Utilizing Teaching Games for Understanding in Physical Education: Effects on Primary Students' Metacognition

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The study sought to confirm the effect of Teaching Games for Understanding (TGFU), a teaching approach in Physical Education (PE), on students' metacognition. It utilized a quasi-experimental pre and post-test design to two groups of Grade 3 students with comparable abilities. One section was taught using the TGFU approach and another section with Skills-Based Approach (SBA). Paired sample *t*-test results showed no significant difference on the metacognitive skills of students from both sections after the intervention program. However, further analyses of the qualitative data suggested that the group taught with the TGFU approach had improved in all the metacognition phases and the level of their discussion of concepts and game strategies had moved beyond surface understanding. Implications for effective teaching include the emphasis on integrating either direct or implicit teaching of thinking skills in the teaching of PE. Recommendations for future research are discussed to address the study's limitation, such as longer time allotment for PE and having a smaller class size.

Keywords: *thinking skills, metacognition, teaching games for understanding, physical education*

Introduction

Research on different subjects in schools highlights the development of students' thinking skills. However, in the case of Physical Education (PE), studies usually emphasize the benefits of physical activities more than the subject's content. PE is given less attention as evidenced by the time and budget allotted for it in the curricula. Based on the 2016 Philippine K-12 curriculum, PE in Grades 1 to 6 is taught 40 minutes a week; in Grades 7 to 10, 60 minutes; and in grades 11 to 12, 120 minutes a week. This allotment compels PE teachers to compress lecture, warm up, skill acquisition, game application, and cool down in a limited period of teaching time. In effect, PE becomes merely an outlet for physical activity rather than an academic subject that integrates the development of important thinking skills.

The 2016 Philippine K-12 PE Curriculum states that the subject's ultimate goal is the achievement of lifelong fitness. However, while the goal of the subject is clear, there are other benefits of the subject that are not fully acknowledged; one of these is its impact on students' thinking skills. Previous studies show that movement, such as in performing exercise and doing sports and games, enhances students' ability to concentrate and focus more on cerebral tasks (McGovern, 2005; Taras, 2005). It was found that there are hormones and neurotransmitters triggered during physical activities that enhance memory, mood, and endorphin release that help students learn better. Moreover, research also shows that PE programs have the potential to help students become more aware about their thinking and to prime their minds to engage in challenging tasks (Landers, Maxwell, Butler, and Fagen, as cited in Costa, 2001). These skills and abilities are usually enhanced through sports and games facilitated by a more knowledgeable individual, such as the teacher, who acts as scaffold to support students in formulating strategies, collaborating with their team mates, and in resolving conflicts (Jensen, 2000). To date there have been few studies, particularly in the local context that looked into how PE impacts students' thinking; thus, it is important to fill this gap.

PE and Thinking Skills

Physical activity has been shown to enhance students' thinking and learning processes (Taras, 2005). It also oxygenates the brain (Martin, 2010; McGovern, 2005; Shepard, 2014) and increases brain's blood flow to the cortex and this is posited to lead students to effective processing and storing of information (Martin, 2010). These studies emphasized the effect of physical activity on students' learning, specifically on their ability to concentrate and focus (McGovern, 2005).

Studies on brain-based teaching note positive association among physical activities, student motivation, and engagement (Jensen, 2000; Martin, 2010). They hint that movement allows the brain to produce feel-good hormones such as endorphins and dopamine. As a result, the psychological well-being of students is positively affected and that they are able to regulate emotions, persevere, set goals, manage time, and take calculated risks (Rosewater, 2009). The abovementioned processes are deemed essential in improving students' thinking and learning potential.

PE, Thinking Skills and Collaboration

PE highlights the importance of movement through playing games and sports. These activities require active collaboration among students. In collaborative activities, especially in team games, students discuss ideas and share insights regarding the tasks on hand. They actively talk about different points of view and construct meaning about the experiences and tasks that the learning environment offers. As students exchange ideas, they come to realize differences in their background knowledge and experience disequilibrium. Disequilibrium is the discrepancy between the knowledge being presented and what the students perceive to be true. When this happens, students find ways to understand different perspectives and try to seek equilibrium. This process improves students' learning (Sills,

Rose & Emerson, 2016).

Despite these potential contributions of PE to learning, it has often taken the back seat role in the curricula of most academic institutions, compared to subjects such as mathematics, science, and language (Hardman, 2006). Lack of research to prove PE's long-term effect on students learning is one of the reasons why PE's contribution has been overlooked in the field of education. Several studies back up the claim that physical activities prime concentration but only a few prove its lasting contribution to learning (Taras, 2005), particularly on how it enhances thinking skills, one of which is metacognition (Ames, et al., 1988; Keiichi, 2000; Lim, 2009, as cited in Narang & Saini, 2004; Tella, 2007).

PE and Metacognition

Metacognition is the awareness of one's thought and knowledge (Bahri & Corebima, 2015; Brown, et al., as cited in Conrady, 2015). It has two components – cognitive knowledge and knowledge monitoring. Cognitive knowledge is the capability of knowing how an individual learns and applies knowledge while knowledge monitoring is the ability of an individual to plan, regulate, and evaluate knowledge (Schraw, et al., as cited by Lai, 2011). According to several researches (Alexander, Fabricius, Fleming & Brown, 2003; Bahri & Corebima, 2015; Conrady, 2015; Hacker, Dunlosky& Graesser, 2009; Hartman, 2002; Lai, 2011; Schraw, as cited in Chatzipanteli et al., 2015), there is a strong correlation between increase in metacognition and improvement of over-all learning. Fortunately, metacognition can be taught and enhanced (Bahri & Corebima, 2015; Hacker & Dunlosky, 2009; Lusung-Oyzon, 2005; Lai, 2011). In the study of Lusung-Oyzon (2005), it was noted that while young students are capable of 'thinking about their thinking,' elementary children need to be scaffolded for their metacognitive skills to be 'switched on'. This was observed in the teaching of Social Studies, where metacognition was integrated to Grade 5 students. Result showed significant improvement in students' cognitive knowledge and knowledge monitoring. It was also noted that

metacognition should be regularly infused, either explicitly or implicitly, in class activities so that students would reach a certain level of automaticity in the use of the skill.

To date, there is still a dearth of researches that explore the improvement of student metacognition in PE classes. The first study conducted by Papaioannou, Theodosiou, Pashali, and Digelidis (2012) delved into "self-check" style of teaching in PE wherein the students assess their learning through a set of criteria provided by the teacher. The participants of the study were 279 Grade 6 students of seven public elementary schools in Greece. The study revealed that such approach positively affected metacognitive regulation as well as students' goal orientation and intrinsic motivation. A similar study made by Chatzipanteli, Digelidis, Karatzoglidis, and Dean (2015) discussed another approach called Teaching Games for Understanding (TGFU) in promoting metacognitive behavior among students. The approach was tried out among middle school students in Greece. Results showed that TGFU positively affected students' metacognitive behavior.

Teaching Games for Understanding (TGFU)

Teaching Games for Understanding or TGFU is one of the many approaches in PE that aims to encourage thinking through problem solving (Griffin & Butler, 2006). In TGFU, teachers create a venue for students to improve both motoric and thought-processing skills through games. TGFU was conceptualized for teachers to veer away from the more traditional approach of teaching PE, also known as the Skills-Based Approach which emphasizes drills or the repeated practice of skills within the context of the game (Mawer, as cited in Chatzipanteli, et al., 2015).

In the Skills-Based Approach, the premise in teaching PE is that there are standard movements that should be rigidly followed and mastered by heart by the students. Mastery of fundamental movements is needed to move forward to the next skill. The goal is for students to attain that stage of

motor control whereby they could automatically perform the needed skill in a particular situation on their own (Fitts & Posner, 1967, as cited in Taylor & Ivry, 2012). This kind of teaching is also called 'direct teaching' wherein students rely heavily on the teacher's direction or instruction.

On the other hand, TGFU uses or infuses games in the teaching and learning process, such as in PE classes, with the end goal of enhancing the thinking skills of students. According to McBride (1999), there are three factors that foster the development of thinking. The first factor is the teacher's role. The teacher acts as a facilitator and not as an owner and dispenser of knowledge. The second factor is giving the students the opportunity to learn collaboratively and be able to brainstorm, plan and set standards, analyze, and decide on their actions to fulfill a desired performance. The final factor is the debriefing of students or evaluation of their thoughts and actions and how they made sense of the tasks performed in class. It involves explicit discussion or sharing of their thought processes or 'thinking out loud about their thinking' in solving a particular problem or on how a certain task was or is to be performed.

TGFU consists of six steps: *(1) introduction of the game, (2) game appreciation, (3) tactical awareness, (4) decision-making, (5) skills execution, and (6) performance.* The first step, the *introduction of the game*, aims to develop understanding of rules and strategic nature of the game guided by the teacher (Turner & Martinek, 1999 as cited in Chatzipanteli, et al., 2015). The second step, *game appreciation,* is done through discussion of the importance and values of rules. *Tactical awareness* follows which directs students to plan out options on how to solve a specific problem found in the game. *Decision-making,* the fourth step, aims students to apply the best way to attain the objectives of the game. The next step or the *skill execution* requires students to focus on movements or skills needed to be successful in the games. Lastly, the sixth step or the *performance* directs students to combine both tactics and psychomotor abilities to play effectively (Shepard, 2014).

The steps done in TGFU are planned out in each lesson. The teacher presents the game and directs the students every step of the way through proper cues and questions. The process of TGFU is more time consuming compared to Skills-Based Approach. The facilitator asks students a series of questions to guide them in meeting the desired outcomes. Griffin and Butler (2006) underscored that when students are mindful of their thoughts before, during, and after games, successful game performance is achieved.

While TGFU has been tried out in schools abroad, there is a dearth of studies done in the local set up that confirms what other researchers found, that is, its impact on students' thinking skills. Only two studies have been found to explore TGFU in the Philippines. The first study done by Barber (2001) used the approach in a PE basketball class while a similar study made by Isada and Valleser (2017) taught the same approach in a PE volleyball class. Both studies investigated the effects of TGFU on students' game performance focusing on three components – support, skills execution, and decision-making. Both studies found that TGFU did not significantly impact students' game performance. Interestingly, though, unlike the study of Chatzipanteli, Digelidis, Karatzoglidis and Dean's (2015) where metacognition was explored more thoroughly, the former studies did not probe deeply into students' conscious thinking about their thoughts and decisions but focused more on how students reacted in a game.

It should be noted that the abovementioned studies utilizing TGFU had older students, i.e., tertiary students and middle graders, as participants. Thus, there is a need to find out if such an approach affects younger students' thinking processes (i.e., in the primary grades), particularly their metacognitive skills. This study intended to fill this gap.

Research Problems

The study specifically aimed to answer the following research questions:

1. Is there a significant difference between the

metacognition of students who were exposed to the TGFU approach and those who were exposed to Skills-Based Approach?

2. How do students taught with TGFU solve problems and think about their thinking in a PE activity (i.e., basketball offense) compare to those who were taught using Skills-Based Approach?
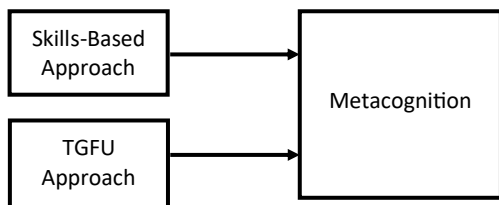

Figure 1. Conceptual Framework of the Study

The study hypothesized that there would be a significant difference between the metacognition of students who were exposed to the TGFU approach and those who were exposed to Skills-Based Approach.

Research Design

This study used a quasi-experimental two-group pretest-posttest design. This design is most appropriate for this study as it used two intact and comparable classes since it was not administratively possible to do random sampling. The two intact classes were exposed to two different teaching approaches.

The research design is illustrated below.

Table 1
Research Design

Skills-Based Approach	O_1	X_1	O_1'
TGFU Approach	O_1	X_2	O_1'

Where:
O_1 = Metacognitive Process in Physical Education Questionnaire used as pretest
O_1' = Metacognitive Process in Physical Education Questionnaire used as post test

X_1 = Skills-Based Approach (SBA)
X_2 = Teaching Games for Understanding (TGFU)

To further understand the effects of the approaches on students' thinking and game performance, observations and close monitoring of students' discourse in class were done. Their discussions were audio-recorded and their behaviors were observed during class hours. The data culled from these observations and monitoring were used to answer the second research question.

Research Participants

The study was conducted in a public school in Quezon City, Philippines and involved two intact Grade 3 classes (N=66), with students' ages ranging between 8 and 9 years old. The students in this school are grouped heterogeneously.

Each class was randomly assigned a teaching approach (TGFU or Skills-Based). Both groups took the Metacognitive Process in Physical Education Questionnaire (MPIPEQ). The mean results of the test were subjected to two-tailed *t*-test for independent samples to ensure the initial comparability of the two classes.

Instruments

Metacognitive Process in Physical Education Questionnaire (MPIPEQ). The MPIPEQ of Papaioannou, Theodosiou, Pashali, and Digelidis (2012) was adopted for this study. Originally, the MPIPEQ, was a 52-item uni-dimensional questionnaire. Upon receipt of consent from the authors, the questionnaire was adapted and translated to Filipino language. It was language validated by a Grade 3 Filipino teacher and content validated by an Educational Psychology expert. The questionnaire was reduced from 52 items to 35 items. These items were pilot tested to another group of Grade 3 students in the same school where the study was conducted. The revised MPIPEQ was then subjected to factor analysis. The final result was a 21-item revised MPIPEQ, which had a reliability coefficient of 0.874.

Lesson Plans. A total of 12 lesson plans (i.e., six lesson plans using Skills-Based approach and six lesson plans using TGFU) were used. These lesson plans focused on developing four skills – dribbling, passing, shooting, and game play. A senior PE teacher who was also the head of the PE and Health Department in the school validated the lesson plans. In the implementation phase, another senior teacher observed and assisted the teacher-researcher. This was to ensure that the objectives of all lessons were met and did not deviate from the school's curriculum requirements, and that there was no researcher bias in the conduct of the study.

Qualitative Monitoring and Assessment of Metacognitive Behavior. Observations during problem-solving tasks were done to monitor and assess the metacognitive behaviors of students. The observations were audio-recorded and immediately transcribed after each lesson. A panel of experts was regularly consulted to ensure the validity, reliability, and objectivity of the qualitative data. Assessment of the qualitative data was done by using five-phase metacognitive model by Yimer and Ellerton (2010) as suggested by the Chatzipanteli et al.'s (2015) study. According to this model, metacognition has five phases: engagement, formulation, implementation, evaluation and internalization.

Procedures

Pre-experimental phase

Prior to the experiment, MPIPEQ was validated. It was then pilot-tested to Grade 3 students.

After the pilot testing of the MPIPEQ, observation was conducted in one class. The process of how to orient the activities and how long the process would take was also done to ensure that Grade 3 students understood the instructions. The students were given tasks, other possible scenarios to explore, and relevant follow up questions to find out how they think about their thinking. The observation procedures and tasks

were then finalized after the session.

After pilot testing, the MPIPEQ pretesting was administered.

Experimental phase

Two intact Grade 3 classes were used. One class was Skills-Based and the other, to TGFU approach. Six sessions of 60-minute class in PE were conducted to both classes. Similar objectives and learning competencies were set for both groups. Lesson plans were strictly implemented.

The lesson plans for the TGFU were initially derived from Griffin, Mitchell and Oslin's (1997) lesson plan format. Their lesson focused on tactical approach in basketball offense such as maintaining possession of the ball, attacking the basket, making space for attack, and using space in attack. The concept of this approach was to use games as a preparation to teach the actual sport.

Figure 2. Teaching Games for Understanding model (Adapted from Bunker & Thorpe, 1982 as cited in Griffin, Mitchell, & Oslin, 2013)

For this study, TGFU model was modified to be developmentally appropriate to third grade students. Lesson plans were designed in the context of games but focused more on the basic skills of basketball – dribbling, passing, and

shooting. Tactical awareness was emphasized toward the last two sessions of the intervention in the form of game play.

The Skills-Based Approach, on the other hand, followed the same structure used in regular PE classes wherein the teacher gives instructions and drills. Students then methodically follow instructions, and practice the skills until they master them. For six sessions, students in the Skills-Based Approach were asked to master skills such as dribbling, passing, shooting, and game play.

To understand the difference between the two approaches, Table 2 provides a summary of the flow of lessons for both groups.

Table 2
Lesson flow for TGFU and Skills-Based classes

Lesson Flow	TGFU	Skills-Based
Introduction of Objectives	Lecture Discussion	Lecture Discussion
Warm up	Group Games	Dynamic Stretching Footwork
Introduction of Skill	Game Focusing on the Skill	Lecture Discussion on Proper Form
Teacher Cues	Question and Answer	Demonstration of Drills
Practice Tasks	Mini Game that Practices the Topic	Students imitate teacher and repeat drills.
Teacher Cues	Question and answer on the mini game and tactical awareness after the mini game *(How is the mini game related to the first game? What strategies did they use? What movement do they find difficult?)*	Teacher reminds students the proper form and when to apply the skills.
Practice Tasks	Repeat the mini game for application	More challenging drills for application
Cool Down	None, the mini game acts as their cool down.	Static stretching
Topic Closure	Reminds the skills taught and give the next topic.	Reminds the skills taught and give the next topic.

Both groups were taught the same lessons. The only difference between the two was the way they were taught. In TGFU, skills were introduced and students learned these through games while the Skills-Based class was taught through regular drills. Moreover, students in the TGFU class were asked to construct meaning from their experiences and did collaborative planning. In the Skills-Based class, the teacher discussed lengthily and provided direct instructions.

During the intervention, three sessions were allotted for problem-solving tasks for game application through group activities. A total of six students, one group consisting of three students from each class, were chosen for the case study. These students were closely observed and monitored as they discussed their problem-solving

tasks. The group discussions were done after every topic. These sessions were discretely audio-recorded to ensure that the standard reactions and discourse would be spontaneous. Discussions were then transcribed verbatim.

The group discussed three sets of problem-solving tasks which are as follows:
1. Cross from one point to another point either by dribbling and passing. A group will get 1 point for each line crossed.
2. Play a regular 3 on 3 Game without dribbling. Traveling or double dribbling is not allowed. The target skills of this activity are passing and shooting. A group will get 1 point for each shot made.
3. Plan offensive play against a 5-member group. The target skills in this activity are dribbling, passing, and shooting. Similarly, travelling or double dribbling is not allowed. A group will get 1 point for each shot made.

Post-experimental phase

After the intervention, the MPIPEQ posttest was taken by the students. Then, a statistical analysis of the data gathered from the test was done.

Meanwhile, the transcriptions were analyzed using the five-phase model developed by Yimer and Ellerton (2010) as suggested by Chatzipanteli (2015). The observation of students aimed to find out if anyone in the group exhibited metacognitive skills during discussions and to see if the five phases were present in the discussions as well as how these progressed. The panel of experts was consulted for the analysis of the qualitative data for the validity, reliability, and objectivity of the data and the process followed. Table 3 provides the discussion of the five-phase model.

Table 3

Metacognitive Model used in Qualitative Analysis (Yimer and Ellerton, 2010, as cited in Chatzipanteli, et al., 2015)

Phases	Sub-categories	Sample behavior or scenarios
1. Engagement	Initial engagement, restating the problem, assessing familiarity	Understanding tactical scenario Reading the problem out loud
2. Formulation	Analysis of information, identifying patterns	Making connections based on previous experiences "in PBA or NBA, this is what they do…" "My father told me…"
3. Implementation	Exploring the essence of the plan, performing the plan, monitoring the performance on the plan	"We can move faster when if we do this…" "He will be the one who will try to guard you…"
4. Evaluation	Reflecting the solutions, monitoring and justifying the solution	Checking of errors "I think that is the most effective way we can do the task…" "We did it well because…" "What you did a while ago is correct…"
5. Internalization	Assessing difficulty, confidence in finding the solution	Finding different ways of solving it "He/she must do this next time so that…"

Results and Discussion

Initial comparability of TGFU and Skills-Based groups

MPIPEQ pretest and post mean scores of both groups were subjected to two-tailed independent samples *t*-test to determine the comparability of two groups before and after the intervention. Results show that the TGFU group (M=76.03, SD=15.695) was comparable to Skills-Based group (M=73.97, SD=13.002) at the beginning of the intervention; t(64) = -0.58, p = 0.565.

Research question 1: Is there a significant difference between the metacognition of students who were exposed to the TGFU approach and those who were exposed to Skills-based approach?

The mean, standard deviation, and the result of an independent samples *t*-test for the MPIPEQ scores of both the Skills-Based and the TGFU group are illustrated in Table 4.

Table 4
Independent Samples t-test on Skills-Based and TGFU Group

Measure	Group	Mean	SD	Df	T	Sig.
Pre Test Total Score	Skills-Based Group	73.97	13.002	64	-0.58	0.565
	TGFU group	76.03	15.695			
Post Test Total Score	Skills-Based Group	79.19	14.150	64	-0.032	0.974
	TGFU group	79.29	12.703			

*p<.05

Results reveal that there were no significant differences between the metacognition of both groups after the intervention. This implies that after the intervention, the metacognition of the TGFU group was still almost similar with the Skills-Based group.

Furthermore, to identify whether there was a significant effect on metacognition on both approach, paired samples *t*-tests were conducted on each group's pretest and posttest at 5% significance level. The summary of the paired samples *t*-test is shown in Table 5.

Table 5
Paired Samples t-test on MPIPEQ Results

	Mean	SD	Df	T	Sig.
Control Group Pretest- Posttest Score	-5.219	14.701	31	-2.008	.053
Experimental Group's Pretest- Posttest Score	-3.265	13.480	33	-1.412	.167

*p<.05

According to the MPIPEQ paired sample *t*-test results, there was no significant difference between the metacognition of the TGFU group and the Skill-Based group after the intervention. Quantitative results show that both approaches did not make a significant impact on the students. They are in contrast with the results in Chatzipanteli's (2015) study which showed the effectiveness of TGFU in improving students' metacognition. This can be explained by the two factors, namely, age of participants and time allotment.

The age range of the participants in the two studies were different. In Chatzipanteli's study, the students were aged 11 to 12 years old while in this study, the students were 8 and 9 years old and might not be cognitively mature to automatically exercise metacognition as they performed the tasks. As the literature suggests, metacognition should be specifically and explicitly taught and regularly integrated in class activities so that students would reach a certain level of automaticity in the use of the skill (Corss et al., 1988, as cited in Lai, 2011; Dignath, et al., 2008, as cited in Bahri et al., 2015; Hennessey, 1999; Lai, 2011; Lusung-Oyzon, 2005). While TGFU emphasized processing knowledge through question and answer, what might have been emphasized more in the current study was on how to move in a basketball offense and less emphasis on how to think while moving in a basketball offense.

Another factor that might have contributed to the findings was time allotment or frequency of meetings. Metacognition is a difficult skill to teach. It takes a lot of practice and scaffolding for the students to appreciate how they think in a PE class. In the present study, there were only six sessions to master four skills – dribbling, passing, shooting, and game play. TGFU was also divided into two sessions to allot enough time for practice and avoid cramping lessons in one session. Furthermore, psychomotor skills should be taught properly and be mastered first before proceeding to game form. Both TGFU and Skills-Based had the allotted same duration of time for the discussion and the practice part of the lessons. The duration for mini games,

however, might not have been sufficient for practicing the basic skills. Unlike in the Skills-Based Approach, where students were simply reminded about the proper form and execution during the drills in TGFU, the teacher has required to stop the students in the middle of a game to think, discuss, and correct their form and execution. In effect, TGFU students' time to achieve mastery in movements was somehow shorter compared to the Skill-Based Approach class. It is deemed that to gain mastery of the skills and to perform them well, thereby achieving the objective of the lesson, necessitated not just the skill to 'think about one's thinking' but longer practice time and exposure to the game. Thus, the time allotment for students in the TGFU might not have been enough for them to reach their potential.

A venue for explicit instructions on how the students may strategize and think aloud about these could have been helpful also for the students to significantly improve their metacognition. As researches say (Bahri & Corebima, 2015; Hacker & Dunlosky, 2009; Lai, 2011; Lusung-Oyzon, 2005), metacognition can be taught and learned. However, with the time allotment given to each session, the teacher-researcher might have focused on the objective to teach students how to move in a game rather than how to think about their thinking in a game.

Research question 2: How do students taught with TGFU solve problems and think about their thinking in a PE activity (i.e. basketball offense) compare to those who were taught using Skills-based approach?

Skills-Based Group

In the first group discussion, members were excited to talk about their plans regarding the task. It was observed that they immediately skipped to the formulation and implementation of their plans. They did not express any reflection on how they came up with their plans. Table 6 shows some excerpts from the first group discussion.

Table 6
Skills-Based Group's First Discussion Sample Excerpts

Phases Achieved	Sub-categories	Actual Students' Response
Formulation	Analysis of information, identifying patterns	Wait lang so kapag naipit tayo. Tapos ikaw nandito… (*Wait, if we get stuck here, and if you are here…*)
		Magiging defense po ba kame at tsaka defense? (*Will we be playing both the offense and defense?*)
		Kapag pinasa ko po nandito si Xyris. Pag pinasa ko po, 1 point po ba yun? (*If I pass the ball and Xyris is here… if I pass it, is that 1 point?*)
Implementation	Exploring the essence of the plan, performing the plan, monitoring the performance on the plan	Kapag naka-dribble ako, ipapasa ko sayo. Kapag nakalagpas ako, ipapasa ko sayo. (*If I get to dribble, I will pass it to you. If I pass this line, I will pass it to you.*)
		Hindi, kunyari magdi-dribble muna dito si Xyris tapos ipapasa na niya kay JC. Tapos magdi-dribble na siya dito. (*No, for example, Xyris will dribble here and pass to JC. Then JC will dribble here.*)
		Nandito ako, nandito si..nandito ikaw. Tapos ipasa mo sa kanya. Tapos papasa ko nalang. (*I am here. You are there. Then pass it to her. Then I will just pass*)

The second group discussion also revolved around the formulation and implementation of their plans. At this point, there were fewer interactions as compared to the first discussion. One member dominated the discussion and acted as the leader of the group. The others just helped in formulating ideas but mainly acted as support. Table 7 provides some of the excerpts of second group discussion.

Table 7
Skills-Based Group's Second Discussion Sample Excerpts

Phases Achieved	Sub-categories	Actual Students' Response
Formulation	Analysis of information, identifying patterns	Pero sino kukuha ng bola. Kasi bawal mag-violations e… (*But who will get the ball…violations are not allowed*)
		Pero dapat kase may haharang…Tsaka bawal din mag-dribble, dapat ipapasa mo… (*There should be someone who will block. And we are not allowed to dribble. You can only pass the ball…*)
Implementation	Exploring the essence of the plan, performing the plan, monitoring the performance on the plan	Pwedeng i-shoot mo tapos ibibigay mo sakin. (*You can shoot the ball and then give it to me.*)
		Gamitin natin ang chest pass kase sabi ni teacher, yun ang pinakamablis na pass…so yun. (*We should use chest pass because teacher said it is the fastest way to pass.*)

The role of the members of the group was consistent during the third discussion and the practice games in class. One member acted as the leader and the other two followed through. While the group still focused on the formulation and implementation phase, it is also notable that they reached the evaluation phase in this session. Table 8 shows some of the excerpts of the third discussion.

Table 8
Skills-Based Group's Third Discussion Sample Excerpts

Phases Achieved	Sub-categories	Actual Students' Response
Formulation	Analysis of information, identifying patterns	Teacher, at least ilang passes po ba? At least ilang passes? (*Teacher, how many passes are allowed? At least how many passes?*)
		Dun kaya ako kay teacher sa sobrang layo (sa ring). (*What if I position myself far from the ring?*)
Implementation	Exploring the essence of the plan, performing the plan, monitoring the performance on the plan	Ganito, ganito. Di ba nandito... Eto ako ah. Tapos ito si Elisha. Tapos kunyari sinusundan ako ng isang kalaban. Tapos nandito pa yung dalawang kalaban...magba-back up naman kami dito kahit... Tapos bigla kong ipapasa kay Elisha. (*Here, This is where I am, Elisha is here. Then, for example, the opponent is following me.. Then the other two opponents are here. We will back you up. Then I will immediately give the ball to Elisha*.)
		Dapat JC, dapat, kapag sa tingin mo hindi aabot sa pasa namin, lumapit kang konti. So dapat ikaw, tatakbo ka na dito… (*JC, if you think you cannot pass the ball to us, you should come nearer. You, you should run here.*)
		So dapat fina-follow mo yung rule na pass and go. (*We should follow the rule pass and go.*)
Evaluation	Reflecting the solutions, monitoring and justifying the solution	Ikaw dapat yung palaging may hawak ng bola. Ikaw yung marunong magpasa e. Tapos ako naman, basta parang gitna. Pero kung kaya naman ni JC i-shoot, i-shoot na niya agad. (*You should always be the one who holds the ball. You are the one who knows how to pass. Then I should be in the middle. But if JC can shoot, shoot the ball already*.)
		Nagba-block ka. Malaki ka e...Parang ikaw yung nagba-block kase matangkad ka. (*You are going to block because you are big. You will be the one to block because you are tall*.)

Over all, one member led the control group and the rest simply participated in formulating ideas. The same setup was observed during the second and last group discussions. The members of the group relied heavily on the leader. This was confirmed when, during the last group discussion, the teacher-researcher asked, "How did you arrive at the ideas?" and one of the members said, "Well, she's smart. That's why."

Consequently, collaboration did not improve among students in the control group because of too much dependence on the leader. Group members were also rushing to finish on the given task. One of them even commented, "Never nila akong pinapatulong kaya ganyan sila" (They never allowed me to help. That's why they are like that) during the third group discussion.

Table 9 presents the progression of the control group's discussions. It shows that control group focused on the formulation and implementation phase but later on reached the evaluation phase of metacognition.

Table 9
Skills-Based Group's Summary of Metacognitive Phases Achieved

	Discussion 1	Discussion 2	Discussion 3
Engagement			
Formulation	✓	✓	✓
Implementation	✓	✓	✓
Evaluation			✓
Internalization			

TGFU Group

It was observed that in the first discussion, students in the TGFU group were not as confident in exchanging ideas as compared to the Skills-Based group. The members of the TGFU group did not contribute much in the discussion. It was seen in their body language that they were hesitant in providing solutions to the tasks. Despite this, it should be noted that their level of discussion had reached the internalization phase of metacognition. Table 10 shows sample excerpts of the first discussion.

Table 10
TGFU Group's First Discussion Sample Excerpts

Phases Achieved	Sub-categories	Actual Students' Response
Engagement	Initial engagement, restating the problem, assessing familiarity	Lagay mo, 1 point, 2 points (*Writing task on paper, write 1 point, 2 points*)
Formulation	Analysis of information, identifying patterns	O dito… di ba hindi nila pwede kunin satin kapag… nakuha ng bola. *(Here, they cannot steal the ball if the ball is ours right?)*
		Eh paano tayo makaka-shoot? De, mag-ano nalang tayo...pwede po ba yung ano… 3 passes… (*How can we shoot? Let us just… Are 3 passes allowed?*)
		E pano tayo makakapasok… (*How can we go in?*)
Implementation	Exploring the essence of the plan, performing the plan, monitoring the performance on the plan	Hindi tayo gagalaw. Hahawakan lang natin. (*We will not move. We will just hold the ball.*)
		Hindi ganito nalang, ikaw yung maghawak ng bola… (*No, let's just do it like this. You hold the ball.*)
Internalization	Assessing difficulty, confidence in finding the solution	Di ba maliliit tayo, e di pwede tayo lumusot. (*We are short, right? We can go under them.*)

As the sessions progressed, the group became comfortable with and had confidence in each other. They talked about their plans before the practice games. In the second problem-solving activity, it was observed that their level of confidence increased. They skipped the engagement phase and started immediately with the formulation phase. They also consistently reflected on their past games to make sense of their current plans (e.g., "…Ako po ang galing dati, nag-aagawan sila sa bola tapos … dun ako banda sa ring di na-shoot ni Diwa… tas nakuha ko. (Me, I used to be good, they were trying to get hold of the ball….I was there, near the ring. Diwa missed the shot, then I got the ball.). Table 11 shows sample discussions from the second discussion.

Table 11
TGFU Group's Second Discussion Sample Excerpts

Phases	Sub-categories	Actual Students' Response
Formulation	Analysis of information, identifying patterns	Teacher kapag pinass po ba sa kin, tapos pinass sa kanya, ipa-pass din ba sa kanya? (*Teacher, if she passes it to me and I pass to her, then should she also pass to her?*)
		Teacher isang pass, tig-isang player po ba? (*Teacher, is it one pass for every player?*)
Implementation	Exploring the essence of the plan, performing the plan, monitoring the performance on the plan	Tapos pa-ikot-ikot na yung bola. Tapos ipapasa ko sayo. Tapos ipapasa mo rin sakin. Tapos ano mangyayari, ipapasa ko ulit sayo? (*The ball will move around. Then I will pass it to you. Then you will pass it to me. Then what will happen, will I pass the ball again to you?*)
		Ganito, ipa-pass ko muna kay Meg. Tapos ipa-pass ko sa'yo. (*I will pass the ball to Meg then I will pass the ball to you.*)
Evaluation	Reflecting the solutions, monitoring and justifying the solution	Ako po ang galing dati… Ako po ang galing dati, nag-aagawan sila sa bola tapos… dun ako banda sa ring di na-shoot ni Diwa… tas nakuha ko. (*Before, it was amazing, I was near the ring. They were fighting for the ball. When Diwa missed the shot, I got the ball.*)
		Dapat meron tayong…Di ba dati di nagtagumpay ang plan natin dahil wala tayong defend? (*We should have... Our plan did not work before because we have no defense, right?*)
Internalization	Assessing difficulty, confidence in finding the solution	Kaya nga pwede tayong lumusot sa kanila e. (*That's why we can go under them (Context: They are shorter than the opponents.*)

For the last problem-solving task, the group skipped the formulation phase. They immediately came up with plans. They were confident about their ideas and consistently referring to their experiences in the past games to find solutions and/or options (e.g., "…Kasi di ba, ako unang tagabantay sa ring? Dati pa. [… Because I was the one under the ring even before, right?]"). Table 12 demonstrates the discussions of the TGFU group.

Table 12
TGFU Group's Third Discussion Sample Excerpts

Phases	Sub-categories	Actual Students' Response
Implementation	Exploring the essence of the plan, performing the plan, monitoring the performance on the plan	Ah alam ko na, Sally...di ako sa gitna, kayo, medyo layo layo kayo. tapos mamaya may lalapit, edi lulusot ako...o kaya sa ilalim nila iaano ko yung bola...tapos habulin niyo na yung bola... (*I know already, Sally! I will not be in the middle. You should both move far from each other. Then later someone will come near. So I will cross. Or I will do something with the ball underneath them. Then just run after the ball.*)
		E 'di apply natin yung ano...I-apply natin yung pagpasa. Yung pass and go... (*Let us apply the one with passing. The pass and go.*)
Evaluation	Reflecting the solutions, monitoring and justifying the solution	Kasi di ba, ako unang tagabantay sa ring? Dati pa. (*Because I was the one under the ring even before, right?*)
Internalization	Assessing difficulty, confidence in finding the solution	Pupunta ako sa side. Sa mga side po para meron akong choice...kung sa side o ano.. *(I will position myself on the sides, so that I can have a choice where to go or to pass the ball.)*

The experimental group's insights involved knowing their strength and weakness as a group. These were based on their past experiences during the games held in class. This was confirmed when the same question was asked to the group, "How did you arrive at your ideas?" One member said, "Kapag po nag-fail kame." (When we fail.) Another member supported this by claiming that they arrived at the ideas because of their experiences.

Furthermore, improvement in cooperative learning or collaboration was more evident in the experimental group's discussion than in the control group. They started from having difficulty in expressing their opinions, but later on had the confidence in exchanging thoughts and insights about a situation (e.g. being short and exploring other options). This group consequently reached the internalization phase through reflecting on their previous game failures. Table 13 provides a summary of the phases reached by the experimental group.

Table 13
TGFU Group's Summary of Metacognitive Phases Achieved

	Discussion 1	Discussion 2	Discussion 3
Engagement	✓		
Formulation	✓	✓	
Implementation	✓	✓	✓
Evaluation		✓	✓
Internalization	✓	✓	✓

Although, the TGFU and Skills-Based Approach did not significantly affect students' metacognition based on the quantitative results, they did indicate improvement in metacognition based on the qualitative data. The Skills-Based Approach group started with only the formulation and implementation phase and then reached evaluation phase during the last group discussion. Improvement in metacognition was even more evident in the TGFU group.

The TGFU group might have improved in discussion because of the members' active interactions as the tasks evolved. They were more engaged and motivated in solving the tasks compared to the other group. According to Ryan and Deci (2000) motivation is acquired through psychological needs. TGFU might have tapped students' need for competence, autonomy, and relatedness while solving tasks. Competence, which is the feeling of control and having mastery on the given tasks, was achieved because of the consistent exposure to group activities. The students were able to know and understand each other because of the series of games they had to go through. This might have been the reason why they became comfortable in expressing their ideas with each other. Autonomy or independence, was achieved because they were able to do games on their own. Relatedness, which is the feeling of belongingness and connectedness to others, was achieved because of the nature of the games where they played together as a group. Chatzipanteli, Digeledis, Karatzoglidis and Dean's (2015) study also supported the position that TGFU improves students' ability to voice out how they think. In their study, the students' responses before TGFU approach were limited. These improved after introducing TGFU. Same results were achieved in the current study. Students in the experimental group started with few responses. After being exposed to TGFU, they were able to not only engage in problem-solving tasks but also evaluate and internalize their movements that helped them with problem solving.

Conclusions and Implications

Improvement of thinking skills such as metacognition is one of the main objectives in teaching. In this study, quantitative data showed no significant difference between the metacognition of students exposed to the TGFU and to the Skills-Based Approach; however, upon careful analysis of the qualitative data, it was found that improvement of thinking skills was more observable in the TGFU group. The Skills-Based group reached evaluation stage only in the last group discussion while the TGFU group reached internalization phase as early as the first discussion.

It is also good to note that, based on the results, PE subject has a potential to improve not just motor skills but also thinking skills. Thus, PE curriculum may be revisited to emphasize the centrality of

improving students' thinking skills. More problem-solving tasks should be integrated in PE lessons and teachers should consciously entice students to think about their thinking before, during, and after such tasks. Moreover, TGFU can be explored as an addition to the traditional Skills-Based Approach to create other ways for student to deeply learn about movement and thinking skills. Adequate training of PE teachers on these approaches may also be done to help in the improvement of students' thinking.

There are also limitations in the study that should be addressed since metacognition is a difficult skill to teach and learn. Students should be given more time to be exposed to TGFU to improve significantly in the skill. A smaller class size may also be considered. Having a smaller class size may help the teacher focus on the students' immediate needs such as practicing a specific task to improve on a skill. It may also mean more time for students to do the tasks to practice the skill. Moreover, the research may be improved by providing additional support in group observations such as think-aloud protocols and/or personal interviews for participants to identify and understand thought processes of students in the actual activities.

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