

The effectiveness of using Command and Guided Discovery Teaching Styles with mobile phone in teaching forearm pass skill and enjoyment among primary school students

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ABSTRACT

Finding ways to reach each student begins with selecting the right teaching style which remains a challenge. In physical education, practice style is the most common teaching strategy used to teach skills among students. However, this style was found to limit creativity among students as the teacher is the primary decision maker in a lesson as compared to different students-centred teaching style such as guided discovery that promotes peer feedback and more engagements with friends. Furthermore, adding mobile phone as medium in learning psychomotor skill among primary school children is a new experience and worth to be explored. Hence, this study aims to evaluate the effectiveness of command and guided discovery teaching styles with mobile phone on primary school students' forearm pass skill and enjoyment. The present study was carried out on 28 subjects (7 males, 21 females) between the ages of 9-12 years old. Random assignment was used to divide the sample into two groups: Command teaching style (n=14) and guided discovery teaching style with mobile phone (n=14). The effectiveness of both teaching styles was tested using the psychomotor test established by Brady Wall Volley Test, while the students' enjoyment was measured by using the Physical Activity Enjoyment Scale (PACES). To this end, the students' ability in forearm pass and their enjoyment scale were recorded. All the students participated in one volleyball lesson for 30 minutes, with forearm passing included in the curriculum units. No significant differences were found between both teaching styles either in the psychomotor test or enjoyment test. However, the students' mean scores of forearms passing volleyball skill and Physical Education enjoyment improved more through the Guided Discovery Style with mobile phone, as compared to Command Style. The learning process through connecting the dots in Guided Discovery Teaching Style by students when seeking the answers using mobile phone as the medium to observe, learn and produce the forearms passing movements improves both the cognitive and social domain among students. This style of teaching should progressively take over Command Teaching Style which only focuses on following instruction from the teacher. Considering the fact that this is the first time the students were exposed to this teaching style and the results showed a positive improvement in term of skills and enjoyment especially when learning using mobile phone as the medium. Further research should be conducted to investigate the effects of both teaching styles for a longer duration and on a larger population.

Keywords

Volleyball skill, Command Style, Guided Discovery Style, mobile phone, enjoyment

Introduction

Physical Education (PE) serves to educate students through physical activities (Goldberger, 1991). PE not only assists students in reaching their potential in a variety of sports, but also enhances their confidence and life skills like collaboration, communication, creativity, critical thinking, and aesthetic appreciation. Although curriculum goals can vary from country to country, all focus on fostering students' motor skill acquisition, cognitive learning, physical activity levels and affective learning (Ran Gerdin et al., 2019; Sympas et al., 2016; Wee, 2013). Teachers make up an essential component of the learning process. Thus, teachers should convey the skills that they want to transfer to students in the most appropriate way possible (Özgül, Atan, & Kangalgil, 2019). Hence, effective PE teachers should be proficient in various teaching styles (TS) to promote students' learning and help them to accomplish the curriculum goals (Derri & Pachta, 2007). To meet the physical, cognitive, and social needs of the different learners, teachers must employ different TSs, hence the development of the Spectrum TSs is important.

Mosston's Spectrum of TSs (Mosston & Ashworth, 2002) is perhaps the most comprehensive framework which has been applied and refined for over 30-years in the domain of PE. Mosston and Ashworth's TSs can be

considered as a “toolbox” which could guide PE teachers to support students in realising the learning objectives (motor, cognitive, and social) associated with a given context (Byra, Sanchez, & Wallhead, 2014). The 11 TSs of Mosston will lead to different learning outcomes (Goldberger, Ashworth, & Byra, 2012). Each style, with its specifically different decision anatomy in the pre-impact, impact and post-impact set of decisions, offers significantly different and enriching landmark learning opportunities (Zeng, 2014). This means that each TS has a structure and offers a specific landmark learning purpose.

Many studies (Chatoupis & Vagenas, 2017; Zeng, 2016; Byra et al., 2014; Jaakkola & Watt, 2011; Kolovelonis et al., 2011) were conducted in an attempt to discover the relationships between different reproductive TSs and student learning rather than production TSs but perceived production TSs to be equally beneficial or more beneficial for their students than styles from the reproduction cluster. Research of Zeng (2016) showed that the reproduction styles are used more often than the production styles. Of all the TSs, the practice style was the most used, followed by the CS and the inclusion style (Mosston & Ashworth, 2002). The use of guided discovery and convergent discovery of the six production TSs were sometimes used, with the remaining four seldom used (Chatoupis, 2018).

Command Style (CS-Style A) and Guided Discovery Style (GDS-Style F) were selected in this present study as they were chosen by most of the teachers (Byra et al., 2014). Command Style emphasises the role of teachers as decision makers. Teachers have to make decision before, during and after the learning process. The learner's role is to perform, follow and to obey. Findings of Sympas et al. (2017) reported that learning is more effective when the teacher is the source of knowledge and decision maker. It appears that command or practice style might be an appropriate choice if the teacher wants to elicit skill improvement and short-term learning in a task that is closed and target-oriented. The emphasis of this Spectrum TS is more on learner psychomotor performance.

On the other hand, the emphasis of GDS is on the cognitive learning domain. The learners seeks the answers to a sequence of questions that leads to the discovery of concept, principle, or reason for doing something a particular way (Mosston & Ashworth, 2008), such as discovering the use of forearm to pass the ball over the net. Therefore, using GDS, students will be able to connect the dots by themselves when seeking the answers throughout the questions in the sequence and provide the learner with opportunities to engage in cognitive operations that rely on discovery of information.

Volleyball is chosen as it is recommended to be acquired in the formative years of primary school children. The aim of this sport is to send the ball to the other side of the net under organized rules (Aracı, 2006). Most of the studies that have been conducted were related to reproduction and production cluster of TSs with learning outcomes (Chatoupis, 2018, Zeng, 2016), and only a few studies about comparing teaching volleyball basic skills between teacher centred learning and student centred learning style have been carried out (Sunay, Gündüz, & Dolacı, 2003; Neetz, 1987). Study of Cahyadi et al. (2019) found that the CS shows a huge influence compared to divergent TSs in improving badminton skills. In addition, because of what had been practiced in PE and time constrain, Physical Educators usually apply Command or Practice Style, which are the dominant teacher-centred learning. The teachers in India are forced to choose reproductive style teaching due to that the PE teachers are not trained in productive TSs, not familiar with other TSs (Duaigues & Giménez Fuentes-Guerra, 2010) and productive TS are viewed as a threat to student control (Arjunan & Jayachandran, 2012). Besides, Aktop and Karahan (2012) also reveal that 99.1% of teachers prefer to use expository strategies in their classroom. Sympas and Digelidis (2014) have reached similar conclusions, indicating that teachers spend most of their time teaching classes using reproductive styles. Since the new PE curriculum started, the PE teacher had been recommended to use student-centered methods like reciprocal, self-check, inclusion, guided discovery and divergent methods (Aktop & Karahan, 2012). The advocates of GDS recommend that the aforementioned method is more suitable for the primary school children. It was found that both the teacher-centered and student-centered TSs were effective in acquisition of discrete skills. However, for retention and transfer of learning, the child-centered approach had an advantage (Arjunan & Jayachandran, 2012). Therefore, it seems that an inconsistency exists between suggestions for the PE curriculum and the preferred methods used to teach classes.

The study of Sunay et al. (2003) showed that no significant differences were found between the effectiveness of command and GDS in teaching volleyball basic skills. On the other hand, a study by Neetz (1987) found that command and GDSs showed positive results for the bump and serve skill. However, the CS produced a significantly better result on setting skill. The study of Cuellar-Moreno (2016) concluded that a more varied use of TSs (mixed Reciprocal and Guided Discovery TSs) compared to CS could improve student involvement and satisfaction and provide a better response to the requirements of PE curricular programs. Findings of Chatzipanteli et al. (2015) indicated that the combination of student-activated TSs may have encouraged students to learn about concepts, and strategies (declarative knowledge), related to executing the appropriate motor skill (procedural knowledge) and when to use it (conditional knowledge) to succeed in game situations. Study of Özgül et al. (2019)

found that the inclusion style was more effective than the CS or traditional teaching methods in teaching volleyball skill among middle school. There is still very little empirical evidence for the guided discovery TS in PE. Inconsistent results were reported in these studies, requiring further investigation to verify the effectiveness of using student centred learning strategy in teaching PE, and to examine the reasons for ineffective outcomes, especially for student centred learning style. Byra (2000) points out that the opportunity for elementary-aged learners to attempt skill trials in the guided discovery and CSs is similar. However, the GDS is as effective in fostering student skill and cognitive learning in an elementary population as the CS. According to Shieh and Yu (2016), teaching methods that promoted in guided discovery instruction are to cultivate learner' abilities of discovery, exploration, problem-solving and independent thinking, and creation and invention through discovery or creative learning. In other words, students could actively, rather than passively, participate in learning.

So why these results? Why are the student-centered TSs seldom used by the educators? Perhaps one of the reasons was closely related to the ability of the students to connect the dots between the movement performed as the results of the teaching tools used. Furthermore, all these studies were conducted a long time ago (almost 20 years) where the usage of mobile phone especially in schools was still very limited. In recent years, the rapid advancement of mobile phone has created new interests and tools for use in the educational domain. School-aged children and adolescents are accompanied by mobile phone not only in their leisure time but also in their daily life at school (Nemcek, 2013). The digital age continues to expand the ways teachers engage students in content-area learning. The use of digital tools provides multiple and varied opportunities for teachers to foster authentic and engaged learning experiences (Siefert et al., 2019). Mobile phone has the potential to facilitate more effective instruction in PE and to provide physical educators with key pieces of information that can be used in advocacy efforts. Moreover, Semiz and Ince (2012) stated that integrating of technology such as mobile phone in teaching and in emerging PE and sports related technologies is recommended.

The advancement in mobile phone has brought upon countless developments in sports, especially through mobile electronic devices that are able to record and interpret the physical efforts that have been carried out (Stoicescu & Stanescu, 2015; Fabian & MacLean, 2014). As a result, mobile devices have become an attractive learning device for education (Baran, 2014). Some of the researchers conducted the study by integrate ICT in their PE classes, for example through the use of computers, e-mail and Internet (Gibbone et al., 2010), pedometers, heart rate monitors, telephones, tablets, reality simulators, exergames (Lindberg et al., 2016) and mobile applications related to physical activity and sport (Pyle & Esslinger, 2014). PE teachers have traditionally relied on observations as a primary method of assessment in determining student activity levels. However, recent advances in physical activity mobile phone provide more valid and reliable measurements that can help document student performance (Eberline & Richards, 2013).

The study of Stoicescu & Stanescu (2015) and Gibbone, Perez and Virgilio (2014) have shown that the efficiency of PE can be enhanced through the usage of mobile phone. With mobile technology particularly, physical educators now have a wide range of tools that they can use to examine and improve their students' physical skills. Advanced mobile devices such as smart cellular telephones are very popular among people because they are wireless and portable (El-Hussein & Cronje, 2010). It can be enjoyable tools for complementing traditional PE activities and promote social interaction and facilitate collaborative learning environments (Heflin et al., 2017). The study of Palao et al. (2015) investigated the effectiveness of the use of video feedback on student learning in PE. The result showed that there were significant improvements in skill execution, technique, and knowledge learning when applied 'video and teacher feedback'. Students performance videos can be shown during school board meetings, parent or teacher conferences, and assemblies to demonstrate the variety of activities offered through PE. The potential of the use of mobile phone as teaching, learning and assessment aid in PE should be investigated in a twenty-first century society that emphasis on communication, teamwork and problem-solving (Weir & Connor, 2009). The majority of the studies have been focused on PE teacher education students' information and communication technology (ICT) competency and skills (Adamakis & Zounhia, 2013; Goktas, 2012). Not much evidence can be found on in-service PE teachers using mobile phone in PE (Kretschmann, 2012; Tearle & Golder, 2008).

In fact, PE might not be judged as technology-related subject since it usually conducted the activity outside the classroom (Kretschmann, 2010). According to Howard Gardner's Multiple Intelligence Theory (1999), every person possesses all the eight multiple intelligences but in differing quantities, meaning that they are developed differently where optimum learning occurs, when content is delivered to their dominant intelligences (Sulaiman, Abdurahman, & Rahim, 2010). The multiple areas of intelligence include verbal-linguistic, logical-mathematical, visual-spatial, musical-rhythmic, bodily, interpersonal, intrapersonal and naturalistic intelligence (Eberle, 2011). By using mobile phones in TSs, students can develop their visual-spatial intelligence when they playback and review the skill that they have carried out. At the same time, they can make use of their interpersonal intelligence when they

make comparisons and have discussions with other peers, throughout the process of discovering the answer (connect the dots). Teachers can video-tape student performances and then replay the video to show students the skill elements they are performing correctly and those element that need improvement. Videos can also help in highlighting students who are successful at a particular task, where the teacher can positively reinforce student behaviour. Nevertheless, findings could help teachers to take advantage of the combination of affordances of mobile technology and TS that actually improve some aspects of learning practice. To analyse the effect of the command and GDS with mobile phone on teaching forearm pass skill and enjoyment the following question- was examined in the present study: a) Were primary school students taught with GDS with mobile phone more effective than students taught with CS in learning forearm pass skill and enjoyment? It was hypothesized that guided discovery TS with mobile phone would be more effective than CS in teaching the forearm pass skill and enjoyment.

Method

Participants and research setting

The sample for this research involved 28 students which included 21 females and 7 males. All of the sample mean age were 10±1 year from a primary school and the students were taught volleyball skills during their PE classes. All subjects were informed about the study and its purpose, with the consent from their parents obtained before the study was carried out. Participants were selected among students who were novice players of volleyball and were divided into two groups. Each group consisted of 14 students which were randomly assigned. One group was taught with CS while another group was taught using GDS for only one lesson (video was recorded by a camera during the lessons). The lessons were conducted for 30 minutes with lesson plans concerning both TSs, as determined by the instructors and teachers, being prepared and applied. The lesson plain consisted of four steps hich were warm up, introduction, group activity, and conclusion. Detail lesson plan can be obtain upon request. The instructors included one volleyball trainer and one teacher. The effects of the different methods on forearm pass skill and enjoyment among the students were studied on both groups.

Procedure

An experimental pre-test/post-test design was used to determine the effectiveness of Command and GDS, and were firstly evaluated prior to the intervention (pre-test) and again after one PE lesson (post-test). The control group will follow the normal PE lesson conducted using the CS method, while the experimental group will employ the guided discovery TS with mobile phone. Pre-test measurements were taken before the experiment and post-test afterwards for each group.

Measure

Student's demographic information (age, gender, class, etc.) was obtained using a demographic information sheet completed by students, with assistance from qualified PE teacher and instructor. Brady Wall Volley Test was used to measure psychomotor ability (Figure 1). The test was developed by Brady to measure the general volleyball playing ability (Kronqvist & Brumbach, 1968). There was no restraining line used and a line eleven feet six inches was designed as the net line. The score indicated the number of times the ball hit the wall target. The subjects volleyed the ball against the wall for one minute and had one trial. The reliability coefficient was calculated as .93 and the value of validity was .86 (Brady, 1945). The data of pre-test and post-test of psychomotor skill were recorded on video and evaluated with reference to other volleyball skill videos, arriving at an equivalent average score.

The PACES test, which includes 7 negative items, measured the emotional aspects of the research (Motl et al., 2001), with higher scores indicating lower physical activity enjoyment. The questionnaire was formulated based on a 5-point Likert scale with the responses ranging from highly disagree, disagree, neutral, agree and highly agree (Liang et al., 2014). The lowest possible score was 7 and the highest was 35. When the scores were averaged, the lowest was 1 and the highest was 5. The Cronbach's alpha reliability index was calculated as .90; the criterion validity index was calculated as .95.

Data Analysis

Statistical analysis of the results was performed with excel. Descriptive statistical methods of the data show a normal distribution. Since the subjects were homogeneous and had a normal distribution, Independent t-test was used to analyse the data and the meaningfulness level was taken as 0.05.

Results

Results of the Pre-test and post-test of Brady wall volley test teaching by CS and GDS are shown in Figure 2. As can be seen, the mean of pre-test of Brady wall volley test teaching by CS was 2 and post-test was 3. Pre-test and post-test of Brady Wall Volley Test teaching by CS and GDS indicated no significance different for both groups ($p>0.05$). When the pre-test and post-test scores of the control and experimental group were evaluated, no significant differences were found. However, Figure 2 showed that the post-test skill scores were higher than the pre-test skill scores for both groups.

The result of the pre-test and post-test for enjoyment PACES test for both TS are shown in Figure 3. As can be seen, the result of CS and GDS showed no significant difference in increasing their enjoyment ($p>0.05$). The score of pre-test and post-test of the enjoyment PACER test for both TS are shown in Figure 3. The post-test PACES scores were lower than the pre-test PACES scores for both groups (the lower the enjoyment score, the higher the enjoyment level). This indicated that the students were enjoying their PE lesson more, especially for the GDS (excitement due to the usage mobile phone).

Discussion

The purpose of this study was to evaluate the effectiveness of command and guided discovery TS with mobile phone on primary school students' forearm pass skill performance and to evaluate the effects of both TSs on primary school students' enjoyment during PE classes. The results of this study showed that no significant differences were found between the two TSs. The results found similarities to the studies done to investigate the effectiveness of various TSs in the psychomotor domain, which had also shown no differences among them (Goldberger, 1991; Goldberger & Gerney, 1986). For instance, no differences between the Command and Guided Discovery TS were found in teaching golf (Silverman, 1991). Goldberger et al. (1982) conducted a research by comparing the Command, Reciprocal and Inclusion TSs in teaching hockey and they found that these TSs have an effective result in teaching motor skills, but there were no statistical differences found among these TSs. Meanwhile, Sunay et al. (2003) compared the effects of the CS and the guided discovery method for teaching volleyball technique and also found no meaningful differences between them. This outcome shows a parallelism with our study. This is because some students are used to teacher centred learning style and seldom give response to questions from teachers when they are implementing student centred learning style. In addition, this study had employed a single lesson unit design, resulting in a crucial time limitation for the teachers to accomplish a new skill and TSs (Dyson & Casey, 2012; Fernandez-Rio et al., 2016). Similar to students, they also need more time to master a skill. Besides, teacher and students need more time to adapt to the new teaching approach and the application of digital mobile phone in TS.

In a review of the effectiveness of teaching physical activities, Dudley, Okely, Pearson, & Cotton (2011) also emphasized that the direct teaching method is more effective for improving children's physical activity and motor skills development. Maria (2014) also highlighted that the direct method achieved better results in improving the motor skills among children for cases between 12-14 years old, but there were significant differences when compared to indirect teaching method. These previous studies using GDS did not show a significant motor skill increase in PE classes. One possible explanation might be that previous studies did not include mobile phone in teaching. One study believes that using mobile phone in the classroom generates greater satisfaction at work and encourages more active participation (Fiksl, Flogie, & Abersek, 2017). The increase in the utilisation of mobile phone reveals not only innovations but also some complex situations (Smeets, 2005). The utilisation of mobile phone influences the interaction between teachers and students. In addition, simple technologies like sound insulation can increase the students' motivation and connection among teacher-students and student-student (Akyürek, 2019). In summary, these technologies provide benefit for both students and teachers in the learning process. However, according to Vernadakis, Zetou, Avgerinos, Giannousi, & Kioumourtzoglou (2006), post-test results showed that no significant differences were found between the groups regarding the skill test using multimedia computer-assisted instruction, traditional instruction, and mixed instruction methods in the process of mastering setting skill in volleyball. This is in line with our study which also showed no significant results when using mobile phone in teaching skill.

Although the results obtained for the psychomotor skill test showed that although these variables are not significant for any of the aspects studied, both groups obtained improvements for all students analysed. The results of the experimental group (GDS with mobile phone) showed a better improvement compared to the control group (CS). This increase was higher particularly in the group where students recorded and corrected their peers by using mobile phone. This result was in line with study of Palao et al. (2015). This suggests ICT in PE is not fully exploited. The use of mobile phone was found to be a worthwhile aid to the education process (Weir & Connor, 2009). It was regarded as a useful aid to learning and in maintaining student engagement. Besides, the study of

Arjunan (2012) reported that for psychomotor skill under the GDS, a child-centred teaching approach is superior compared to a CS teaching approach or a teacher-centred teaching approach. Mohamad (2010) also highlights that GDS in learning the skills of volleyball is more preferable than the CS. Stoicescu and Stanescu (2015) researched the effects of using mobile phone to improve the efficiency of PE and showed a positive effect on PE activity. Therefore, although the results are not significant on a general level, this is similar to the study of Nichols (1994), which stated that production cluster that included Guided Discovery TSs allow the students to gain experiment with different movements and strategies, to make comparisons with other movement responses of their own and their peers, and to analyse the correct motor responses during the learning process. Similarly, the findings of Morgan, Kingston, and Sproule (2005) indicated that peer and inquiry TSs such as the Reciprocal and the Guided Discovery respectively promoted a more mastery oriented motivational climate than direct TSs (the Command and the Practice TSs). According to the social learning theory suggest by Bandura (1978), learning through observation of a model is powerful. Hence, the use of modelling or visual demonstrations through mobile phone is an important tool in PE to teach new motor skill, as replaying the video shows students the skill elements they are performing correctly and those elements that required improvement (connect the dots).

For the enjoyment variable, it can be observed that the results are not significant in all items. Therefore, it can be concluded that differences in the enjoyment variable are affected by the TS. However, GDS achieved higher scores that could encourage students to be more active and collaborative in the learning process. Mullen et al. (2011) also stated that enjoyment plays an important role in encouraging participation of students in physical activity. Enhancing intrinsic and extrinsic motivation through enjoyment help to maintain active involvement of pupils in physical activities (Carraro, Young & Robazza, 2008). These statements are associated with the study of Angosta, Serafica & Moonie (2015) which reported positive interest and enjoyment toward physical activities among the students. Moreover, the production cluster of TSs can enhance the student's motivation as indicated by Hein et al. (2012).

Conclusion and Recommendation

This study concluded that no TS can be considered as the sole best TS because each has different learning outcomes or goals to be achieved. This is due to the non-significance difference between Guided Discovery and CS in improving students' forearm pass skill and in increasing students' enjoyment. Furthermore, each student has their different ways of learning and acquiring information. However, the reproduction cluster of TSs promotes psychomotor performance more effectively whereas the production cluster of TSs places focuses on the cognitive and social domain. This study has broad implications for all teachers and lecturers as by implementing appropriate TS and taking advantage of multiple intelligence theory, the lessons could be made more interesting and creative. Consequently, these features lead to a better skill learning environment and outcome. Therefore, a strategy to inculcate the ability to connect the dots in guided discovery TS, ensuring improvement in the cognitive and social domain among students, should progressively take over command TS which only focuses on psychomotor performance.

Future research should be carried out to investigate further the effects of both TSs for a longer duration (which involves more PE lessons and skill) and in a larger population. Since the study design was focused on single lesson units, the changes resulting from the intervention might be difficult to spot due to students' attitude and the inadequate time for practice. By increasing the number of lessons, the skill progression can be monitored more precisely. Besides, more lessons would also allow both the teachers and students to have more time to adapt to the new teaching approach and the application of digital mobile phone in TS. The result of the present study is limited in representatives of primary school in Selangor state whereas a larger sample used will ensure that the study is more reliable and can be generalized to a larger population, without being restricted to certain age group. Nevertheless, the findings can provide valuable insights for the policy makers in the design and successful implementation of educational workshops or seminar that facilitate the on-going development of PE.

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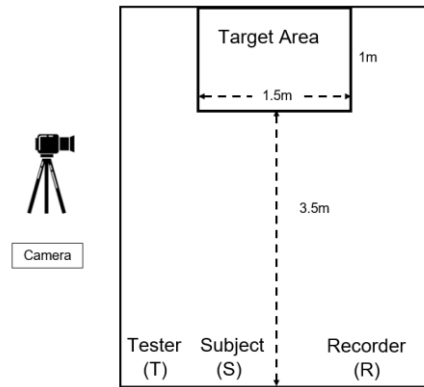


Figure 1. Brady Wall Volley Test

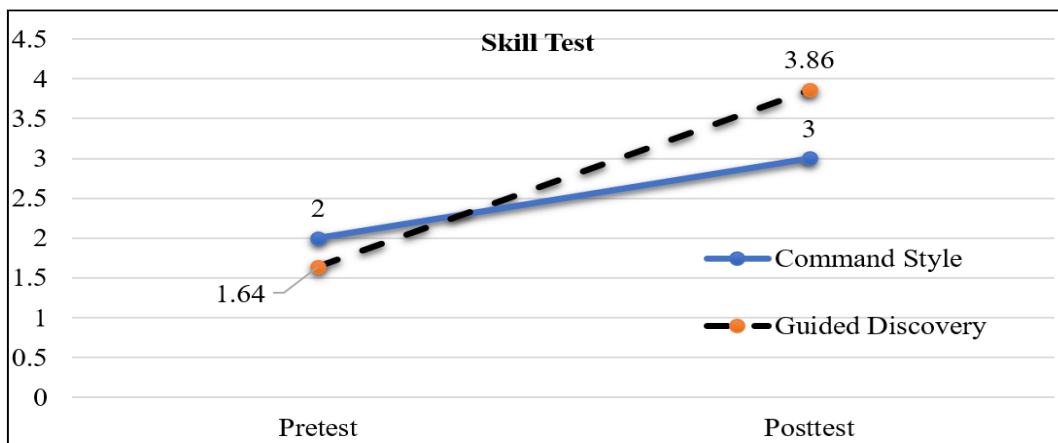


Figure 2. Pre-test and post-test skill scores



Figure 3. Pre-test and post-test enjoyment PACES scores