

# **Teaching Games for Understanding: A study of U19 college soccer players improvement in game performance using the Game Performance Assessment Instrument**

**Stephen Harvey**  
Loughborough University  
UNITED KINGDOM

## **Abstract**

The purpose of this paper was to examine whether Teaching Games for Understanding (TGfU) could be utilized to improve specific aspects of game involvement and game performance in soccer using the Game Performance Assessment Instrument (GPAI). The study involved 16 participants aged 16 – 18 years who were part of a soccer development squad at a Further & Higher Education Institution. Players' game performance in a modified game situation was analyzed from videotapes before, during and after the study. The modified game involved three central defenders working together to implement several defensive strategies. The GPAI was used to analyze the individual game components of skill execution, decision-making, adjust and cover. Results indicated a gradual improvement in game involvement and a marked increase in game performance over the course of the study. These findings suggest that a game-centered approach has the potential to improve players' performance. However a particular challenge for further research is how TGfU might be developed to assist players to work together in small groups within modified and normal games contexts to implement defensive and offensive strategies in invasion games.

## **Introduction**

Since the introduction of the TGFU model by Thorpe & Bunker (1982) it has growing research attention due to its potential to (a) facilitate the development of technical skills (Lawton, 1989); (b) promote the development of tactical knowledge (for example see, Griffin, Mitchell & Oslin, 1995; Butler, 1997; Grehaigne, Godbout & Bouthier, 1999; Rovegno, Nevett & Babiarz, 2001); (c) assess the tactical transfer across games (Oslin & Mitchell, 1998); teachers perceptions of the TGFU approach (Turner, 1996b); and (d) design ways to assess game performance, that has attracted most of the research in this field (Oslin, Mitchell & Griffin, 1998; Grehaigne, Godbout & Bouthier, 1997). A study involving the Manchester United Academy under 9 year old players by Fenoglio (2003) found that 4 V 4 small sided games provide 585 more passes, 481 more scoring attempts, 301 more goals, 525 more 1 V 1 encounters and 436 more dribbling tricks when compared to 8 V 8 games. The Victorian Soccer Federation (VSF) also published a game centered program of teaching and coaching (Greener, 2003) called Rooball which uses many developmentally appropriate small sided games to help youngsters develop their game play in soccer. Other studies have looked into developing the original TGFU model so it is more applicable in today's sports loving societies (Australian Sports Commission 1997a; Griffin, Mitchell & Oslin, 1998; Holt, Streat, & Bengoechea, 2002; Kirk & McPhail, 2002).

Despite the growing interest in “game sense” from national and international governing bodies such as the Rugby Football Union & Soccer Association in England, the Australian Coaching Council, however, traditional skill and drill sessions remain common in youth sport settings. Therefore in order to address the need for new avenues of effective instruction in teaching and learning (other than the traditional approach) for physical educators and coaches the present study was aimed at providing empirical support for TGFU instruction by assessing improvements in players game involvement and performance using the GPAI, and continue the work of Griffin, Mitchell & Oslin (1998). The results could therefore be utilized to demonstrate that TGFU indeed can be a valuable way of instructing children in the physical education arena. It also sought to provide new knowledge about the use of a TGFU approach to teaching older and more experienced players. It set out to find out whether a period of intense teaching using the games for understanding approach would improve performances in soccer players aged 16 – 18 years who were affiliated to a local further education college development squad program and had between 7-10 years of playing experience. The GPAI assessment tool (Griffin, Mitchell & Oslin, 1988) was used in the present study to analyze a small unit of player’s game involvement and game performance. Earlier, Griffin, Mitchell & Oslin (1997) had noted three main reasons for the use of this approach to teaching games in contrast to the more technique-based drill practice approach. They included (a) the fact that the children were actually playing a game and this fostered the learning of new skills in this environment, (b) empowerment (aiding the children to learn for themselves and take this responsibility), and (c) the affective domains of fun and enjoyment in playing games.

### ***Research questions***

The current study was aimed at providing knowledge on differing ways to analyze game performance using the GPAI and continue the work of Griffin, Mitchell & Oslin (1998). It also sought to provide new knowledge about the use of a TGFU approach to teaching older and more experienced (in terms of years playing soccer and level of play) players. Hence, the purpose of this present study was to find out whether a period of intense teaching using the games for understanding approach would improve performances in soccer players aged 16 – 18 years. The specific research question to be answered in this paper was:

- Does the TGFU approach improve game performance (as measured using GPAI) for this group of youth soccer players? (Quantitative dimension)

### **Methodology**

#### ***Participants***

The 16 participants (aged 16-18) involved in this study were all affiliated with a soccer development squad at a local further education institution in Great Britain. All had 7 to 10 years of experience playing soccer. The group was divided into a group of six defenders with the remaining players left being members of the attacking group. The defenders were the participants involved in the observations with the Game Performance Assessment Instrument (GPAI).

### **Scheme of Work**

Several meetings with the coach of the group were held to decide the content of the 12 sessions of instruction, and help the coach find out more about the TGfU approach to games teaching. The coach watched the 'Game Sense' videocassette Australian Sport Commission (1997a) and read Chapter 13 of the 'Instructional Models in Teaching Physical Education' text by Michael Metzler (2000) about how to apply the instructional sequences of TGfU.

The period of testing lasted six weeks. There were 12 lessons (60 minutes each) on a Monday and Tuesday. Due to the setup of the Scheme of Work (see Table 2.0 below) for this block of teaching, each session focused on a particular concept of the overall theme. The overall theme chosen was 'defending as a three' in soccer, as in a 3 – 5 – 2 defensive system, or as a "UNIT OF THREE."

**Table 1.0: Scheme of Work used in the study**

<b>Session Number</b>	<b>Date</b>	<b>Session Content</b>
1	Monday 8 <sup>th</sup> April	<b>Initial Assessment</b> <b>Session 1</b> 3v3 Games
2	Tuesday 9 <sup>th</sup> April	<b>Session 2</b> Closing Down
3	Monday 15 <sup>th</sup> April	<b>Session 3</b> <b>Marking</b>
4	Tuesday 16 <sup>th</sup> April	<b>Session 4</b> <b>Covering</b>
5	Monday 22 <sup>nd</sup> April	<b>Session 5</b> <b>Dealing with Crosses</b>
6	Tuesday 23 <sup>rd</sup> April	<b>Mid Term Assessment</b> <b>Session 6</b> Restriction of Space & 3v3 Games
7	Monday 29 <sup>th</sup> April	<b>Session 7</b> Defending the Final 3rd
8	Tuesday 30 <sup>th</sup> April	<b>Session 8</b> <b>Marking</b>
9	Tuesday 7 <sup>th</sup> May	<b>Session 9</b> <b>Covering</b>
10	Monday 13 <sup>th</sup> May	<b>Session 10</b> <b>Dealing with Crosses</b>
11	Tuesday 14 <sup>th</sup> May	<b>Session 11</b> 11 v 11 Full sided Game
12	Monday 20 <sup>th</sup> May	<b>Final Assessment</b> <b>Session 12</b> 3 v 3 Final Assessment Games

Each of the sessions seen in the Scheme of Work in Table 1.0 began with reference to an initial game form. This was a simple game that introduced the concepts that could be referred to throughout the session. This was then progressed as the players were asked questions and provided with a set of new challenges by the coach during the rest of the session. This basic format followed the outline presented on the 'Game Sense' videotape (Australian Sports Commission, 1997a) and is highlighted below:

1. Warm-Up
2. Game
3. Questions & Challenges
4. Game

5. Further Questions & Challenges
6. Progression of Game
7. Repeat Cycle

Finally in the last three sessions of the Scheme of Work a second game form was played for three 'key aspects' in order to "spiral the sessions" and put the players under more pressure. Spiraling the sessions refers to when the same sessions are repeated later in a scheme of work. In this case the sessions were repeated but the students were set new challenges as per the above model from the Australian Sports Commission. The three topic areas that were considered 'key aspects' of the game concept, those of marking, covering and dealing with crosses and these were the sessions that were spiralled in sessions eight, nine, and ten (see Table 1.0). A full version of the game was also played in session 11 to assess the defensive players' understanding of the concept of "defending as a unit" in a parent game version of soccer.

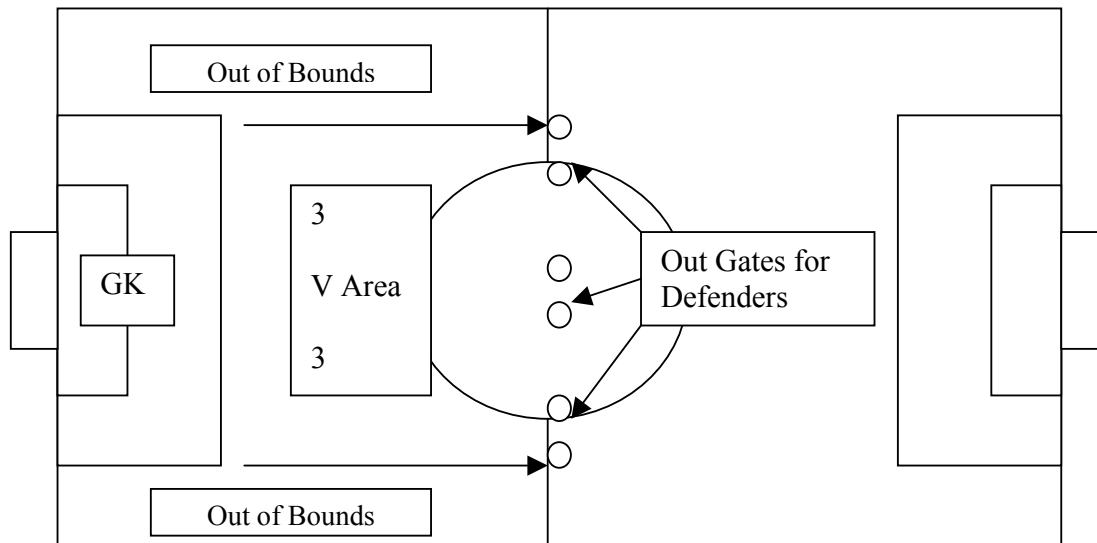
### ***The Assessment Game – development and procedure***

The coach and the author developed the game from which the assessments for the GPAI would be conducted. It was a 3 V 3 attack versus defense game played on half a soccer field to the width of the 18 yard box (see figure 1.0 below). Using the GPAI allowed for measurement of game involvement and game performance of the three defending players **AS A UNIT OF PLAYERS**. This was a unique element to this present study. Pre, mid and Post assessments of the players were made as aforementioned game component. The assessment games were video taped using Canon 550MVi video camera; this included the 11 v 11 game in session eleven of the study.

In terms of analysing the game components, the videotape of each assessment game was played and split into 'plays'. A 'play' was described as "*one attack by the attacking team which culminated in a goal or goal shot, or a successful clearance by the defenders over the end line or sideline or one of the defenders passing or running the ball through one of the three outlet gates*". Each play was watched four times by the author and the coach in order to analyse it for each of the four game components. As the play progressed on the VCR the observer marked a tally each time the players made an appropriate or inappropriate decision. For example on play one in the pre-test assessment, on the decision making component, the researcher and the coach both noted three appropriate and one inappropriate decision. This format continued until all the plays had been ran through and analysed. In the pre-test assessment there were 18 plays, the mid-term assessment there was 20 plays and with the post test assessment there was also 20 plays.

The plays were assessed independently by the observers. Afterwards an inter-observer reliability test was conducted between observed scores from the author and coach (both UEFA 'B' Licensed soccer coaches). Results indicated high in both the pre-test assessment (0.82) and post-test assessment (0.80).

**Figure 1.0: A diagrammatic representation of the 3 V 3 assessment game used in the study.**



**Data Collection (GPAI - Game Components)**

Using the GPAI allowed for measurement of **game involvement (GI)** and **game performance (GP)** of the three defending players (see below). Griffin et al (1998) identify seven 'Game Components' in their validation paper and utilized three of these components for the validation of the system.

In this particular study, after discussion with supervisors and the coach, four game components were selected, including adjust, decisions made, skill execution, cover (see Table 2.0 for definitions). These four components were chosen to best represent what the unit of three defenders was trying to achieve in the game chosen for this study and were all related to the defensive aspects involved in the assessment game. Short descriptors for these game components were devised to allow for analysis of the assessment game (see later 'assessment game' section).

**Table 2.0: The GPAI modifications and definition for “defending as a UNIT of three players” in soccer.**

<b>Game Component</b>	<b>Criteria</b>	<b>Index Calculation and example from pre-test assessment</b>
<b>Skill Execution</b>	Technique in the context of the game situation, e.g. correct movement to or away from the ball, altering body position etc.	SEI = Appropriate Skill Executions / Inappropriate Skill Executions, e.g. SEI (28/18) = 1.56
<b>Adjust (Defending)</b>	The players move keeping their distances from each other as the ball moves. Must remain a maximum of ten yards apart (defending ONLY).	AI = Appropriate Adjusts / Inappropriate Adjusts, e.g. AI (19/11) = 1.73
<b>Cover (Defending)</b>	The two players not involved “on the ball” provide support for the 1st defender who travels to the ball.	CI = Appropriate Covers / Inappropriate Covers, e.g. CI (15/15) = 1
<b>Decision Making</b>	<p>Players make appropriate choices about what to do when in possession of the ball:</p> <p>a) Players pass to an open teammate, run ball through an open goal or clear the ball to the side. Players make appropriate choices about what to do when not in possession of the ball:</p> <p>b) Players close attackers down to win possession, by acting as the first defender to the ball, the second supporting defender or the third cover defender.</p>	DMI = Appropriate Decisions Made / Inappropriate Decisions Made, e.g. DMI (30/23) = 1.30

**Target Variables (Game Involvement & Game Performance)**

**Game Involvement Index (GI Index)** was calculated as follows (see example):

Total number of appropriate responses (30+28+19+15) + total number of appropriate skill executions (28) + total number of inappropriate skill executions (18) + total number of appropriate decisions (30) = 168.

The **Game Performance Index (GP Index)** was calculated by dividing the total scores of the four individual game components by four (see examples in Table 2.0 for individual game component calculations). GP (continuing using the example from the pre-test analysis) was calculated using all of the results from each of the four indices highlighted in Table 2.0 to give a figure of 1.4.

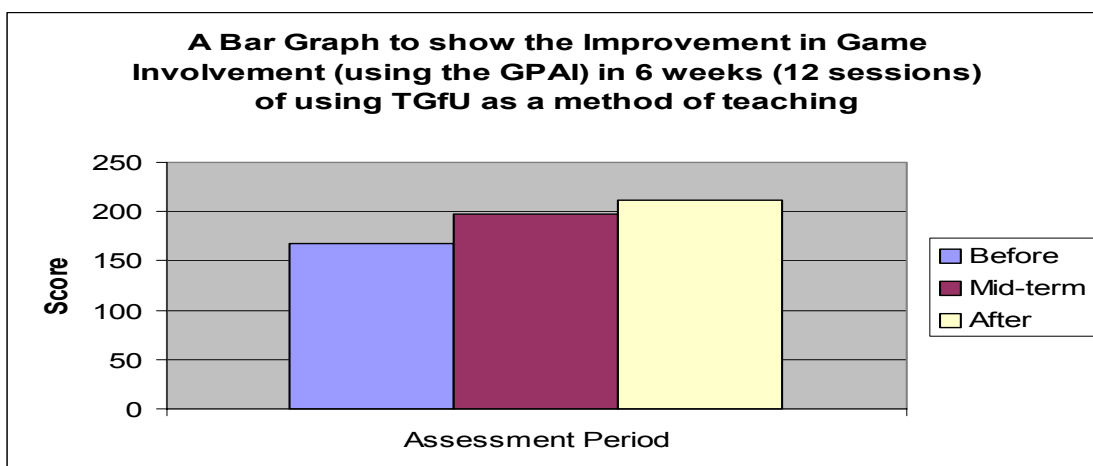
The GP and GI indexes were calculated for pre, mid-term and post-test assessments and the results compared to assess improvement over the 12 sessions of implementing a TGFU approach to teaching the players in this study (for specific results see Table 3.1 in the results section).

## Results & Discussion

### **Game involvement**

In terms of the TGFU approach improving the GI for this group of youth soccer players some evidence suggested that this is true, especially the results shown in tables 3.0 and 3.1 below. Indeed the GPAI results revealed a high involvement on the GI index by the end of the 12 sessions (see figure 3.0). GI rose to 211, from 168 throughout the duration of the study (mid-term GI index 187). The increase in GI is reflected in figure 2.0. High GI results are a positive aspect of the present study because high GI essentially is a prerequisite for subsequent improvement in game performance. That is, it allows them to have more experiences in game play in which to learn and progress their skills. Indeed Grehaigne et al (1997) focus on game involvement in the first level their Team Sport Assessment Procedure (TSAP). This first level reveals the “volume of play” that the students have within a game, such as conquering the ball and receiving the ball. The second level of the TSAP then assesses the player’s game performance, which they label the “efficiency index” and this is comprised of lost balls, neutral balls, and successful shots and passes. Because the volume of play is subsequently divided by the efficiency index it makes sense that more involvement increases their chances of a higher score on this assessment procedure. It could be suggested that the high GI index observed in the present study may be due to the fact that the players entered the study with some previous experience of match play in training and competitive match play.

**Figure 2.0: Changes in Game Involvement over the 12 Sessions (60 minutes) of Training**



### **Game Performance results**

As far as the individual constructs that make up GP from the GPAI were concerned, all of these improved over the course of the study (see Figure 2.1 below). The DMI results showed a large change from 1.3 to 4.5. Players made slightly more appropriate decisions (30 – 36), but markedly less inappropriate decisions (36 – 8).

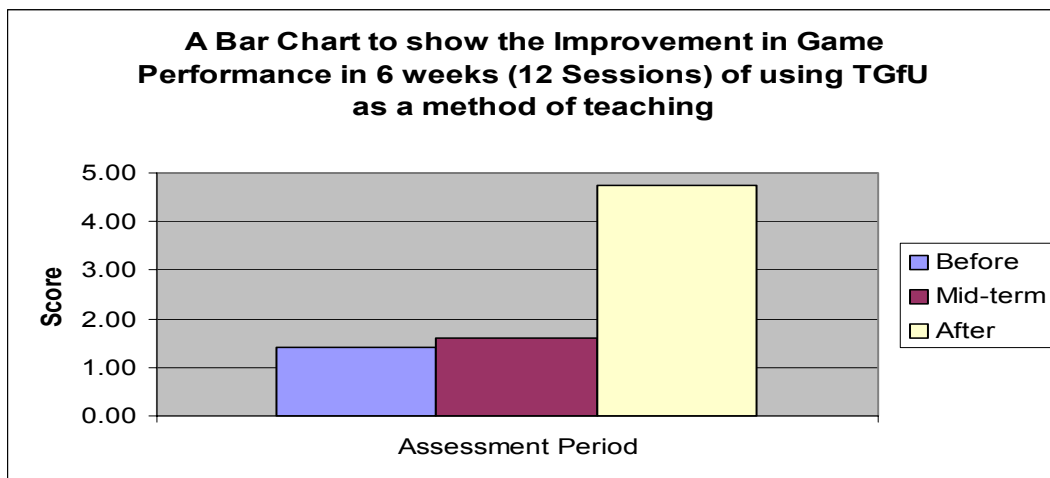
SEI did not reveal as great changes as the DMI. SEI rose from 1.56 to 2.2. This may have been due to the fact that the players had quite a high skill level already at the start of the study. However this may raise questions about how a younger group may develop this aspect of GP. Teachers beginning to use the games approach may also want to intersperse this with some technical practice, as noted by Bunker & Thorpe (1982). They suggest that players may still need some technical instruction, but at a time that is appropriate to their developmental level, i.e. before they are ready to progress to more exaggerated games or more complex representative games, e.g. from 5 V 5 to 8 V 8.

The CI rose from 1 to 4.5. Its change was due to a combination of more appropriate and less inappropriate covers. Reasons for this are intimated in the next paragraph and throughout the discussion section.

In terms of the AI, this showed the largest increase, from 1.73 to 7.75. There was an increase in the number of appropriate adjusts (19 – 31) and a decrease in the number of inappropriate adjusts (11 – 4). This combination accounts for the large increase in the AI. However, the AI was the only one to actually decrease during the course of the study (1.73 at the start of the study down to 1.55 in the mid term). As with the CI (because this only rose from 1 to 1.14 over the first 6 weeks of the study) this may have been due to the fact that defensive aspects take longer to learn as they have a greater level tactical complexity (see Griffin, Mitchell & Oslin, 1997). Also, the spiral of the sessions, more specific questioning, and game progression to increase challenges (see following discussion) may have contributed to this.

The overall GP Index rose from 1.4 to 1.59 over the first part of the study and then from 1.59 to 4.74 over the second six weeks of the study (see figure 2.1 below). We believe this improvement can be attributed to the spiraling of the sessions. The main suggestion as to why these improvements have taken place is due to the spiral of the sessions, i.e. the repeating of the 'key aspect' sessions (marking, covering and defending crosses). In these sessions the coach uses more advance questioning techniques (better phrased to reveal more specific answers), and set further challenges to players within the context of the game, which had been progressed from the previous session completed in the first part of the study. Therefore, this demonstrates the value and importance of repetition when learning new or refining skills previously learned. Obviously, the exact effect nature of the spiral is not clearly understood. Further studies that compare a spiral to a non-spiral protocol would shed more light on its role.

**Figure 2.1: Changes in Game Performance over the 12 Sessions of Training**



This study also demonstrates that already advanced players may improve their GP when taught using a TGFU approach. There may be a lot of power in this games-based approach to teaching, especially if children can be taught earlier using this method as suggested by Griffin, Mitchell & Oslin (2003). TGFU also has the potential to work for students in the affective domain (Bunker & Thorpe, 1982, Holt et al, 2001) as well as the cognitive (Dodds, Griffin & Placek, 2001) and the psychomotor (improving skilled performance) domain (for example see, Mitchell, Griffin & Oslin, 1995, Griffin, Mitchell & Oslin, 1995, Oslin & Mitchell, 1998, Harrison, Blakemore, Richards, 1998; Turner, 1996a, Turner & Martinek, 1995, Lawton, 1989).

**Questions raised by the present study**

The present study has found that GI and GP can be increased over a period of 12 teaching sessions using the TGFU approach to teaching. It suggests that players at a more advanced level than typical physical education students can improve their decision making, skill execution, adjusts and covering for other players and that setting increasingly complex challenges to these players with the adaptation of the game form may heighten their performance. Indeed it has been suggested that players would improve irrespective of the type of approach to instruction in there was a focus on one aspect of play, such as defending as occurred in the present study. Thus a further study in this area on another aspect of play and/or with more frequent assessments may be required to formulate a strong case for the use of the TGFU method over a traditional method, especially in the ‘coaching’ arena. Some use of inferential statistics could also be used to add to the positivistic research base.

The lack of the formal positivistic research base for TGFU that exists suggests that there is no reason why children must be taught tactical approaches, especially when at a young age children also need a good basis of motor skill development. However Launder (2001) points out that both the traditional approach and the games approach to teaching of sport have “evolved from a process of reflective thinking..(the process)..has been driven by a need to find better ways of inducing young people to make sport an integral part of their lives” (p.15-16). The ready acceptance of the games approach to games education must be one we look to explore further despite the current equivocal findings in the games teaching research.

Furthermore Rink (1996) has suggested that it may not be possible to make valid comparisons of the results of some of the comparative studies that have been conducted between traditional and games approaches to teaching games as the research designs used have been too different. But the production of a wealth of positivistic findings would aid researchers in the TGFU movement in gaining grants to further TGFU research and for governing bodies like the English FA to adapt their curriculum and coach education courses accordingly to promote this type of instruction. This is not to say that other more qualitative research is not required as the knowledge bases of students and decision-making processes may only be able to be explored using this method of enquiry, and this is also invaluable in the TGFU debate.

Furthermore this study has revealed the need for a more teacher-friendly way of assessing student performance when playing games. The analysis section of the present study using the GPAI was very time-consuming and laborious, and this was just using the players as small units (using the GPAI with small unit's still needs validation). Teachers interested in authentic assessment need to be equipped with instruments that can be used while teaching and observing the students within the lesson. The use of quantitative data by teachers can only objectify the formal assessment process in schools. The Team Sport Assessment Procedure (TSAP), (Grehaigne, Gadbout & Bouthier, 1998) was a latest attempt at assessing game performance, but this relies on the children assessing themselves, and researchers must be careful on how reliable this may be. Teachers and coaches are often very busy and need 'user friendly' assessment tools that are at the same time, authentic and can actually assess what TGFU sets out to develop: understanding. Random sampling procedures of children's decision-making process/skill executions could free the teacher up to not only teach but assess children at the same time, also reducing the need for a formal 'assessment session'. In addition game frameworks could be developed to allow teachers to assess qualitatively the children's performance and categorize them into levels (like the National Curriculum in England) and small video clips of children at these levels could be produced to let teachers reference their children to those kept on an internationally accessible web site such as the TGFU site. Thus further work is required in order for research to progress the invaluable work of Griffin et al and Grehaigne et al.

Lastly it would be a good idea to come up with a suggestion of modified games that can be used in the above assessment process throughout the age ranges within schools. These games must satisfy current curriculum standards. Kirk (2003) has recently attempted to relate the use of TGFU to curriculum standards in the UK national curriculum and the Australian Queensland standards. This work needs to be further developed if TGFU approaches are going to provide an alternative to traditional approaches.

### ***Conclusions and Implications for future research***

The results from the present study suggests that the TGFU approach has the potential to improve involvement and performance in team sports, through increasing decision making capacities of players in order for them to execute more effective skills and less ineffective ones. This in turn may affect other necessary game component such as adjusting your position in relation to the ball and covering for players that are out of position. However there

may be a need to replicate this type of study with players of this developmental level to aid in giving more concrete evidence that the TGFU approach does work across all levels of ability.

Indeed this particular study has raised a number of issues and not least the fact that the GPAI had previously been used in studies to analyze the game performance and game involvement of individuals. Firstly, how long should it take for players to respond to a TGFU teaching approach? If teachers and coaches are to use this method more studies of varying lengths using TGFU as a method of instruction may be needed and a more longitudinal protocol needed. Secondly Grehaigne et al (1998) have introduced TSAP as an alternative to using the GPAI for assessing both individual and team performance in games (more refined approaches were presented in Grenhaigne et al, 1997). However, more user friendly approaches to game assessment for the teacher/coach may be needed and some ideas were presented in the discussion. Indeed this also introduces the need to design a series of modified games at varying levels of play and grade levels (that are developmentally appropriate), and in varied game based activities (invasion games, striking& fielding games, target games, net/wall games and court divided games) to let players work collectively rather than as individuals and facilitate improvements of game performance and involvement. These modified games can then be utilized in the classroom setting as assessment games in which teachers can assess students/pupils game performance and tactical knowledge.

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**APPENDIX 1 – Example of Raw Data Collection Performa for Assessment Game using the GPAI**

Play	Decision Making		Skill Execution		Adjust		Cover	
	A	IA	A	IA	A	IA	A	IA
1	3	1	0	2	0	1	0	0
2	0	1	1	2	0	1	1	0
3	0	3	2	2	2	1	0	3
4	1	2	1	1	0	1	0	2
5	1	2	1	2	1	1	0	2
6	2	2	1	1	4	1	1	1
7	2	2	2	1	2	0	1	1
8	1	0	1	0	1	0	2	0
9	2	1	1	1	1	0	2	0
10	1	0	1	0	1	0	1	1
11	1	3	1	2	0	2	0	2
12	4	1	4	0	1	0	2	0
13	4	2	6	1	2	1	1	1
14	1	0	1	0	1	0	1	0
15	2	1	1	2	1	1	1	1
16	2	0	2	0	1	0	1	0
17	0	2	0	1	0	1	0	1
18	3	0	2	0	1	0	1	0
19	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
<b>Total</b>	<b>30</b>	<b>23</b>	<b>28</b>	<b>18</b>	<b>19</b>	<b>11</b>	<b>15</b>	<b>15</b>

**APPENDIX 2: Game Involvement (GI) & Game Performance Calculated Results**

**KEY:**

Total number of appropriate responses (TNOAR)  
 Total number of appropriate skill executions (TNOASE)  
 Total number of inappropriate skill executions (TNOIASE)  
 Total number of appropriate decisions made (TNOADM)

<b>TIME</b>	<b>Game Involvement Calculation</b>	<b>TOTAL</b>
<b>Pre</b>	TNOAR (30+28+19+15) + TNOASE (28) + TNOIASE (18) + TNOADM (30)	<b>168</b>
<b>Mid</b>	TNOAR (32+32+31+16) + TNOASE (32) + TNOIASE (19) + TNOADM (32)	<b>187</b>
<b>Post</b>	TNOAR (36+33+31+27) + TNOASE (33) + TNOIASE (15) + TNOADM (36)	<b>211</b>

**KEY:**

DMI – Decisions Made Index  
 SEI – Skill Executions Index  
 AI – Adjust Index  
 CI – Cover Index

<b>TIME</b>	<b>Game Performance Calculation</b>	<b>TOTAL</b>
<b>Pre</b>	DMI (30/23 = 1.3) + SEI (28/18 = 1.56) + AI (19/11 = 1.73) + CI (15/15 = 1) ÷ 4	<b>1.4</b>
<b>Mid</b>	DMI (32/16 = 2.0) + SEI (32/19 = 1.68) + AI (31/20 = 1.55) + CI (16/14 = 1.14) ÷ 4	<b>1.59</b>
<b>Post</b>	DMI (36/8 = 4.5) + SEI (33/15 = 2.2) + AI (31/4 = 7.75) + CI (27/6 = 4.5) ÷ 4	<b>4.5</b>