

**Special Olympics Swimming
(Improving the warm-up)**

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Introduction:

For our independent study, we had the opportunity to work with the Hamilton Special Olympics swim team. Every week we would go to their practices and assist with the coaching as well as analyze the warm-up and come up with ideas and recommendations on how to better improve the warm-up so that it has the most efficient effect on the skill development of the practice. We also had the opportunity to do some fitness testing with the athletes testing their strength, flexibility, balance, and aerobic activity.

The athletes at this particular swimming club have different skill levels and different ability levels. It is important to take into consideration each individual's disability and the limitations and the abilities that come along with that disability. It is important to note that you have to take into consideration each individual as a separate case when dealing with recommendations because certain athletes will be able to do certain activities while other athletes will not be able to do those same activities.

Observations:

The first evening we helped out with the swim team practice, we focused on just observing how the practice is run and what the coaches are doing well and what they could improve on. The pool is divided into three sections with lane ropes, and the athletes are split up into three groups. These three groups were advanced ability, intermediate ability, and beginner ability. There is quite a difference in the swimming ability between the three groups.

One of the first observations is that the athletes, rather than the coaches, led the warm-up and cool down. When the athletes are leading the warm-up, it is not so much a warm-up but rather it turned into them just standing around and chatting away, with the stretches turning into not the full range of motion and not done properly. Furthermore, the warm-up is only about two minutes long when the athletes lead it.

Most of the athletes are also rolling in the door a few minutes before 8:00 pm and then stepping onto the pool deck right at 8:00 pm or even a few minutes later. This means that the athletes are using part of the practice time for their warm-up. Normally, because the athletes are late, they are not jumping into the pool until 8:10 pm and don't actually start the practice until close to 8:15 – 8:20 pm. At our last volunteer session, the coaches sat down with the athletes and told them that from then on they had to be ready out on the pool deck warming up at 7:50 pm so they could be in the pool by 8:00 pm.

Moreover, the cool-down could be improved as well. Normally, the coaches only leave five minutes or less for the cool-down. This is not enough time to have a sufficient cool-down. We noticed that during the cool-down the athletes once again led it. This is not a bad idea per say because it gives the athletes the chance to not always be under the direction or authority of the coaches. When the athletes lead the cool-down, it turns into a time when they are talking with each other and fooling around. They are not actually doing much stretching. Furthermore, when the athletes are leading the stretches, they tend to do the basic leg and arm stretches which is not sufficient enough.

Each group of swimmers have their own skills to improve on. In general, all three groups need improvement on flexibility, strength, and power. A few athletes are quite flexible which really surprised us and then there are the athletes who really need to improve their flexibility. A number of the athletes are not as flexible as they should be and they are below the average flexibility ranges. In regards to strength, a number of the athletes do not have a lot of strength and are below average. We also noticed that when doing laps, a number of the athletes do not push off the wall and use that power to help them down the length of the pool. Rather when they get to the wall, they just stop swimming, turn around, and then continue swimming down the lane without pushing off the wall.

We had the opportunity to do some videotaping and had access to use the dartfish program provided by the Special Olympics to look at and analyze the front crawl swim stroke. We videotaped individuals from the beginner group, the intermediate group, and from the advanced group. Each group is at a different skill level and this is clear by analyzing the results from the videotaping.

Beginner group:

We videotaped a couple of the athletes in the beginner group. One athlete, when he is doing the front crawl, he really flails his arms. From analyzing the video, he is twisting and turning his torso and his torso and the bottom half of his body are sinking in the water. Furthermore, this athlete does not use his legs to kick and when he does kick his legs, it is a motion from the knees down rather than from the hip down with knees straight. This is not an efficient way to kick because the legs are not propelling the athlete forward and this is clear to see because this athlete has difficulty swimming the length of the pool and it takes way longer. This athlete also does not put his head in the water and as he brings his arms above his head he turns his head from side to side. His swimming is not a fluid motion at all and he is a very frantic swimmer.

Furthermore, there was another individual who swam with a life jacket on and we videotaped him doing the front crawl. His front crawl was more of a doggie paddle motion. With this particular individual, chances are you will not improve his swimming technique. His disability will not allow it. Another particular swimmer in this category has trouble getting his one arm out of the water and above his head because of his shoulder inflexibility. The arm goes through the arm motion for the front crawl swim but it is under water and not over his head. This is due to his particular disability.

We have noticed with swimmers in this particular group that their form for the front crawl is not advanced at all. It seems to be the case that they have adapted their skills in order to make it

down the length of the pool or that they perform any body movement in order to swim the length of the pool. This group has a huge variance in the level of abilities of the athletes.

When using the dart fish program on the computer we were able to take measurements of the angles of the legs and arms of the athletes. For most of the swimmers in this group, the angles of the arms and legs are very inconsistent. In regards to the athlete's legs, the knee joints are quite bent and they are kicking from the knee down. They are not using their hip joint. Bending at the knee does not allow the athlete to propel themselves forward because their legs are not propelling rather they are just moving in the water kind of in a bicycle motion.

Furthermore, we noticed that a few of the swimmers in this group have their hands in almost a closed fist when instead their palms should be flat and scoop the water. Even more, with one particular athlete we noticed that when he has his head out of the water, his torso and legs start to sink but then when he sticks his head back in the water he lifts up his torso and leg.

Intermediate group:

We videotaped a couple of athletes in the intermediate group as well. Their front crawl skill is a bit more advanced than the beginner group. In this group of swimmers, some of the swimmers take a breath to the side whereas other swimmers stop the stroke and lift their head straight out of the water to take a breath. Furthermore, the athletes in this group do not take a breath every arm stroke like the athletes in the beginner group. The torsos of the swimmers do not twist as much as the beginner groups. The front crawl is more of a fluid motion compared to the beginner group which is more of a flailing motion. There is an athlete with Down syndrome in this group and he swims with very straight arms out to the side a bit. This might be in relation to the disorder.

When using the dart fish program on the computer we were able to take measurements of the angles of the legs and arms of the athletes in this group as well. Some of the athletes in this

group have inconsistent angles for the arms but a majority of the swimmers in this group do have good consistent arm angles. All the angles are different from each other when comparing athlete to athlete but when looking at just one particular athlete they are consistent which is a good thing. All the athletes have good hand positioning with the palm open and scooping the water as well. There is one individual in this group who, when doing the front crawl, does a scissor kick rather than the flutter kick. The head coach said you can do everything in your power to change that but it won't work because this is a stubborn athlete who just doesn't listen.

Each athlete has a different breathing technique. Some of them take a breath after each arm stroke, some of them take a breath after three arm strokes, which is correct method, and then there are other athletes who take a breath every five or six arm strokes. A few of the athletes in this group slow down when they breath and then speed up again when their head is back in the water. Furthermore, there are a few athletes in this group who lift their head out of the water and stop their arm movement to take a breath and then they stick their head back in and continue on their way.

Advanced group:

In the advanced group there are just two athletes. Both of these athletes have the skill to compete nationally. These two swimmers show a significant increase in skill for the front crawl stroke. They swim at a much higher level than the other athletes. When they turn their head to the side to take a breath they do not slow down. Their breathing technique is good with breathing after three arm strokes. Their bodies are in a straight line with good arm motion. These athletes kick from the hips and keep their knees relatively straight. Their front crawl swimming technique is a very fluid motion with minimal splashing unlike the other athletes in the beginner group and intermediate group

Once again, we videotaped this group and used the dart fish program to measure the angles of the arms and legs of the athletes. Both athletes in this group have very consistent arm angles. They use their entire leg for the kicking motion kicking from the hip with minimal knee bending so it is more of a flutter kick.

We had the opportunity to participate in an aqua fit class one evening as well. Aqua fit exercise can also be beneficial for the warm-up and cool down in swimming practices. We came back to practice the next week and tried to incorporate some of the aqua fit exercises into the cool-down. The athletes seemed to really enjoy these exercises as they were different from the routine stretching they normally do in every other practice. It was a new and exciting idea for these athletes that they really enjoyed.

Furthermore, we also did some testing with the athletes. We tested their flexibility, arm strength, leg strength, balance, and endurance over a period of six laps of the pool. Our observations of the fitness testing are that a number of the athletes need improvement in all five areas. The fitness testing activities and protocols we got directly from the Special Olympic website. The athletes were the best at the flexibility portion of the fitness testing which was really surprising to us. Overall though, the athletes need improvement in all five areas that were tested.

Interviews:

During our observation stage we did not conduct any formal interviews. We did spend a lot of time talking to the head coach of the swim team though. We had a lot of interesting conversations with him regarding the different athletes and their disabilities and abilities. He was very good about informing us about their disabilities and what they were most likely capable of achieving in regards to improvement. The head coach was very good about explaining the different disabilities to us. He is also a good knowledge source of what will work and what will

not work in regards to improving the strokes and improving the warm-up. Furthermore, the coach sat down with us throughout our time with the team and explained the best coaching technique for each individual athlete. Some of the suggestions we made for the warm-up and improvement of the front crawl, he was good about being honest with us about what would work for certain athletes and what wouldn't work for other athletes. The head coach gave us the freedom to try any of our ideas and he would correct us or make suggestions based on his opinion, which was really helpful. We really appreciate how flexible and willing the coaches were to our ideas.

Physical Fitness Testing:

Over several weeks of practice we were able to do some physical fitness testing with the athletes to see where they need improvement. We were not able to give the athletes a consent form to sign in order to have their approval for doing the fitness testing. The reason for this was because the athletes may not understand what they are signing and it may be a liability issue having the athletes sign consent for something they may not understand. We asked the coach if we would be able to do physical fitness testing on the athletes, who then talked to the parents/guardians, as well as we talked to a Special Olympic representative and they both gave us the go ahead.

The Physical Fitness Testing page used for recording the fitness test results can be seen in Appendix A. During the testing, we filled out this form for each athlete. The athlete's names were kept confidential and the forms with their names on it were destroyed once the results were recorded.

The areas that we focused on in the testing were flexibility, strength, balance, and endurance. These components are all important in swimming. Flexibility is needed because as a swimmer the athlete needs to be able to move their arm and leg joints through the appropriate range of motion. Strength is important for a swimmer because they need to be able to propel themselves through the water while performing the different strokes. Balance is also an important

factor for any swimmer because they have to be able to maintain correct body position while swimming in the pool. Endurance is also a very important factor for any swimmer because they need to be able to swim lengths up to 200 m when competing. The tests were chosen according to the equipment and space we were provided to work with.

We were not able to do some testing that may have been useful. The aerobic component of fitness would have been chosen, but since the area the testing was done in was on a pool deck, this was not able to be carried out due to safety issues from the wet floor, as well as not enough space. For most of the athletes, their balance had a need for education, so we decided not to do the balance test with the athletes eyes closed due to safety reasons.

The testing took approximately ten minutes for each athlete and involved taking the athletes out of the pool one at a time to a corner on the pool deck. The equipment that was used were stopwatches, a measuring tape, a small and large goniometer, a towel, a hand dynamometer, a sturdy chair, a pen and the fitness testing forms. The testing was done by both Sarah and Michelle together.

Methods:

Hamstring Flexibility: Supine (Passive) Knee Extension: A towel was placed on a dry area and the athlete lied supine on the towel. The fitness tester squatted at eye level beside the leg being measured. The proximal arm of the goniometer was placed with the lateral midline of the fibula with the lateral malleolus as a reference. The center of the fulcrum of the goniometer was placed over the lateral femoral epicondyle. The athlete was instructed to hold the thigh of the leg being measured to ninety degrees of flexion and to relax the lower leg. One of the fitness testers held the thigh in place so that it did not move. The other fitness tester passively straightened the athlete's knee as far as possible without causing the athlete pain. The angle between the thigh and leg was measured, and this was performed on both of the athlete's legs. The values were recorded

according to the flexibility of the leg. If the knee went fully straight, it was recorded as zero degrees. If the knee did not go straight, the value was recorded as negative, and if the knee went beyond being fully straight into hyperextension, the value was recorded as positive. If the athlete had a score of less than negative fifteen degrees or asymmetry, it was indicated that the athlete may need education.

Calf Muscle Flexibility: Supine (Passive) Ankle Dorsiflexion: A towel was placed on a dry area and the athlete was instructed to lie supine on the towel with their legs in front of them and arms at their side. The fitness tester squatted at eye level beside the leg being measured. The proximal arm of the goniometer was placed with the lateral midline of the fibula using the fibular head as a reference. The distal arm of the goniometer was placed parallel to the lateral midline of the fifth metatarsal. The center of the fulcrum of the goniometer was placed over the lateral aspect of the lateral malleolus. The athlete was instructed to relax their foot and ankle on the side being measured. One fitness tester passively dorsi-flexed the ankle by grasping and pulling down on the athlete's heel, while pushing up on the foot with their forearm. The other fitness tester measured the angle between the leg and the foot, and this was performed on both of the athlete's legs. The neutral position was a right angle between the leg and the foot, and the angle was recorded in relation to this neutral position. If the athlete reaches neutral position, it was recorded as zero degrees. If the athlete could not reach neutral, value was recorded as negative and if the athlete was able to go beyond neutral, the value was recorded as positive. If the athlete had a flexibility of less than positive ten degrees or asymmetry, it was indicated that the athlete may have a need for education.

Anterior Hip Flexibility: Modified Thomas Test: A towel was placed on a dry area and the athlete was instructed to lie supine on the towel. The fitness tester squatted at eye level beside the leg being measured. The proximal arm of the goniometer was placed in line with the lateral midline of

the pelvis. The distal arm of the goniometer was placed in line with the later midline of the femur. The fulcrum of the goniometer was placed over the lateral aspect of the hip joint with the greater trochanter as a reference. One fitness tester flexed the hip of the leg being measured to one hundred degrees and placed one hand on the anterior crest of the pelvis. The athlete was instructed to relax this leg. The fitness tester passively lowered the leg until the pelvis moved forward, and once it did, the test was done. The angle between the pelvis and thigh was measured, and this was repeated on both legs of the athlete. If the thigh lowered to the surface or ground, the value was recorded as zero degrees. If the thigh did not reach the surface or ground, the angle was recorded as negative. If the athlete had a flexibility of less than negative ten degrees or asymmetry, it was indicated that the athlete may have a need for education.

Functional Shoulder Rotation: Apley's Test: The athlete was instructed to stand in an upright position and reach one arm behind their head and down the back, and reach the other arm behind their hip and up the back and to try to touch their fingers. One of the fitness testers demonstrated this test. The distance between the index fingers was measured, and this was repeated on both shoulders. If the athlete's finger tips were able to be touched, the distance was recorded as zero centimetres. If the fingers were not able to touch, the separation was recorded as negative, and if the fingers overlapped, the value was recorded as positive. It was also recorded if there was symmetry, which was if each arm reaches equally toward the middle, as well as if there was asymmetry, which was if the arms approximate the midline unevenly. The flexibility of the left and right side was marked as within normal limits, more flexible and less flexible. If the measurement was higher than negative fifteen or if there was asymmetry, it was indicated that the athlete may have a need for education.

Timed Stand Test: A chair with a firm straight back was placed on a dry surface. The athlete was instructed to sit on the chair and was told to stand from sitting and then sit down again ten times.

One of the fitness testers demonstrated this to the athlete, and another fitness tester stood behind the chair and held it to ensure that it did not move during the test. As well, they counted so that the athlete knew how many more they had to go. The test was timed using a stopwatch, and the time was stopped once the athlete completed ten repetitions. If the time recorded was greater than twenty seconds or if the athlete was unable to perform ten repetitions, it was indicated that the athlete may have a need for education.

Hand-Grip Test: The athlete was instructed to stand in an up right position and was shown the hand grip dynamometer. One of the fitness testers demonstrated to the athlete to hold the hand dynamometer at their side with their arm straight and told to squeeze it with one strong squeeze for six seconds and then let go. The dial was set to zero, and the test was performed two times on each arm of the athlete. The result was recorded in pounds, and the highest score on each arm was used for the final measurement. The athlete's results were determined according to the table below (Heyward, 2006, p. 120).

Grip Strength										
Rating	20-29 years		30-39 years		40-49 years		50-59 years		60-69 years	
	M	F								
Excellent	≥ 115	≥ 70	≥ 115	≥ 71	≥ 108	≥ 69	≥ 101	≥ 61	≥ 100	≥ 54
Very good	104-114	63-69	104-114	63-70	97-107	61-68	92-100	54-60	91-99	48-53
Good	95-103	58-62	95-103	58-62	88-96	54-60	84-91	49-53	84-90	45-47
Fair	84-94	52-59	84-94	51-57	80-87	49-53	76-83	45-48	73-83	41-44
Needs Improvements	≤ 83	≤ 51	≤ 83	≤ 50	≤ 79	≤ 48	≤ 75	≤ 44	≤ 72	≤ 40

Single- Leg Stance with Eyes Open: The athlete was instructed to stand with their feet shoulder width apart beside a wall or chair. A fitness tester stood on the other side of the athlete in case they needed support. The athlete was instructed to lift one leg and balance until they were not able to or

until the maximum time of 30 seconds was reached. A fitness tester demonstrated the test to ensure the athlete understood. The athlete was timed using a stopwatch, and time was stopped at thirty seconds or if the athlete lost their balance (if their foot touched the ground or if they reached for the wall or fitness tester). If the athlete had a time of less than twenty seconds it was indicated that the athlete may have a need for education.

Muscle Fatigue after 300m swim (Front Crawl): The athlete was instructed to get into the pool and to perform six laps of front crawl (three hundred metres). The first fifty metres was timed, as well as the last fifty metres. Any observations made during the three hundred metre swim were recorded.

Resources: Special Olympics Healthy Athletes FUNfitness and Assessment of Human Fitness Textbook

Heyward, V. H. (2006). *Advanced Fitness Assessment and Exercise Prescription* (Fifth ed.). United States, AL: Burgess Publishing Company.

Results:

The results of the physical fitness testing are seen in the following charts. The Special Olympic Athletes results were tested in the areas of flexibility, strength, and balance. The endurance portion of the testing is located within the strength section of the results. Beginner athlete is represented by a 'B', an intermediate athlete is represented by a 'I', and an advanced athlete is represented by a 'A' in the following charts. These are following the subject letter.

Flexibility:

	Hamstrings – supine (passive) knee extension		Calf – supine (passive) ankle dorsiflexion		Anterior Hip – Modified Thomas Test		Shoulder – Apley's Test	
	Left	Right	Left	Right	Left	Right	Left	Right
Athlete A-I	8°	-3°	12°	11°	-16°	-10°	-23 cm	-22 cm
Athlete B-I	-25°	-11°	-30°	-14°	0°	0°	-6 cm	-4 cm
Athlete C-	-19°	-25°	-5°	-5°	0°	0°	4.5 cm	4 cm

A								
Athlete D-A	-3°	-20°	-5°	0°	0°	0°	-0.5 cm	4.5 m
Athlete E-B	-27°	-7°	-30°	-30°	0°	0°	-13 cm	0.5 cm
Athlete F-B	-15°	-20°	-10°	-11°	0°	0°	-11 cm	-10 cm
Athlete G-B	-43°	-40°	-30°	-30°	-20°	-17°	Unable to perform	Unable to perform
Athlete H-B	-35°	-40°	Unable to perform	Unable to perform	-15°	-7°	-22 cm	-30 cm
Athlete I-B	-10°	Unable to perform	-20°	-2°	Unable to perform	Unable to perform	-13 cm	-30 cm
Athlete J-I	-35°	-30°	0°	-10°	0°	0°	2 cm	3 cm
Athlete K-I	-15°	-23°	-30°	-15°	0°	0°	-26 cm	-31 cm

Strength:

	Leg Muscles – Time Stand Test	Forearm and Hand Muscles – Grip Test			Muscle Fatigue after 300 m swim (front crawl)	
		Left	Right	Total	1 st 50 m	6 th 50 m
Athlete A-I	22.43 s	49 kg	50 kg	99 kg	97 s	100 s
Athlete B-I	32.19 s	33 kg	30 kg	63 kg	56 s	83 s
Athlete C-A	23.94 s	40 kg	60 kg	100 kg	49 s	50 s
Athlete D-A	19.10 s	70 kg	87 kg	172 kg	37 s	34 s
Athlete E-B	29.13 s	unable to perform	Unable to perform	Unable to perform	192 s	Unable to perform
Athlete F-B	43.02 s	20 kg	20 kg	40 kg	207 s	Unable to perform
Athlete G-B	33.4 s	79 kg	85 kg	164 kg	102 s	Unable to perform
Athlete H-B	32 s	8 kg	10 kg	18 kg	230 s	Unable to perform
Athlete I-B	35.41 s	9 kg	20 kg	29 kg	117 s	123 s
Athlete J-I	26.06 s	10 kg	15 kg	25 kg	75 s	88 s
Athlete K-I	19.34 s	24 kg	35 kg	59 kg	Unable to perform	Unable to perform

Balance:

	Eyes open single leg stance		Eyes closed single leg stance	
	Left	Right	Left	Right
Athlete A-I	30 s	30 s		
Athlete B-I	16.78 s	2.30 s		
Athlete C-A	6.59 s	3.65 s	5.0 s	3.34 s
Athlete D-A	30 s	30 s	22.25 s	27.21 s
Athlete E-B	30 s	30 s		
Athlete F-B	2.35 s	4.44 s		

Athlete G-B	1.5 s	4.35 s		
Athlete H-B	6.0 s	3.0 s		
Athlete I-B	5.0 s	2.0 s		
Athlete J-I	30 s	30 s		
Athlete K-I	6.0 s	5.0 s		

Overall Results for the Need for Education: This chart shows each athletes areas that they may have a need for education. An empty box shows that there is no need for education required for that particular skill, and a “Yes” indicates that they athlete may have a need for education.

Fitness Test	Subject										
	A	B	C	D	E	F	G	H	I	J	K
Hamstring-supine knee extension		Yes									
Calf-Supine ankle dorsiflexion		Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes
Anterior Hip-Modified Thomas Test	Yes						Yes	Yes	Yes		
Shoulder’s Apley’s Test	Yes				Yes	Yes	Yes	Yes	Yes		Yes
Timed Stand Test	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes	
Grip Test		Yes			Yes	Yes		Yes	Yes	Yes	
Single Leg Stance		Yes	Yes			Yes	Yes	Yes	Yes		Yes

Overall, the athletes and coaches had positive responses to the fitness testing being done. The athletes mostly all enjoyed being taken out of the pool and participating in something different from their regular routine. The athletes also enjoyed having that one on one time with the testers who were also volunteering with the coaching. Most of the athletes understood the testing after demonstrations and instructions were given. Most of the time, a visual demonstration of the

different tests was the best way for the athletes to understand what test was being done and what was expected from them. The coaches were all understanding and allowed for the athletes to be taken out of the pool and taken away from the practice time.

It was observed overall for flexibility that most of the athletes had flexibility in their hips that is acceptable. There is a large need for hamstring flexibility and calf and ankle flexibility as it was seen in the most of the athletes that they have a need for education in this area. For a little over half of the athletes, there needs to be increased shoulder flexibility. Overall, the flexibility of the athletes needs to be improved.

Furthermore, when looking at the balance of the athletes, it is seen that most of the athletes need to work on their balance, as a lot of the athletes were not able to balance at an acceptable length of time.

In the area of strength, it is seen that most of the athletes need education for the timed stand test as well as about half of the athletes need to increase their strength according to the grip test. As for the muscle fatigue test, it is seen that in general over the 300 m front crawl, the athletes are slower in the last 50 m compared to the first 50 m. Each athlete needs to improve their endurance and this is best attained by continually doing laps.

Recommendations:

After observing, testing and researching on the area of swimming, there are some recommendations that can be given for the areas of the warm-up and the athlete's overall fitness.

Great Activities From Coaches During the Practice

There are many great activities that are already being done by the coaches during the practice to help improve some of the biomechanics and fitness aspects that the athletes may need to work on.

To improve the kicking of the athletes, the coaches use flutter boards or noodles so that the athletes do not focus on their arms, but focus on the kicking motion during the front crawl and back crawl. This will help to improve the kicking of any athlete, but mostly for those athletes whose trunk and legs sag as they are swimming. It will also help the kicking motion of the athletes who kick from their knees rather than their hips. They will learn to kick from their hips in order to better propel themselves through the water. The flutter board or noodle kicking will also help to improve the athlete's strength in their trunk and legs. When the strength in the athlete's trunk and legs is improved, it will help the athlete to be able to keep their lower body up in the water.

Another technique that the coaches were already using is to have the athletes use hand paddles. Using hand paddles will improve the athletes hand techniques. In some of the athletes, it is observed that they do not keep a flat palm but use punching or a closed fist when doing the front crawl. The hand paddles force the athletes to keep their palms flat, which help in making an improved swimming motion. If an athlete does not have access to hand paddles, small pieces of noodles could be used instead.

The coaches also have the athletes use flippers to practice their kicking. The use of flippers help athletes improve their kicking strength, ankle flexibility, body position, and it allows the athletes to go faster during practice. Flippers will increase their kick strength because there is more resistance in the water with the flippers meaning they would have to use more strength to propel themselves through the water.

During the practice, another activity that was used was the use of flutter board as a resistance. The flutter board was held perpendicular to the athlete's body in the water so that there is resistance created. The resistance created by the flutter board will help to increase the athlete's strength in their upper and lower body. It will also help work on the athlete's kicking as they will

have to use more strength and power in order to be able to swim against the resistance of the flutter board.

New Suggestions

The following are some suggestions that are made to help improve some of the biomechanics and fitness aspects of the warm up that the athletes may need to work on.

In order to improve the strength of the athlete's lower and upper body, as well as to help improve the athlete's kicking, the athlete's could hang onto the wall and practice their kicking motions and really focus on kicking from the hips rather than from the knees. Hanging onto the wall will eliminate the athlete's focus on the arm movements, and will help them just focus on what their legs are doing. If this is done for a good length of time, it will work on the strength of the athletes, which will in turn help the athlete's to be able to keep their legs up in the water, instead of sagging down. This exercise will also improve the core strength of the athlete.

In order to work on the athlete's breathing techniques and arm movements, the athletes could hang onto to the wall and go through the arm motions. If the athlete is not able to support their lower body while doing this, they could place a noodle by their ankles to support their lower body. Also, if the athlete does not understand the proper hand and arms motions, and breathing patterns, the coach could stand on the deck bent over at the waist and demonstrate the motions while holding a flutter board. Doing this will help the athlete to understand the basics and hopefully improve their arm motions and breathing techniques.

Warm-up Suggestions

As observed, the athletes mostly led the warm-up. This may make the warm-up more of a social time instead of being a serious time to prepare and warm-up the athletes bodies for the practice that they are about to perform. As well, the athlete's that are leading the warm-up may not know the proper stretches that need to be done. It would also be beneficial to have a coach

supervising the athlete's to ensure that all of the athlete's are participating. Another great suggestion made by the coaches is to start the warm-up before the pool time starts so that it does not take up too much time into the practice. For example, the coaches asked the athletes to be on the pool deck ready to warm-up at 7:50 pm so they can be in the pool at 8:00 pm when their practice time actually starts and make full use of the pool time.

During the warm-up, it would be good to see more dynamic stretching done. It was observed that a lot of static stretching was done, which is good as well. More of a variety would be good. For the static stretching, it is good to ensure that the arms, torso, neck, and legs be stretched, with more of a focus on the arms and legs (hamstrings and quads).

The following are some suggestions for dynamic activities that can be done. Lunges are good to warm-up the leg muscles, as well as work on the strength, flexibility, and endurance of the athlete's leg muscles. Deep water aqua fit exercises can be done as well. One idea would be to use a noodle as a bike, and have the athletes "bike" around the deep end. This will work on warming up the athlete's muscles, strength of the upper and lower body, and flexibility. Another idea is to have the athlete hold onto a noodle, and do vertical kicks with their legs in the water, which will work on warming up the athlete's leg muscles as well as work on the athlete's strength as well as the kicking motion needed for the front crawl stroke. Treading water with arms up is also a good warm up for the legs and works on the athlete's strength.

Cool-Down Suggestions

For the cool-down, dynamic and static stretching is suggested as well. Also, it is suggested to leave enough time at the end of practice for the cool down, as it was observed that not a lot of time was left, rather only a couple minutes were left at the end. Also, just as suggested for the warm-up, it would be beneficial to have a coach lead the cool down to increase the seriousness of it and to make sure all athletes are participating rather than fooling around. As observed, a lot of

the times the athletes were not participating as they figured it was just the end of practice and it is a time to socialize. It is a time to socialize but the athletes need to be stretching and cooling down while they socialize.

The following are some dynamic stretching ideas. The athletes could walk or run in the water across the shallow end a couple times. Also the athlete can stand in one place and bring the knee up to chest level and touch the opposite knee with their opposite hand. The athletes can lift their knees up to their chest or as high as they can for a couple minutes. Furthermore, they can perform jumping jacks and lunges in the water. Furthermore, the athletes can do a skiing motion where they are moving their arms and legs in the water as if they were skiing across snow.

For the static stretching, it should be performed after the dynamic stretching. Typical static stretches would include, hamstring stretches, quad stretches, arm stretches, and groin stretches. Furthermore, for the static stretching good stretches to include would be the standing chest stretch and the standing back stretch. These can be viewed at

http://www.calainc.org/Aquafitness/aquafit_movements.htm.

Suggestions for Each Level of Swimming

For the beginner level swimmers, it is suggested to go back to the fundamentals of the swimming, specifically to the arm, leg, hand and breathing motion of the front crawl. As observed, it seems like some of the athletes may not fully understand how to perform the proper movements. If the fundamentals are taught to the athlete's, it may help to improve their performance even just a little bit. Coaches need to be willing to help teach these athletes the correct technique as best as possible. A good website to look at for explanations on the basics of the front crawl is http://www.swim.ee/models/free_swim1.html. This website has descriptions as well as numerous pictures to show the different phases of the front crawl as well as the different positions of the arms, legs, hands, and body. Another good resource of coaches is to go to the

special Olympic swimming coach's guide,

http://sports.specialolympics.org/specialo.org/Special/_English/Coach/Coaching/Aquatics/Teaching/Freestyl.htm, for explanations and reminders for the front crawl swimming stroke. This is a wonderful resource teaching tool for the coaches and they need to make use of it.

For the intermediate level swimmers an improved warm-up may help to improve their level of swimming and energy level. As observed, a lot of the athletes complain of being tired throughout the practice, and usually take a lot of breaks throughout the practice. The endurance, strength and flexibility of these athletes need to be improved for improved swimming techniques. It would also be beneficial to look at the website previously stated in the above paragraph, http://www.swim.ee/models/free_swim1.html, for descriptions as well as numerous pictures to show the different phases of the front crawl as well as the different positions of the arms, legs, hands, and body of the swimmers as reminders for these athletes. It might also be beneficial to show the athletes this website so they can see for themselves what their body should look like if they are able to comprehend this.

For the advanced level swimmers, it is also suggested to have an improved warm-up, which will carry over into their swimming techniques. As well, it would be good to have some reminders once in a while for the form of their arms and legs. For these reminders you can go back to the website previously mentioned, http://www.swim.ee/models/free_swim1.html, for descriptions and reminders. As a coach you can also show the athletes these pictures and reminders so they can visually see it for themselves.

Conclusion:

As can be seen from our results from the observations and fitness testing, there is always room for improvement. It is important for coaches to use resources and techniques from other

coaches, as well as look into the biomechanics of the swimming movements. It is important to use updated resources to have a variety of well known techniques, and to ensure that the swimming techniques are being done properly, and so that the athletes are getting the coaching they deserve.

Overall, this was a great learning experience for both of us. We really enjoyed working with the athletes every week and getting to know them better, as well as helping and supporting them with their active lifestyles. We enjoyed learning new coaching techniques as well as learning how to work with athletes with disabilities. The coaches were inviting and accepting of our help. After this experience, we both would consider volunteering for Special Olympics again in the future.

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Appendix A:

First Name	Last Name	ID

Date	O Male O Female	DoB	Age (years) O Not sure
Event	Location	O Athlete O Unified partner	Sport

FLEXIBILITY

Note Positive (+) or Negative (-) cm

HAMSTRING - supine (passive) knee extension	
Left _____ degrees	Right _____ degrees
<input type="checkbox"/> Unable to test because athlete: O Refused to perform O Unable to perform O Unable to understand	<input type="checkbox"/> Education < -15o or asymmetry
CALF - supine (passive) ankle dorsiflexion	
Left _____ degrees	Right _____ degrees
<input type="checkbox"/> Unable to test because athlete: O Refused to perform O Unable to perform O Unable to understand	<input type="checkbox"/> Education < +10o or asymmetry
ANTERIOR HIP - Modified Thomas Test	
Left _____ degrees	Right _____ degrees
<input type="checkbox"/> Unable to test because athlete: O Refused to perform O Unable to perform O Unable to understand	<input type="checkbox"/> Education < -10o or asymmetry
SHOULDER - Apley's Test (Functional Shoulder Rotation)	
Left _____ cm.	Right _____ cm.
<input type="checkbox"/> Asymmetry	<input type="checkbox"/> Asymmetry
LEFT SIDE: RIGHT SIDE: O Within normal limits O Within normal limits O Less flexible than normal O Less flexible than normal O More Flexible than normal O More flexible than normal	LEFT SIDE: RIGHT SIDE: O Within normal limits O Within normal limits O Less flexible than normal O Less flexible than normal O More Flexible than normal O More flexible than normal
<input type="checkbox"/> Unable to test because athlete: O Refused to perform O Unable to perform O Unable to understand	<input type="checkbox"/> Education >15 cm between fingertips or asymmetry

STRENGTH

LEG MUSCLES - Times Stand Test (Functional Leg Strength) Time _____ seconds	
<input type="checkbox"/> Unable to test because athlete: O Refused to perform O Unable to perform O Unable to understand	<input type="checkbox"/> Education < 10 in 20 seconds
FOREARM AND HAND MUSCLES - Grip Test Dominant Hand: O Left O Right	
LEFT Trial 1. _____ kg. 2. _____ kg. 3. _____ kg.	RIGHT Trial 1. _____ kg. 2. _____ kg. 3. _____ kg.

_____ kg.		
<input type="checkbox"/> Unable to test because athlete: <input type="radio"/> Refused to perform <input type="radio"/> Unable to perform <input type="radio"/> Unable to understand		<input type="checkbox"/> Education see reference sheet
Muscle Fatigue After 300m swim (Front Crawl):		Time 1st 50m: _____ Time 6th 50m: _____

BALANCE

EYES OPEN Single Leg Stance Left _____ seconds Right _____ seconds	
<input type="checkbox"/> Unable to test because athlete: <input type="radio"/> Refused to perform <input type="radio"/> Unable to perform <input type="radio"/> Unable to understand	<input type="checkbox"/> Education < 20 seconds
EYES CLOSED OR COVERED Single Leg Stance Left _____ seconds Right _____ seconds	
<input type="checkbox"/> Unable to test because athlete: <input type="radio"/> Refused to perform <input type="radio"/> Unable to perform <input type="radio"/> Unable to understand	<input type="checkbox"/> Education < 10 seconds

Notes/ Recommendations: