academicresearchJournals

Vol. 5(4), pp. 116-122, September 2017
DOI: 10.14662/IJARER2017.022

ISSN: 2360-7866
http://www.academicresearchjournals.org/IJARER/Index.htm

***International Journal of Academic Research in Education and Review***

*Full Length Research*

# Skills Acquisition in Dart Manipulation: Ffects of Fixed and Floating Facilitator Models of Problem Based Learning

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Accepted 27 September 2017

**This study investigated the effect of fixed and floating facilitator models of problem based –learning on students process skills acquisition in dart manipulation. It was guided by a research question and null hypothesis. The design used was the quasi-experimental design. Specifically, the pretest-posttest non-equivalent group design was used.The sample size was 208 Home Ecomics students comprising of 151 females and 57 males.Four intact classes from four schools in the area under study were drawn through simple random and purposive sampling techniques. Four intanct classes from four schools in the area under study were drawn through simple random and purposive sampling techniques.The instruments for data collection were Dart manipulation psycho-productive process skill test (DMPPST) a rating scale and two intructional problem based learning lesson plans (Fixed and floating). The Dart manipulation Psycho-productive process skill test (DMPPST) was administered on the different groups before treatment as pre and postest. This test was administered to all the groups to obtain the Dart manipulation process skill acquistion scores. Data obtained were analysed using mean, while all the null hypotheses were tested at .05 level of significance using analysis of covariance (ANCOVA) statistics. The findings showed that: students taught Dart Manipulation using floating facilitator problem based learning model (PBL) had higher mean process skills achievement score than their counterparts taught using fixed facilitator PBL. There was statistically significant main effect ($p<0.05$) for learning models on mean process skills achievement scores of students taught Dart Manipulation. Male students taught Dart Manipulation using floating facilitator PBL had higher mean process skills achievement score than their female counterparts. The result revealed that there was no statistically significant main effect ($p>0.05$) of gender on students process skills acquisition in Dart Manipulation. This finding implies that there is need for clothing and textile teachers to adopt floating facilitator model of problem based learning approach in teaching Dart manipulation at the Colleges of Education in North Central States of Nigeria since it was found to be more effective in improving students process skill acquisition. Based on the findings of this study, four recommendations were made which include the use of floating facilitator model in curriculum for preservice teachers.**

**Keywords:** Dart, Manipulation, Fixed, Floating, Facilitator Models

**Cite This Article As**: Nwadi CL (2017). Skills Acquisition in Dart Manipulation: Ffects of Fixed and Floating Facilitator Models of Problem Based Learning. Inter. J. Acad. Res. Educ. Rev. 5(4): 116-122

## INTRODUCTION

In every new season, designers work hard to create new clothing styles and new look for their customers; they go through very long processes to make their ideas and designs come alive. In design, darts are forms of lines used for style production. They are formed by arrangement of lines in different directions. Darts may change in size, number and direction and are at times placed in a seam to accommodate a style that may sometimes be made invisible. This process of changing dart from one position to any other is known as dart manipulation (Igbo and Iloeje 2013). Darts may sometimes be changed to gathers, tuck or soft pleats, thus used to create new fashion depending on the prevailing style. Darts can be moved around the block in different directions to form styles. These movements include: moving waist dart to shoulder, bust dart to neckline, waist to under arm, bust dart to armhole and movement of dart to form the princess line. These movements produce different designs which solve figure problems. Using darts in the clothing and textile is one of the effective areas of process skills acquisition in clothing and textile and this is called dart manipulation.

Effective process skills acquisition in Dart manipulation concept may be in the area of cognitive, affective and psychomotor domain. These will lead to the production of self-reliant individuals that could go in to garment industry. A close examination of factors responsible for this inadequate process skill indicates that saleable skills in vocational education are no longer attractive to youths possibly because of poor teaching approches, Hargreaves (2006) described teaching approach as an integrated set of theoretical and practical beliefs embodying both teaching syllabus and methods. However some researchers including Pekene (2002) and Sungar and Tekkaya (2006), Dekordi and Heydarmejad (2008) have advocated for the use of these more efficacious methods of teaching. Specifically, Pandey (2012) advocated for problem based learning approach of teaching.Problem-based learning (PBL) is a method of instruction that uses ill-structured problem as a context for students to acquire problem solving skills and basic knowledge. Problem based learning could be a perfect way of combining theory and practice effectively in dart manipulation. In addition, PBL has models or examples to copy.

Model is used in PBL in two senses: to provide a structure for the carrying out of each problem unit and to describe an instructional model (organization of class sessions). The models are (1) fixed or peer facilitator (2) Floating facilitator and (3) hybrid facilitating models. The present study is based on fixed and floating facilitator models. These two models will be chosen because the processes of their applications are in line with the problem-solving skills needed for effective learning of dart manipulation. In the fixed facilitator models, the students are split into groups of about 5-10. The teacher (facilitator) guides the students through their discussions of the problem. The work is done by the students in their groups and with the facilitator, guiding every step of the group activity. In the floating facilitator model, the teacher (facilitator) allows the students to work on their own, but moves around at intervals, from group to group listening to the students and probing their understanding.

Skill in the opinion of Jarnestrom (2000) is the capability of a person in carrying out a predetermined task with the minimum time, energy and material resources. In the context of this study, skill is the capability which students of clothing and textile must acquire to enable them perform a given task in dart manipulation process. Process could be defined as a series of actions, changes or functions bringing about a result. Process skill acquisition is crucial for all human activities. In today's era of fast-paced technological change, the rapid acquisition of skills transferrable to the work place is becoming even more vital Langan-Fox (2001). A broad aim of this present study is to focus attention on the process of skill acquisition in dart manipulation rather than on outcome and to use an understanding of internal processes to inform the design of training program.

Process skill acquisition tells what the students have acquired during the process of manipulations. Manipulation in the view of Hornby (2004) is connected with the ability to handle objects skillfully. In order to achieve observable skill acquisition in dart manipulation, there is need to measure their process skills by using well-constructed and validated Psycho-productive skills test which include: multiple choice test items and rating response where necessary. Though rating scale could be used, Berg (2001) noted that the limitation of rating scale is that it is expensive, involve many raters and cannot measure process of manipulative skills development for large groups. The psycho- productive skills multiple choice items whose psycho-metric properties (item difficulty, discrimination and distraction) which are determined through the ability group of a student can overcome these limitations (Ackerman, 1990). Although the test measures the gains of educational programmes what a student has acquired from the process of learning, psycho-productive test items enable students to demonstrate the acquisition of process skills in dart manipulation and probably practice them after graduation to earn a living. In order to improve the acquisition of process skills of students in dart manipulation, efforts should be made at investigating the interactive effect of treatment given to students and their gender.

Some researchers have found boys achieving better than girls especially on high order knowledge, however

some others establish no significant difference particularly during early education. Which approach, fixed or floating facilitator model of PBL will benefit both genders in dart manipulation? This study therefore was designed to investigate the effect of two models of problem based learning approaches (fixed and floating) on students' process skills acquisition in Dart manipulation.

## PURPOSE OF THE STUDY

The major purpose of the study is to investigate the effect of fixed and floating facilitator models of problem-based learning (fixed and floating) on students' process skills acquisition in dart manipulation.
Specifically, the study sought to determine the:

1. effect of fixed and floating facilitator models of problem based learning (PBL) on the mean process skillsachievment in dart manipulation.
2. influence of gender on the mean process skills acquisition in dart manipulation.

## RESEARCH QUESTIONS

The following research questions guided the study:

1. What is the effect of fixed and floating facilitator models of problem based learning (PBL) on the mean process skills acquisition in dart manipulation?
2. What is the influence of gender on the mean process skills acquisition in dart manipulation?

## HYPOTHESES

The following Null hypotheses guided the study

**$Ho_1$:** There is no significant difference in the process skill acquisition of students taught dart manipulation with fixed facilitating model and those taught with floating facilitating model.

**$Ho_2$:** There is no significant interaction effect of treatments given to students and their gender with respect to their process skill acquisition in dart manipulation.

## METHODOLOGY

### Area of the Study

This study was carried out in the North central states of Nigeria. The North central state of Nigeria is made up of seven states. These include; Kogi, Benue, Nassarawa, Niger, Plataeu, Kwara and FCT Abuja. All the accredited Government Federal and State Colleges of Education that enroll students for Home Economics in the Nigeria Certificate in Education (NCE) Examinations were used for the study. The zone was chosen because they have reasonable number of male and female regular Home-Economics students allowed for effective comparison of process skill acquisition.

### Design of the Study

The study adopted a quasi-experimental design. Specifically, a pretest-posttest non-equivalent group designwas used. Quasi-experimental design was used in this study because full randomization of subjects to experimental groups was not possible. In order not to disrupt the normal class structure, intact classes were used in this study.

### Population for the Study

The population for the study consisted of all the 426 NCE III Home Economics students in the 14 Federal and State Government Colleges of Education in North central states of Nigeria in 2010-2013 academic session where Home-Economics was offered as compulsory vocational subject. The schools with the number of Home-Economics students are seen in appendix N pg 291 and 292.

### Sample and Sampling Techniques

The sample size was 208 Home Economic students comprising 151 females and 57 males. Purposive sampling techniques were used to draw four Government colleges of education. The four colleges were drawn because they had reasonable number of males and females students that will allow for effective comparison of acquisition of process skills. Other colleges were dropped because the numbers of females and males students of Home-Economics were grossly inadequate for effective comparisons. Two schools were assigned to one experimental model while the other two were assigned to another experimental group. All information about the group were obtained from the personnel department of the various colleges of education 2010-2013.

### Instrument for Data Collection

The instruments for data collection were Dart manipulation psycho-productive process skill test

(DMPPST) a rating scale and two instructional problems based learning lesson plans fixed and floating. The reliability of the instrument DMPPST was determined using Kuder – Richardson formula 20 (k – R 20).

### Method of data collection

At the beginning of the experiment the researcher, with the regular Clothing and textile teacher in the Colleges of Education administered the pre-test of the (DMPPST) to the treatment groups. At the end of the experiment, the DMPPST was administered to the two groups as posttest. For each of the groups data for the pre-test and post test were recorded separately.

### Method of Data Analysis

Mean was used to answer all the research questions. Standard deviation was used to determine the degree of deviation from the mean, while analysis of covariance (ANCOVA) was used to test null hypothesis at '0.05' level of significance. The use of ANCOVA was to control the errors of the initial non-equivalence arising from the use of intact classes as subjects of the study.
With the use of ANCOVA too, the pre-test result served as covariate of the post test results. The analysis was carried out using the statistical package for the social sciences (SPSS).

### Findings of the Study

The findings of this study are presented as follows:

1. Students taught Dart Manipulation using floating facilitator problem based learning model (PBL) had higher mean process skills achievement score (33.55 $\pm$ 4.88) than their counterparts taught using fixed facilitator PBL (31. 81 $\pm$ 4.89). There was statistically significant main effect ($p < 0.05$) for learning models on mean process skills achievement scores of students taught Dart Manipulation.
2. Male students taught Dart Manipulation using floating facilitator PBL had higher mean process skills achievement score (32.52 $\pm$ 4.67) than their female counterparts (32.91 $\pm$ 4.98). The result revealed that there was no statistically significant main effect ($p>0.05$) of gender on students process skills acquisition in Dart Manipulation.

## RESULTS

Table 1 shows that the floating facilitator model of problem based learning improved students process skill acquisition in dart manipulation more than the fixed facilitator model. Data presented in Table 1 shows the pre-test and the post test dart manipulation process skill mean scores of studets in experimental group model A and B. The students who were taught using fixed facilitating model learning approach (model A) had a pre-test mean score of 15.97 and the post-test mean process skill score of 31.81. This gives the pre-test and post-test mean gain score of 15.84. the students who were exposed to the floating facilitator model of problem based approach (model B) had a pre-test mean process skill score of 14.60. Their post test mean process skill score was 35.55. this gives a pre and post test mean process skill score of 18.95. This suggests that the students who were exposed to floating facilitator model of problem based learning environment did better in process skill test compared to students who were taught using the fixed facilitator model. To further address the research question, a corresponding hypotheses $H0_1$ was postulated.

### Research Question 2

What is the influence of gender on the mean process skill scores of students in dart manipulation?

Table 2 shows that gender had no influence on the mean process skill scores of students in dart manipulation on the two models of problem based learning. This data shows that the dart manipulation mean pre/post-test of male and female students for experimental groups. The males in the fixed facilitating groups had a mean pre-test score of 16.63. their post-test mean score was 31.49. This resulted to a pre/post-test mean gain score of 14.86. The male in the floating facilitating model groups has a pre-test mean score of 13.61; their post-test mean score was 32.52. this resulted to a post/pre-test mean gain of 18.91. While the females in the fixed facilitating model groups had a pre-testmean score of 15.75. Their post-test mean score was 31.92. this resulted to a pre/post-test mean gain score of 19.03. This implied that gender had no influence on the mean process skill scores of students in dart maaanipulation on the two models pf problem based learning.

## HYPOTHESES

**$HO_1$:** There is no significant difference in the mean process skill of students taught in dart

**Table 1.** Mean response on effect of fixed facilitator and floating facilitator models on process skills scores of students in dart manipulation.

| Group | N | Pretest ($\overline{X}$) | Posttest ($\overline{X}$) | Mean Gain ($\overline{X}$) |
|---|---|---|---|---|
| Fixed Facilitating Model | 200 | 15.97 | 31.81 | 15.84 |
| Floating Facilitating Model | 200 | 14.60 | 33.55 | 18.95 |

**Table 2.** Mean response on the influence of gender on process skill scores of students in dart manipulation.

| Gender | Fixed Facilitating Model | | | | Floating Facilitating Model | | | |
|---|---|---|---|---|---|---|---|---|
| | **N** | **Pretest ($\overline{X}$)** | **Posttest ($\overline{X}$)** | **Mean Gain ($\overline{X}$)** | **N** | **Pretest ($\overline{X}$)** | **Posttest ($\overline{X}$)** | **Mean Gain ($\overline{X}$)** |
| Male | 51 | 16.63 | 31.49 | 14.86 | 33 | 13.61 | 32.52 | 18.91 |
| Female | 149 | 15.75 | 31.92 | 16.17 | 67 | 13.88 | 32.91 | 19.03 |

**Table 3.**

**Tests of Between-Subjects Effects**

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Corrected Model | 358.137[a] | 4 | 89.534 | 3.755 | .006 |
| Intercept | 7865.462 | 1 | 7865.462 | 329.870 | .000 |
| Prettest | 85.375 | 1 | 85.375 | 3.581 | .060 |
| Treatment | 279.810 | 1 | 279.810 | 11.735 | .001 |
| Gender | 5.445 | 1 | 5.445 | .228 | .633 |
| Treatment * Gender | .021 | 1 | .021 | .001 | .976 |
| Error | 4649.611 | 195 | 23.844 | | |
| Total | 205004.250 | 200 | | | |
| Corrected Total | 5007.749 | 199 | | | |

*Significant at Sig of F<.05. Dependent Variable: Posttest

**ANCOVA analysis on achievement skills of students taught in dart manipulation with fixed facilitating model and those taught with floating facilitating model.**

The result presented in table 3 shows a significant difference of .001 on treatment. Therefore there is a significant difference in the effect of PBL approaches in favour of the floating facilitating model.

$H0_2$: Gender has no significant difference on the mean process skill of students taught dart manipulation with fixed facilitating model and those taught with floating facilitating model.

**Table 3: ANCOVA analysis of effect of gender on students taught in dart manipulation with fixed facilitating model and those taught with floating facilitating model.**

The result presented in table 3 showed no significance difference of .633 on gender. The null hypotheses of no significant difference in male and female students (gender) in process skill fixed and floating model of PBL in dart manipulation therefore is upheld.

$H0_3$: There is no significant interaction effect of treatment given to students and their gender with respect to their process skills in dart manipulation.

**Table 3: ANCOVA analysis of interaction effect of treatment on students'process skills and gender.**

Data in table 3 also indicate no significant difference of .976 on interaction. This significant of F is higher than the probability level of 0.05. This means that there is no significant difference in the treatment. Thus the null hypothesis of no significant interaction effect of treatment and gender is upheld as the interaction effect is not significant.

## DISCUSSION

Results of data analysis in (table 1) have shown that students taught dart manipulation concept using floating facilitator model performed significantly better in the dart manipulation than those taught with the fixed facilitator model.Table 1 shows that while the floating facilitator group had the high mean process skill, the fixed facilitator group had low mean process skill acquisition score. This result shows that the floating facilitator group differed from the fixed facilitator group in the mean process skill acquisition score by the students. This result further shows that students' score in dart manipulation seem to depend on teaching approach. Table 2 shows that while the floating facilitator group had the high mean process skill, the fixed facilitator group has low mean process skill score. This finding appears to support the view of Ezugwu (2006) that teacher's teaching approach can greatly affect students' skill acquisition. This finding also agrees with the views of Adesoji (2008), Sungga and Tekkaya (2006), and Rami and Adeoye (2002) that problem-based learning prepares students to be metacognitive aware; giving them opportunities to plan, monitor and evaluate their learning processes. According to their submission, PBL is a metacognitive instructional strategy that greatly affects students' skill acquisition in school. Therefore, the observed significant difference in the mean dart manipulation process skill score for the instructional group (floating facilitator), in this study would be attributed to students' improved participatory learning leading to an understanding of the fundamental concepts in the identified concept.

The relative superiority of the Floating facilitator approach over the Fixed facilitator approach in enhancing students'process skill acquisition would be attributed to the fact that, as instructional approaches, the floating facilitator approach ensured more active participation of students rigidly yet under the guide and facilitation of the teacher in the teaching – learning process. The students do more on their own more than the fixed facilitator approach. The Floating facilitator approach often subjects the learners to the position of a self-participation, doing and understanding the facts handed down to them by the teacher. Given these prevailing circumstances under which the two treatment approaches are employed in classroom instructions, it is not surprising that the floating facilitator groups out performed the fixed facilitator group in dart manipulation psychomotor process skill acquisition during posttest/after teaching. However the fixed facilitating model was effective during pretesting.

This finding is similar to the view of Omele (1994) that no single teaching approach has been found to provide all it takes for reasonable skill to be attained by learners. His findings showed that there was no significant difference in the mean achievement of students taught biology topics using lecture method and guided discovery. He suggested a blend of the two methods of instruction for enhancement of students' achievement in biology.

The present study has indicated that students' psychomotor skill is higher when students experience effective active learning instruction. The teacher facilitates and guides students in the learning process while the students take control and the teacher visits sparingly. The floating facilitator approach of PBL is one of these active learning strategies, where students must go beyond their textbooks to pursue knowledge and skill application irrespective of the teachers presence. In problem-based learning, students are expected to acquire skills, such as problem solving, questioning, researching, thinking, critical reasoning and collaborative working skill. When students succeed in acquiring these skills, they will enjoy the opportunity of functioning effectively on their own in a problem-based learning environment. The main aim of problem-based learning is to make students active, free and self-reliant individuals rather than being passive recipients to the knowledge.Floating facilitating PBL encourages students to become more involved in, and responsible for their own learning. With these, learners come to understand that learning is their own responsibility. The opportunities of being active which students are exposed to problem-based learning environment have been found to contribute immensely in helping them have good mastery of the concepts or the learning issues that is presented to them. The significant skill acquisition of the students therefore in the floating facilitator group could be explained by the fact that this approach of problem-based learning creates a learning environment in which students are given the opportunity to participate actively in the learning situation, and learning by finding solution by themselves to their learning problems. There is scarcity of studies that have recorded contrary results to the effectiveness of problem-based learning on students' process skill acquisition when floating facilitator model is applied in teaching.

The result of this study as shown in table 3 revealed that students' gender has no significant influence on their process skill acquisition.This shows that even though it was discovered in this study that the approaches significantly influenced students'process skill acquisition in dart manipulation,It is also important to note that there was no significant difference in the influence of gender on both process skill acquisition in dart manipulation of students due to exposure to PBL. This could be attributed to equal opportunity which learning in a problem-based approach affords to all students.

## CONCLUSION

Given that the acquisition of skill and competencies in

clothing and textile concept like dart manipulation is a prerequisite for entry into clothing construction related occupations, the need to find out the best approach of teaching to assist NCE students to learn and improve their psychomotor skills is paramount. This study found out that the use of floating facilitator model of PBL approaches is more effective in improving student' process skill acquisition in dart manipulation than the fixed facilitator approach. The study revealed that, there was no influence attributable to gender on students' process skill acquisition in dart manipulation. Also, the study found out no interaction effects of the two approaches (fixed and floating) and gender on process skill acquisition in dart manipulation. This simply means that the effectiveness of floating facilitator model of PBL approach on student's process skill acquisition in dart manipulation does not depend on gender. Hence, irrespective of sex, learners will record improved process skill acquisition when the floating facilitator approach is employed for teaching dart manipulation in clothing and textile. These results therefore showed that the floating facilitator model is a viable teaching approach for dart manipulation concept in clothing and textile.

## RECOMMENDATIONS

The following recommendations were made:

1. Floating facilitator model should be included in the curriculum of pre-service teachers of clothing and textile so as to popularize their use among the teachers in schools.
2. Given that the efficacy of floating facilitator instructional model in fostering students' acquisition of process skill in dart manipulation, it is instructive that Nigerian clothing and textile teachers should adopt floating approach in teaching dart manipulation and other practical concepts in clothing and textile in colleges of Education

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