

*Full Length Research Paper*

# Effects of a modified football program in improving foot-eye coordination among students with intellectual disability

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**Foot-eye coordination skill is important in football. In this study, the researchers developed and validated a modified football training program in improving foot-eye coordination in persons with intellectual disability (PID). The training program specifically focused on improving passing, dribbling and shooting skills. Passing accuracy and time were recorded as part of performance measures. Results show that there was improvement in foot-eye coordination skill. Results also suggest that the performance measure used in this program can help in assessing players for leveling purposes.**

**Keywords:** Foot-eye coordination, intellectual disability, football, shooting skills.

## INTRODUCTION

This research identifies the effects of a modified football program on passing, shooting and dribbling in improving the foot-eye coordination (a key skill in the game of football) of persons with intellectual disability (PID). It also gives a quantitative way of assessing aptitude of PID in playing football. This can be helpful in categorizing skills for leveling purposes.

The participants chosen for this research are students at the Pasig Special Children Educational Institute who are members of the school's football team. The school's football team was formed in 2010 following an invitation to participate in the beginner's category of the Special Olympics. The participants have not undergone any formal football training program. The selection criteria of the school coach were mainly based on the PID's interest in the game, behavior, and physical fitness; not much weight was given by the coach on the inclination towards the game of football in the selection process.

The base training program adopted in this research was aligned with the coach of the Claret school and UP men's football team. The program was modified by the

researchers for PID purposes. PID participants were asked to perform both a forward and a 45 degree angle pass at the end of each training day to assess the effectiveness of the training program in improving the foot-eye coordination. Passing accuracy and time were recorded as part of performance measures. The data taken from six training sessions suggests that improvement in foot-eye coordination skill was evident and that this program can be further enhanced and incorporated as part of formal PID football training program. Further, the results also suggest that the performance measure used in this program can be adopted as one quantitative way of assessing the skill level of PID players.

## Foot-Eye Coordination Activities/Skills

Football is the world's most popular sport. No other sport has its reach and impact (Special Olympics, 2012). Football or soccer is a football game in which the ball is advanced by kicking or by heading (butting with the head). Outside the United States the game is commonly called "football". The name "soccer" is a corruption of the term "association football" (Grandville, 1971).

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**Table 1.** Highlevel Training Program per Session

No.	Activity list per Session	Participant Involvement	Duration
1	Callisthenic warm up exercise (Dynamic stretching, Eye-foot coordination and Form warm ups)	Group participation	10 minutes
2	Modified Passing drill	Group participation	15 minutes
3	Modified Shooting drill	Group participation	15 Minutes
4	Modified Dribbling drill	Group Participation	15 minutes
6	Post drill measurements (Post test)	Individual take turns	10 minutes
7	Cool down exercises	Group participation	5 minutes

It is a known fact that foot-eye coordination skill is important in the game of football. It was confirmed at the Institute for Neurology in London that vision controls the movement of the foot. Foot-eye coordination skill allows players to make pinpoint passes, free kick with precision, fake out the defense, and dribble the ball. Foot-eye coordination also allows a player to stop a soccer ball with his foot and make adjustments to intercept the ball. The development of foot-eye coordination allows a player to keep his head up during ball handling (McClendon 2009).

Further, soccer requires the proper coordination of different body parts particularly the eyes, feet and the hand. Eye-hand coordination is important for goal keepers to prevent the ball from reaching the goal posts (Bhootra and Sumitra, 2008). While position or field players require excellent eye-foot coordination to accurately kick the ball to the right direction. The players' eyes provide their sense of direction and their feet move to follow that projected route. Vision is used as a feed forward control where the eyes fixate on the target position and interacts with the locomotor system to plan the next movement and produce a coordinated activity (Hollands and Marple-Horvat, 2001). Running, kicking and ball direction then become orchestrated to reach the same "goal".

## METHODOLOGY

The modified football training program used in this research was developed by one of the researchers following interviews with professional football coaches experienced in training football to children. The researcher solicited advice on drills that are known to be effective in improving foot-eye coordination in kids. The selected drills were one each for passing, dribbling, and

shooting. These were then modified for PID purposes with illustrations and task analysis added. Modeling was mainly used in demonstrating the steps and for correcting forms.

Warm up and cool down exercises were inserted at the start and end of each session to prevent injury. Table 1 above shows the sequence of activities lined up per training day and the estimated time allotted for each activity. Warm up and cool down exercises were carried out with all the participants at the same time. Passing, shooting, dribbling drills had to be carried out individually or by pairs. And post drill measurements were done individually.

At the first session, it was observed that PID participants easily get distracted and wandered if the waiting time for their turn to do an activity was long. To minimize the waiting time and to maximize the length of training period, all the modified passing, shooting, dribbling drills were held in subgroups and in parallel. The participants were grouped into three subgroups at the start of each session day. Grouping criteria was based on severity of exceptionality. Moderate and less moderate intellectual disability cases were not mixed to avoid boredom or loose focus. Each drill was supervised by at least one researcher who also coached the participants on the correct passing/dribbling/shooting form. Each drill was conducted between ten to fifteen minutes and five minute water breaks were inserted in between drill changes.

Post test data was taken after completing all the drills. Each participant was asked to make two types of passes (a front or forward pass and a 45 degree angle pass) towards make shift passing targets placed six meters from the ball start position and designated by two cone markers placed one meter apart. Participants were asked to make five tries at each passing angle in succession and their passing accuracy and time were

**Table 2.** Sample Data Capture Sheet

Participant Name	Tries	Front Pass		45 degree pass	
		Success (Y/N)	Time (sec)	Success (Y/N)	Time (sec)
Juan dela Cruz	1				
	2				
	3				
	4				
	5				
	Total	% of success	Average (sec)	% of success	Average (sec)

**Table 3.** Participant Attendance Breakdown

Participants		Session Dates							
Name	Age	31-Jan	2-Feb	6-Feb	7-Feb	9-Feb	15-Feb	17-Feb	Total*
Participant 1	16	X	X	X	X	X	X	X	6
Participant 2	15	X		X	X		X	X	4
Participant 3	13	X	X	X	X	X	X	X	6
Participant 4	15	X	X	X	X	X	X	X	6
Participant 5	14	X		X	X		X	X	4
Participant 6	16	X	X			X	X		3
Participant 7	16	X	X		X	X	X	X	5
Participant 8	19	X		X	X			X	3
Participant 9	10				X	X	X	X	4
Participant 10	18				X	X	X	X	4

\* total exclude pre-test date

recorded. Passing accuracy (ranges from 0.0 to 1.0) is represented by the percentage of successful passes over the number of tries. A pass is counted as successful if the ball goes between the make shift passing target after the kick. Time is measured (in seconds) from ball contact until it reaches the passing target. Time was recorded only for successful passes. The average time in each session was used in the performance measurement analysis. Pre-test data was taken at the first session day and data captured at the end of each subsequent session day served as the post-test data. Table 2 shows a sample of type of data that is recorded for each participant.

The program was administered at the picnic ground of the Pasig Rainforest park. The participants together with their primary caregiver assembled at the venue at around 3:30pm during each session day and the training and testing were conducted from 4pm until 5:30pm. For consistency, the researchers endeavored as much as possible to use the same location within picnic ground to set up and conduct the drills and the post-test. Further, the same researchers were assigned to handle each specific drill through out the duration of the program. Moreover, the persons in charge of measuring time and recording performance data were also kept consistent.

## RESULTS AND DISCUSSION

Excluding the pre-test date (31Jan2012), a total of eight training sessions was planned. However, only six sessions were successfully conducted; two were cancelled due to poor weather. Pre-test data was obtained at the first program day, but this was not used in the analysis as the measurement method was not well established at that time; only the data for the subsequent six session dates (where data capture method was consistent) were used. It is also noted that not all participants were able to complete the whole program due to absences. There was also one member who was replaced after two sessions due to a health condition. The data obtained for members listed in Table 3 was used in the analysis.

Further, to facilitate the performance improvement analysis, a calculated metric system called Performance Score was introduced. Performance Score incorporates the accuracy and time result captured per session day and is calculated as accuracy over the square of the average time ( $Performance\ Score = \frac{AccuracyRate}{AverageTime^2}$ ).

Accuracy number in this program is directly proportional

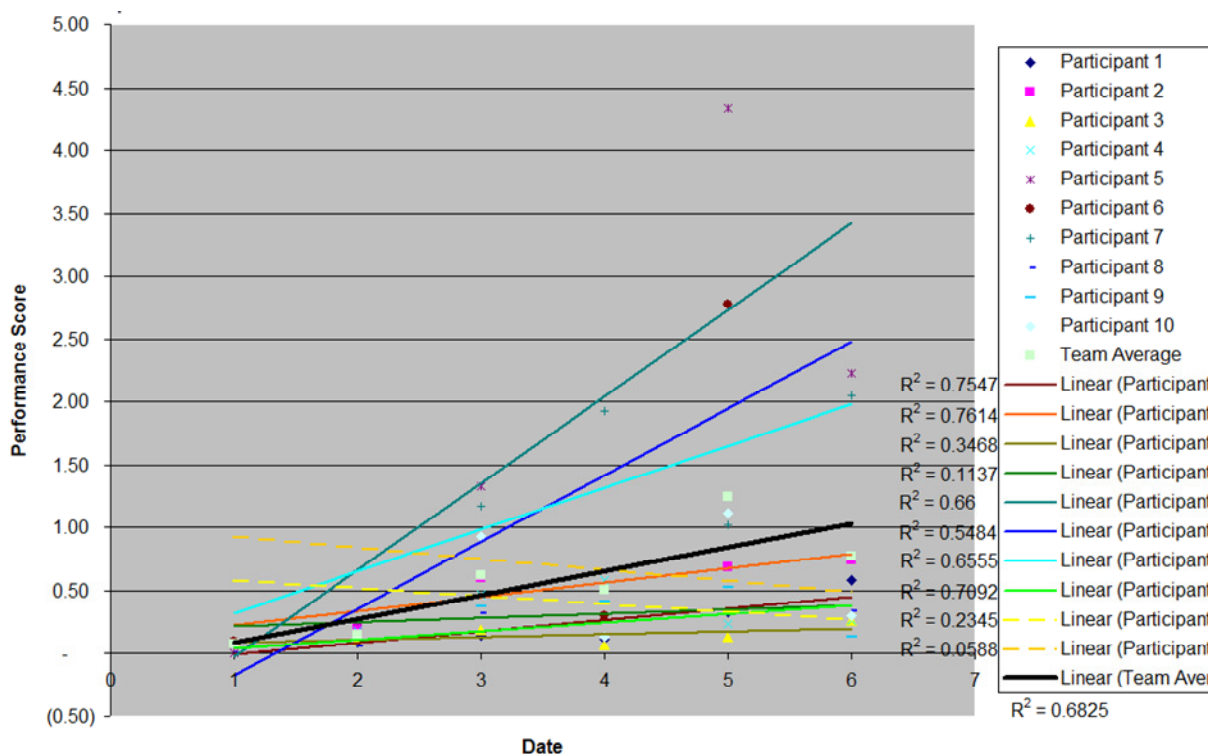


Figure 1. 45 degree Pass Performance Score

to improvement; the higher number means better accuracy. Time on the other hand is inversely proportional to improvement; the longer the time it takes to reach the passing target, the poorer is the performance. The square factor added to the average time ( $AverageTime^2$ ) is intended to increase the sensitivity or weight of the time measure. The maximum Performance Score for a football varsity player using the same measurement setup is estimated to be around 6.25 (1.0 in accuracy and 0.4 seconds average time per pass).

The Performance Score for 45 degree pass is presented in Figure 1. The vertical axis shows the Performance Score calculated for each of the six session dates in the horizontal axis. Linear regression trend lines were added to the chart to easily view the performance improvement trend of each participant. The  $R^2$  or the least-squares of the trend line is also displayed in the chart to view the relevance.

The linear trend lines for eight out of the ten participants are showing positive trend, which means performance is improving as the session progresses. The two participants with negative trend were late additions to the team. They did not have the benefit of the more rigorous coaching done in the earlier sessions, which could explain why their Performance Score were not at par with the rest. Another reason is the researchers/coaches were giving instructions mainly using right foot kicking stance and being the only two left

foot kicking participant in the program, they might have had a difficult time processing the instruction.

There were six participants with  $R^2$  above 0.5, which means there is moderate to strong linear relationship between their Performance Score and the timeline. This suggests that if these participants continue the training program, it is very likely that their Performance Score will improve further.

In addition, the trend line for three participants were exceptionally higher than the rest of the group; namely Participant 5, Participant 6 and Participant 7. These three participants were clearly above the pack with regard to passing ability even for non-football experts; their passes were accurate and very fast. This suggests that the Performance Score measurement can be used as one quantitative factor for categorizing the players when doing team leveling.

The results for front or forward passes were not as good compared to 45 degree pass. Since passes had to be made using the inside of the foot, the 45 degree angle pass can be delivered at a more natural stance; the participants do not have to twist their body as much as when doing a front pass. This suggests that further task analysis may be required to effectively instruct the correct form when doing front passes.

Unavoidable changes in weather may have also affected the performance of the participants. Session five was for example particularly windy. Dust getting into

participant's eyes, and the ball, which was set at the start position, slightly moved just when the participant was about to kick, were some of the incidents that distracted the participant's concentration during post-test. Another factor is the uneven surface in some portions of the picnic ground used. If the ball was not kicked hard enough and it rolls over an uneven portion, it will swerve and miss the passing target even if the initial ball direction was correct.

Modeling was mainly used in delivering instructions to PID participants in this study. It was observed that participants got confused during the first few sessions of post-testing because more than one person is "coaching" them on how/where to kick the ball; the researchers made adjustments from the second session onwards and made conscious efforts to limit the person giving verbal instructions. From the third session onwards, the participants have been given free reign on when they want to kick the ball during post testing; "kick start cues" from the timer has been removed.

Participants generally seem to respond more positively to drills when they are working together with a co-participant rather than just with the instructor/coach. Select participants were also asked to mentor their peers in some of the drills. To be appointed as mentor served as positive reinforcement to the participant as they aimed to perform better when their turn comes. From the third to the last session, it was observed that the participants seem to take the drills less seriously. This was likely due their familiarity/boredom of the routine. To counter this, one of the researchers was tasked to engage participants in soccer play while waiting for their turn in post-testing and this proved to be a good way of keeping them focused in the session.

Six of the ten participants have been members of the school football team since the team was formed. They have been playing in the team for two years now and they have also participated in the Special Olympics in Football Games last year. The six participants are Participant 7, Participant 5, Participant 6, Participant 2, Participant 1, and Participant 8. The other four, who recently joined the team and have been members for three months, are Participant 4, Participant 3, Participant 9 and Participant 10. Participant 10 and Participant 9 missed half of the total training sessions. Participant 10 was absent due to sickness while Participant 9 came in late to replace another participant because of a health condition.

Among all the participants who are new in the team, Participant 4 exhibited moves which are typical of a beginner in the game. As the training progressed he gradually showed improvements and was able to follow and execute simple instructions given during the training. He was also observed to sometimes exhibit mood changes when bored and frustrated. However, he was generally manageable and cooperative during the training.

Participant 8 started the training with a sprained right ankle which was acquired in a game the previous month. Participant 2 displayed good playing form but performed inconsistently during the training due to lack of focus. Both Participant 8 and Participant 2 were not able to complete all the training sessions.

Participant 1 performed well in the training but not consistently. He was usually distracted and always offering comments on the other participants but can perform better when directed to focus on the activity. Participant 3, being one of the beginners in the team, was gradually learning and acquiring confidence in the game by patiently following instructions during the training.

Generally, the participants exhibited restlessness which was evident with Participant 7, and Participant 2 among others. But with some modification in the program, the group's restlessness was addressed during the course of the training.

### **Individual Behavior and Performance Observations**

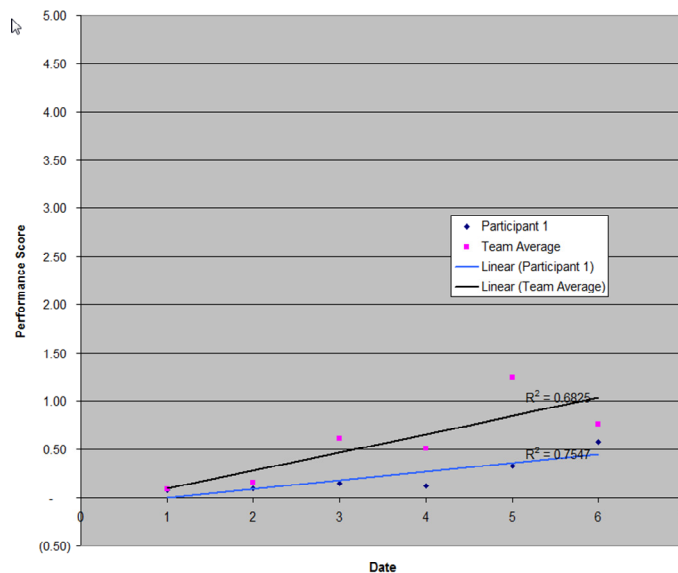
This section documents the detailed observations for each participant presented side by side their individual Performance Score for the 45 degree pass. For ease of comparison, team average Performance Score trend line is also included in the charts; individual's trend line is shown in blue and team average is in black.

#### **Participant 1**

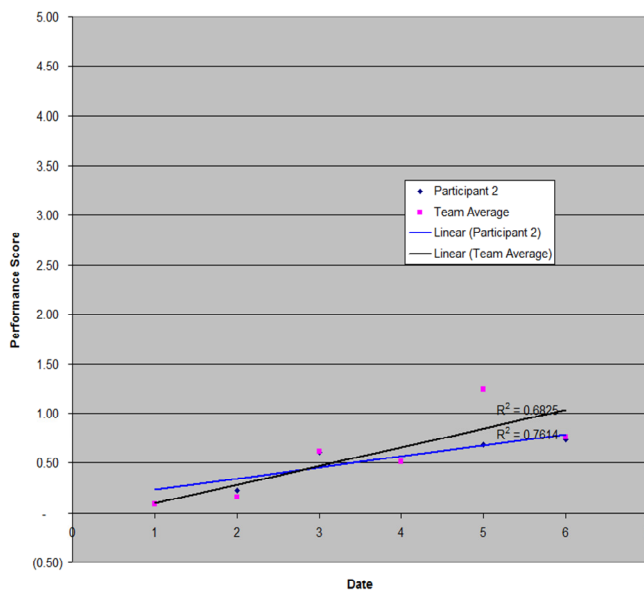
He always talks to the coaches. He asks if they will start training already. He follows the instructions of the coaches and repeats it to his teammates. He asks teachers if he can help in getting the ball or in fixing the equipment needed. He smiles when doing the drills and the test. During passing drill, he would instruct his partner to position himself or to look at the ball. He would pass the ball successfully with a one meter distance from the marker, but more than one meter, he has difficulty in hitting the marker. He listens to the signal when doing the test. Coach C needs to do modeling slowly and with keywords (verbal prompts) when doing the test (Figure 2).

#### **Participant 2**

He always gets near the coaches especially to female coaches. He often has a smile for everyone. He comes urgently when called. During the drill, he would pass the ball too hard, but he does this using the correct form. He passed the ball with moderate frequency of successful pass through the marker. On the first and second session, he has difficulty following the timer's signal. He



**Figure 2.** Performance score for participant 1



**Figure 3.** Performance score for participant 2

is able to control himself and wait for the signal with the remaining sessions. He would verbally assist his partner in the drill. He would tell his partner to return the ball to him or what color of the marker to be passed through/ hit (Figure 3).

### Participant 3

He jokes his partner when his partner's pass was not able to pass through the marker or the ball is too slow.

The coach needs to demonstrate slowly with fewer words. He looks at the demonstration intently but the coach needs to hear verbal feedback or see a nod from him to assure that he understands the direction. He has difficulty passing the ball to Coach W. He has low frequency of successful pass in the test (Figure 4).

### Participant 4

He would often go near and smile to the coaches. He

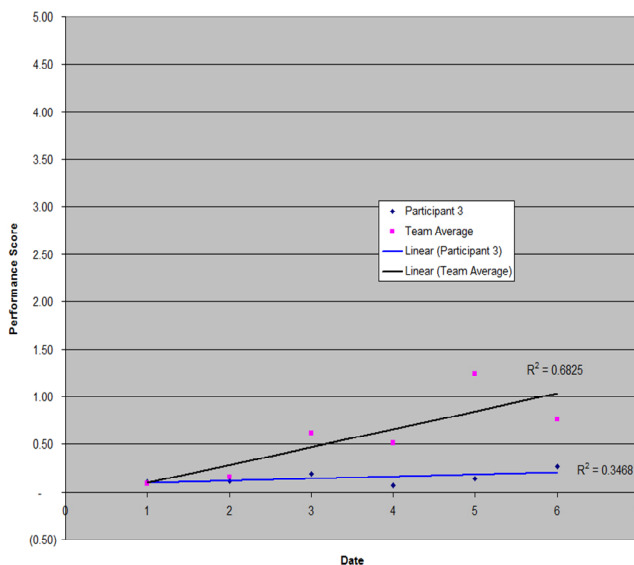


Figure 4. Performance score for participant 3

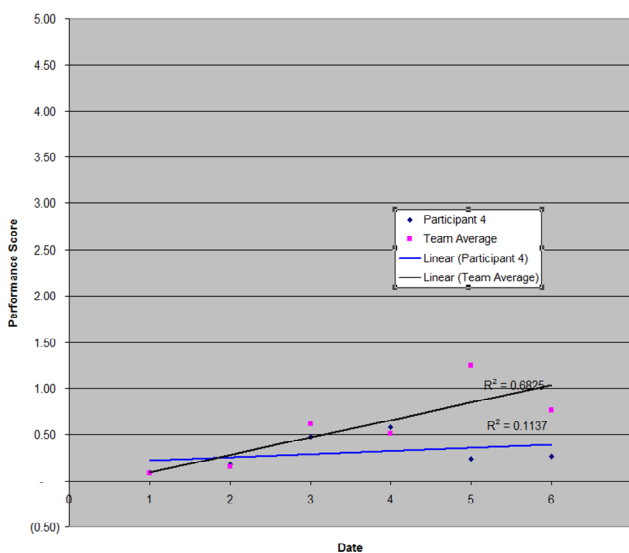


Figure 5. Performance score for participant 4

would repeat Coach C’s verbal direction. During the drill, he has difficulty identifying the colors of the markers. He would repeat the color told by the coach. Though he has difficulty receiving/stopping the ball in the drill, he would often pass the ball successfully to Coach W during test (Figure 5).

**Participant 5**

He passes the ball very fast. He was able to pass the ball through the markers. He stops/ receives the ball

accurately. Coach C models the correct form in passing the ball. He passes the ball with straight body and straight knees. He gets almost perfect score in the tests. He waits for the timer’s signal before passing (Figure 6).

**Participant 6**

He is the de facto leader of the team. His teammates revere to him when the school coach is not around. He is silent when the coaches are around. He jokes around with his teammates. During demonstration, he does not

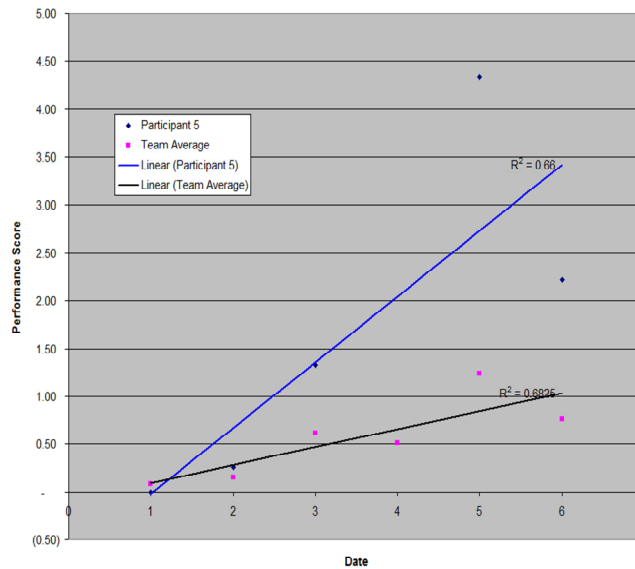


Figure 6. Performance score for participant 5

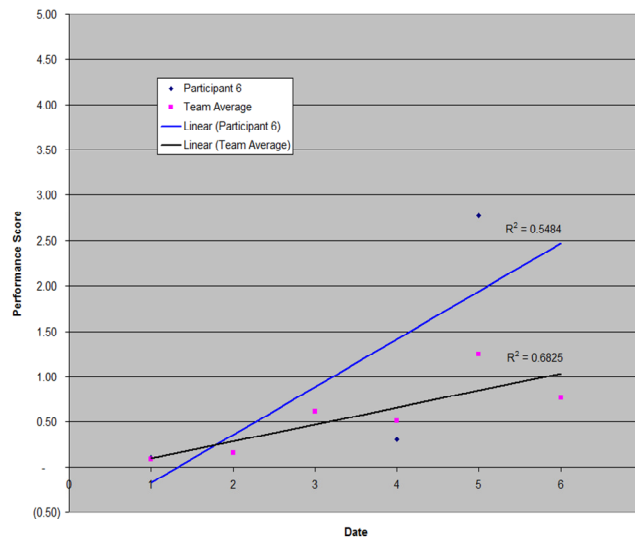


Figure 7. Performance score for participant 6

look at the feet for a long time. Coach C uses minimal verbal instruction and a faster demonstration. He does the passing form correctly. He easily stops the ball passed by his partner (Figure 7).

**Participant 7**

He does the test fast. During the passing drill, he would often hit the marker. His partner would always pick up the ball because Participant 7 would pass the ball hard. His partner would often pick up the ball he passed. He

goes out of his place when not doing the drill. He would go back to his place but walks slow when prompted by the school coach or the coaches. He steps back when he's near his female coaches and appears to have a strong aversion to touch. He is often successful in the test (Figure 8).

**Participant 8**

He was given slow verbal direction and slow modeling. He easily stops the ball passed by his partner. He has



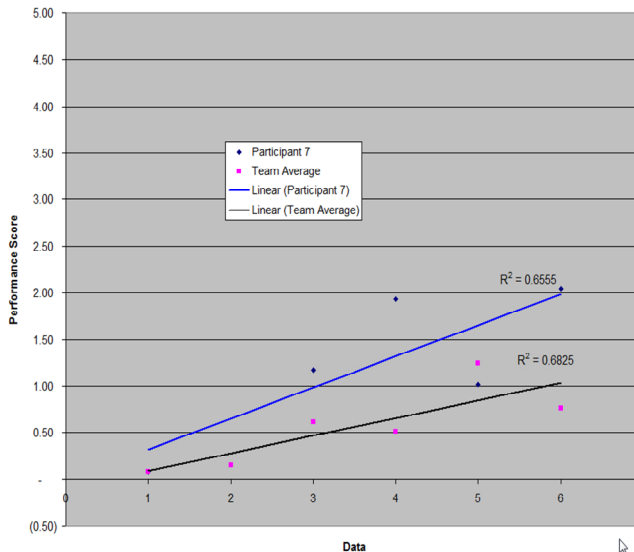


Figure 8. Performance score for participant 7

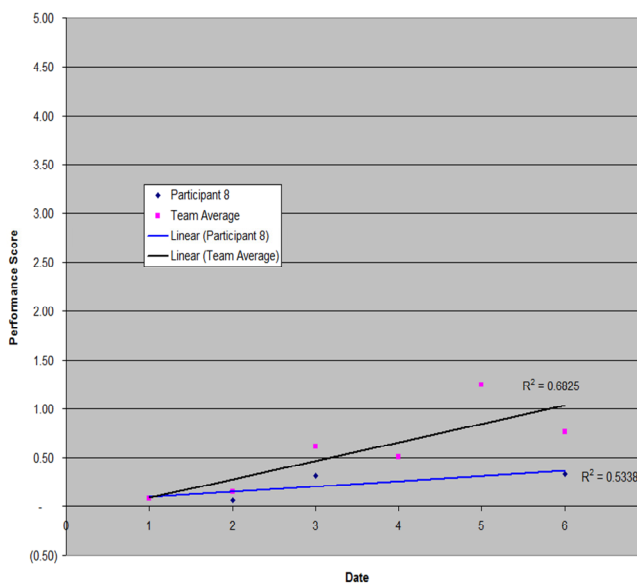


Figure 9. Performance score for participant 8

difficulty passing the ball through the marker. He verbally corrects his partner in passing. Coach C would always ask him to stay/wait in his place. He talks to other students doing other drills when waiting. He does the slalom in such a good form that Coach W would ask him to mentor his peers. This in turn motivated him more (Figure 9).

**Participant 9**

Coach C speaks to him in a regular pace. He focuses on the demonstration by Coach C. He would use his left leg

in passing the ball even if the coach accidentally demonstrated using the right leg. When he passes the ball during drills and tests, he often gets off balanced. He positions the ball properly to make sure that it will pass through the marker. He smiles when he is able to do the drills and test perfectly. He would be heard counting the successful pass at the end of the each training (Figure 10).

**Participant 10**

He is the goal keeper of the team, but his ball handling

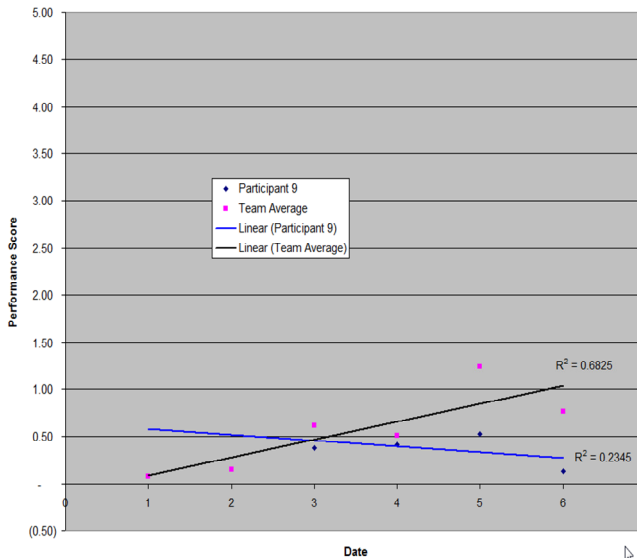


Figure 10. Performance score for participant 9

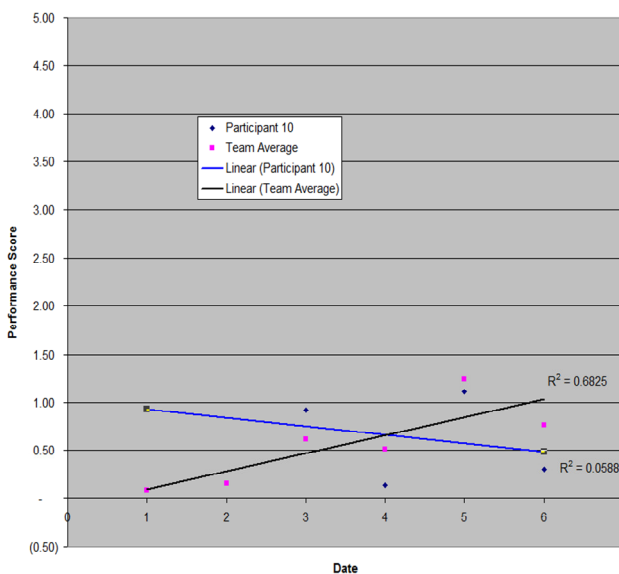


Figure 11. Performance score for participant 10

skills are good. He keeps his focus on the demonstration. He mumbles when he is not able to pass the ball correctly. He speaks at the same time when Coach C is instructing him what to do in the test. He would kick without signal from the timer. He smiles often to coaches (Figure 11).

**RECOMMENDATIONS AND CONCLUSIONS**

The ability to make pin point passes is a legitimate indicator of good foot-eye coordination skill based on the

research done at the Institute for Neurology in London (R.F. Reynolds, 2005). This was observed among the participants of the study. The researchers through the help of professional football coaches developed a modified football training program for PID that focuses on improving foot-eye coordination through passing/shooting/dribbling drills. A calculated metric called Performance Score was introduced in this paper to represent the combined impact of the passing accuracy and time required in making a pass. While only six sessions were conducted and measured, the results indicate that the program was effective in improving the

**Table 4.** Performance Score table

Time	Passing Success Rate				
	0.2	0.4	0.6	0.8	1.0
0.40	1.250	2.500	3.750	5.000	6.250
0.45	0.988	1.975	2.963	3.951	4.938
0.50	0.800	1.600	2.400	3.200	4.000
0.55	0.661	1.322	1.983	2.645	3.306
0.60	0.556	1.111	1.667	2.222	2.778
0.65	0.473	0.947	1.420	1.893	2.367
0.70	0.408	0.816	1.224	1.633	2.041
0.75	0.356	0.711	1.067	1.422	1.778
0.80	0.313	0.625	0.938	1.250	1.563
0.85	0.277	0.554	0.830	1.107	1.384
0.90	0.247	0.494	0.741	0.988	1.235
0.95	0.222	0.443	0.665	0.886	1.108
1.00	0.200	0.400	0.600	0.800	1.000
1.05	0.181	0.363	0.544	0.726	0.907
1.10	0.165	0.331	0.496	0.661	0.826
1.15	0.151	0.302	0.454	0.605	0.756
1.20	0.139	0.278	0.417	0.556	0.694
1.25	0.128	0.256	0.384	0.512	0.640
1.30	0.118	0.237	0.355	0.473	0.592
1.35	0.110	0.219	0.329	0.439	0.549
1.40	0.102	0.204	0.306	0.408	0.510
1.45	0.095	0.190	0.285	0.380	0.476
1.50	0.089	0.178	0.267	0.356	0.444

Performance Score above 1.0

foot-eye coordination skill of PID participants. This was validated by reviewing the trend in their Performance Score for the duration of the program.

Specifically, eight out of the ten participants showed positive improvement trend in their Performance Score. The two that had negative improvement trend were the only left foot kicking participants in the group and were likely confused because instructions were dominantly carried out using the right foot kicking stance, plus the inability of the coaches to model how a left foot pass should be done also contributed to the results. This underscores the importance of doing needs analysis and tasks analysis that meets the requirement of the audience.

It was also observed that three of the participants' Performance Scores were exceptionally better than the rest. These three participants began to show exceptional performance after the third session and their average Performance Scores were above 1.0. This suggest that while Performance Score cannot be used for evaluating the full facet of physical performance in football players like F-MARC test (Rösch D et al., 2000), it can be used however as one potential quantitative measure in determining the aptitude of PID towards football or it can be used for player/team leveling. Table 4 shows the possible Performance Score figures for each accuracy rate and time combination. An initial discrimination line can be drawn at Performance Scores of 1.0 and PID that scores above the discrimination line (highlighted in

yellow) after six sessions can be a good candidate for further football training.

As a next step, it is suggested that the modified football training program and the performance measurement scheme used in this study be incorporated into the football program in PID groups or schools that are interested in developing a football team that will participate in the Special Olympics. This program will help improve foot-eye coordination of the players and the assessment methodology can help identify PID that are better fit for their football program. It is further suggested that the implementation be done at a proper football field. This way adverse environment factors that could affect performance can be minimized, plus the participants can get familiar with the actual competition field conditions.

#### REFERENCES

- Bhootra AK, Sumitra (2008). Elite sports and vision an introduction to implications of vision in sports. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd.
- Glandville B (1971). Soccer. [In] W. Halsey (Ed), Collier's Encyclopedia: With Bibliography and Index. Vol. 21. New York: Crowell-Collier, 1971 Print
- Hollands MA, Marple-Horvat DE (2001). Coordination of eye and leg movements during visually guided stepping. *J. Motor Behavior*, 33(2), 205-216.
- Reynolds RF, Day BL (2005). Retrieved from [http://www.eurekalert.org/pub\\_releases/2005-01/cp-fcv012105.php](http://www.eurekalert.org/pub_releases/2005-01/cp-fcv012105.php)
- Rösch D, Hodgson R, Peterson TL, Graf-Baumann T, Junge A, Chomiak J, Dvorak J (2000). Assessment and evaluation of football performance. *The Am. J. Sports Med.* 28(5 Suppl):S29-39.

Special Olympics Global Football (2012). Retrieved from [http://www.specialolympics.org/global\\_football.aspx](http://www.specialolympics.org/global_football.aspx)

Tara McClendon (2009). Retrieved from <http://www.livestrong.com/article/11325-need-footeye-coordination/>