COM*. Web. 16 Mar. 2012. <http://www.livestrong.com/article/288104-maintenance-safety-for-gym-equipment/>.

Suds, Bobby. "How to Maintain Gym Equipment." *EHow Health*. Demand Media, 18 Dec. 2010. Web. 16 Mar. 2012. <http://www.ehow.com/how_7660722_maintain-gym-equipment.html>.

"What Is A Real Life Example Of A Quadratic Equation And Please Show Work?" *Blurtit*. Web. 16 Mar. 2012. <http://mathematics.blurtit.com/q385354.html>.

RESOURCE ANALYSIS

The information are supported by multiple sources and the information are accurate. Not only that, there are pictures to prove and guide to check the safety of equipment. The information are also current. Information is applicable for our project.

INFORMATION

-loose bolts
-weak weld joints

-material fatigue
-material quality
-weight load
-impact (such as when bar is dropped)

-weld joints
-cracks
-all nuts and bolts connecting equipment parts (check for tightness)
-flaking areas of chrome plating

-lubrication of moving parts
-calibration of equipment settings
-type and regular intervals

-unstable
-rattles in an unusual manner
-proper technique of using the equipment

WORKOUT AREA
-inspect flooring (spills, tripping hazards, damaged surfaces, etc)
-sufficient space -free from obstruction by other objects or subjects
-check free weights
-plastic/vinyl, check for holes
-clean weights with damp cloth and dry before use
-resistance bands, make sure there are no tears
-exercise ball, check for holes, leaks, inflation level, stability

-emergency safety button/option
-"safety key" clipped onto subject's clothing, turns the machine off if the subject falls-if the string is pulled

1. disinfect regularly (soiled with body sweat and dirt) disinfect spray that doesn't contain alcohol or bleach. wipe entire surface, nook, crannies. dirt in the wheels
2. keep parts tightened. screws, nuts, bolt loosen. use screwdriver to tighten the bolts
3.lubricate parts
4.avoid misuse, treatment for the equipment (gently)
5.squeaks/creaks

-free weight is more dangerous because subject is required to balance the equipment independently
-have a fixed goal of what expect from the program
-have a trainer/supervisor

-rusty
-significant amount of wear
-tears

CONCLUSION
Testing the safety of the product it is important to look at the materials. Mostly the loose bolts, weak joints, rust and surface, stability, endurance, weight and more. For better safety, ask expert from the maintenance staff to check the quality of equipment. Workout area needs to also be secured.

INFORMATION ANALYSIS
The information is important for creating and testing. It is a crucial part of the equipment evaluation because it concerns the safety of the client. During creating every specific parts and details. Also during the testing, the information is used to test the endurance and effectiveness of product.

Research Question #4: Program training

INFORMATION
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Evaluation, to know wether the whole research result worked for the client and to know the effectiveness of combination between program set and equipment made.

RESOURCE

Boyle, Kip. "Health Benefits Of Muscular Strength & Endurance." *LIVESTRONG.COM*. Deman Media Inc., 18 Mar. 2011. Web. 10 Mar. 2012. <http://www.livestrong.com/article/84419-health-benefits-muscular-strength-/>.

"Cardiovascular Endurance." *General Fitness Guide*. Web. 10 Mar. 2012. <http://generalfitness.tripod.com/id4.html>.

Davies, Phil. "Muscular Endurance Training." *Sports Fitness Advisor*. Sporting Excellence Ltd. Web. 10 Mar. 2012. <http://www.sport-fitness-advisor.com/muscular-endurance.html>.

Ellyn, Sam. "Muscular Endurance Benefits." *LIVESTRONG.COM*. Demand Media Inc., 3 Mar. 2011. Web. 10 Mar. 2012. <http://www.livestrong.com/article/89973-muscular-endurance-benefits/>.

"Low Volume, Progressive Intensity Training." *ExRx.net*. Web. 10 Mar. 2012. <http://www.exrx.net/WeightTraining/LowVolumeTraining.html>.

Lunardoni, Claire. "Muscular Endurance Training." *LIVESTRONG.COM*. Demand Media Inc., 4 May 2011. Web. 10 Mar. 2012. <http://www.livestrong.com/article/73949-muscular-endurance-training/>.

"Muscular Endurance." *General Fitness Guide*. Web. 10 Mar. 2012. <http://generalfitness.tripod.com/id1.html>.

"Muscular Endurance." *Surfweeter.com*. Web. 10 Mar. 2012. <http://www.surftweeter.com/muscular-endurance.html>.

Muscular Endurance Training Program. Dir. MrSupplement. Perf. Nick Jones. *YouTube*. YouTube, 09 Sept. 2011. Web. 10 Mar. 2012. <http://www.youtube.com/watch?v=qjn1qPQo19k>.

"Muscular Endurance." *Women in Motion*. Sept. 2001. Web. 10 Mar. 2012. <http://sgsamson-ivil.tripod.com/programs.html>.

Tyler, Mara. "Video Game & Technology Addiction." *Healthline*. Ed. Jennifer Monti. Healthline Network Inc., 20 July 2011. Web. 10 Mar. 2012. <http://www.healthline.com/health/addiction/gaming-and-technology>.

YouTube. Dir. Cathe Television. Perf. Cathe's Intensity Series -Muscle Endurance. *YouTube*. YouTube, 16 Feb. 2009. Web. 10 Mar. 2012. <http://www.youtube.com/watch?v=4L0SHUaKFDo>.

RESOURCE ANALYSIS:
All of the websites used concerning the programs and the basic information of muscle endurance is valid because they are all accurate when compared to more than 3 different sources. Even though some of the website are outdated, they still match with the most current articles that were published on the year of 2011.

The videos are also reliable and has been approved by the famous people in the body building group. Nick Jones as the body builder champion and Cathe's Television also produces a lot of other DVD series. There are also testimonies concerning the videos, with a high rate of effectiveness. Information also synchronizes with the other sources. It is objective because the information are gather from different point of views and have the same basic components in the training program.

G. Design Specification

1. Equipment produce effective result within 6 weeks of practices
2. Product can be made in 2 weeks of time
3. Product budget maximum Rp 250.000,-
4. Product and program is safe for the client (appropriate for clients abilities according to PE teacher and doctor)
5. Product is secured for each and every detail (quality of material used, etc)
6. Product and program is enjoyable for the client

7. Product is multifunctional
8. Product can be used in a program that involve intensity/repetition (muscle endurance)
9. Product may not have any weight-lifting involve other than the target's weight
10. Equipments should long lasting
11. Equipment is simple (easy to use, easy to store, portable)

H. Testing Method

1. Discuss concerning designs and program with client (interview)
*which of the equipment design they like most
2. Discuss concerning designs and program with experts (interview)
*(PE teachers, doctors) which of the equipment design is most suitable for muscle endurance training
3. Create a data document concerning the progress of client's muscle endurance ability
*record every single test (1 minute push up/ sit up/ squat, 2-3 times a week consistent days)
4. During the creating product, prepare a warm-up schedule for client and discuss together
*adjustment/improvement of product idea, program and schedule (timing)
5. Testing safety
*look at the loose bolts, rust, material, joints, stability, shape, and more. Ask guidance from the experts in the maintenance staff