



## **Effect of Mastery Learning Strategy on Academic Achievement and Interest of Metalwork Technology Students in Universities in South East Nigeria**

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### **Abstract**

*The study investigated the effect of mastery learning strategy on academic achievement and interest of metalwork technology students in universities in South East Nigeria. The study adopted a quasi-experimental design. The population of the study comprised of 5 universities offering industrial Technical Education in South East Nigeria. The entire population was 372 which 72 students were purposively sampled for the study. The population for the study was grouped into two intact classes. The experimental group called A is made up of 40 students and the control group called B is made up of 32 students. The experimental group was taught metalwork technology using mastery learning strategy while the control group was taught using conventional teaching method for the period of four weeks before exposing them to post-test treatment. Two research questions and one null hypothesis were formulated for the study. The metalwork Achievement Test (MAT) was employed for the study as the instrument for data collection. The test items were validated by three experts. The reliability coefficient of the study was determined using Cronbach Alpha and the Reliability coefficient was 0.81. The data collected were analyzed with frequency count and percentages for research questions and t-test statistics was used in testing the hypothesis at 0.05 level of significance. The findings of the study revealed that there was a significant difference in the academic performance of students taught metalwork technology using mastery learning strategy and students metal technology using conventional teaching method (CTM) in universities in South East Nigeria. Based on the findings the researcher recommends that lecturers should adopt mastery learning strategy in the teaching of metalwork technology for skill acquisition by students to achieve better. The researcher also recommends that seminar, workshop and conferences should be organized to update lecturers on how mastery learning strategy should be used.*

**Keywords:** Mastery Learning Strategy, Skill Acquisition, Metalwork Technology, Effective Teaching

### **Introduction**

Mastery learning is a concept in educational system that cannot be overlooked or skipped whenever there is need to discuss about skill acquisition among students. Mastery learning approach according to Agboho (2014) is the instructional method where students are allowed unlimited opportunities to demonstrate mastery of the content taught. Hence mastery learning is described as the ability of the students to demonstrate effectively the content of the course of study taught. Similarly, Adeyemi (2007) asserted that mastery learning strategy involves a pre-specified criterion level of performance which students must master in order to complete instructional and proceed. Also, according to Wambugo (2008) mastering learning strategy permits students to

repeat study materials until they master them. Mastering of a content is said to be achieved only when students are allowed to practice such content repeatedly without failure. In metalwork technology students are expected to exercise the required competencies and skill needed in the contents before mastery is attained and student are expected to proceed. Also, according to Wambugo [2008] mastery learning strategy permits students to repeat study materials until they master them. Mastering of content is said to be achieved only when students' academic performances is above average as a result of repeated practice. In metalwork technology students are required to demonstrate the competences and skills needed in the content before mastery is attained and student are permitted to proceed to next level. In the same vein, Wachanga and Mwangi (2004) noted that for mastering to be achieved emphasis is placed on developing learners' capabilities for achieving instructional goals. The achievement of instructional goals according to Spencer (1996) is that the content should be planned and organized in such a way that every student can perform and learn to attain more academic achievement according to their capabilities. Stressing more on achievement, Maiyo (2009) posited that in Nigeria, examinations are measure of academic achievement. For instance, senior secondary school certificate and tertiary admission are critical examples of academic achievement.

Academic achievement can be described as the participant examination grade that can be ascertained through scores at the end of the programme. Academic achievement can also be described as the out coming teaching and learning process. In a similar way Imeofor (2019) described academic achievement as a fundamental aspect of everyday life, affecting peoples work, interpersonal relationship, sense of being and leisure. The academic achievement is further defined as the student's grade obtained at the end of a programme. This grade according to Egbule (2004) is seen as the level of performance of an individual in a particular field of study. But achievement of instructional goal in metalwork technology is summarized as the testing of skills and competences achieved.

In metalwork technology, skills are acquired only when the content of metalwork is mastered. According to Odu (2010) the acquisition of the required skills is a means of increasing the productivity power of the nation. However, every citizen should be equipped with practical skills to contribute to the economic growth of the nation. In as much as Nigeria embraces technological growth our youth requires skill acquisition through mastery learning strategy especially in metalwork areas. In view of this skill acquisition according to Ayominke (2010) opinion is that youths should be empowered to acquire appropriate practical skills for the development and employment purposes. This is because graduates of technical and engineering studies are unskillful. And that is why Okoro (2008) opined that product of technical colleges do not have requisite knowledge and skills that can enable them to take up the available jobs or be self-employed. In respect to this happening, the FGN (2013) opined that the intentions of establishing technical and vocational education is to provide technical manpower in applied sciences, technology and business particularly at craft, advance craft and technical levels as well as given training and imparting the necessary skills to individuals for economic self-reliance. These proposals by the FGN can be achieved by adopting mastery learning strategy in the teaching and learning of metalwork technology for skill acquisition.

Learning can take place in an environment where interest and attention are sustained. The sustenance of interest and attention in learning is only when new instructional methods are injected into the teaching and learning. In as much as new instructional methods are introduced student will be interested to learn the content and achieve better. Highlighting on this Hazikiel (2012) asserted that interest and achievement which students show in learning the content and the mastery they



demonstrate on completion of the course of study is depends to a large extent on the teacher and instructional model used. Instructional model like mastery, learning strategy as introduced may help to arouse interest create attention and induce motivation in learning the contents of metalwork technology in universities.

Metalwork technology is an aspect of mechanical technology programme in tertiary institutions such as universities. Metalwork technology programme according to Oranu and Ogwo (2002) involves activities in the occupations that entail design, processing and fabrication of metals. These activities include forging, machining and welding. In a similar perspective Ugbehu (2015) defined metalwork technology as an entrepreneurial based skill, oriented field of study that is expected to equip learners with skill to make for self-reliance and paid employment. To acquire the needed skills and competences, required by students of metalwork technology in universities, mastery learning strategy should be adopted in teaching and learning to ensure that each skill content is learned before proceeding to the next content. This is because metalwork technology content involves a step-by-step skill acquisition in diverse occupational areas like drilling, welding, machining, fabrication among others.

Studies reviewed in different study areas identified the effectiveness of mastery learning strategy. Mastery learning strategy requires appropriate teaching methods whereby students are given contents to learn and perfect in them. The students are assessed through performance test whereby successful students proceed to the next level. According to Spencer (1997) mastery learning is the type of learning strategy that requires individual learning strategy and method. It can also be described by Davis and Sorrel (1995) as a strategy that involves the discussion of subject matter content into units that have predetermined objectives whereby students are grouped into units and are expected to demonstrate masteries on units. Students that score up to 70% is allowed to move to the next unit. But students who score below 70% in the performance assessment test have not obtained mastery and are allowed to receive remediation though small group discussions, peer mentoring tutorials.

The students that failed, continues the cycle of studying and testing until mastery is achieved through the process of corrective techniques. But in conventional teaching method, allotment of more time and opportunities were not given to student to improve in their course work (Mevanchde, 2001). But if mastery learning/ is adopted studying and testing the students on the content till high academic performance is achieved is guaranteed. Also, students reviewed on other science and related arts subjects indicated that mastery learning approach has been proven to be an effective teaching technique and positive in assessing achievement, attitude and retention of the concepts (Davis and Sorel, 1995). The use of mastery learning strategy should be adopted to identify its effects on the academic performance of students of metalwork technologies in South East universities. Other related studies include Udo and Udofia (2014) who conducted an experimental study to investigate the effect of mastery learning strategy on student achievement in symbols, formulae and equations in chemistry. It was found out that students taught using mastery learning strategy performed better than student taught with conventional teaching method. Similarly, Sarita and Jyoti (2014) investigated the effectiveness of mastery learning model on achievement of students of chemistry and found out that students of mastery learning class performed significantly better than those taught with conventional techniques.

In the same vein, Hutescheston (2015) carried out an experimental study to find out the effect of mastery learning approach on students' motivation in middle level science and found out that students showed an increase in motivation and academic achievement than those taught with conventions teaching method. However, inference drawn from these investigations indicated that student taught with mastery learning in both practical and non-practical courses or subjects

performed significantly better than those taught with conventional teaching method. In view of these, there is need to investigate the effect of mastery learning approach or strategy on the academic achievement of metalwork technology students in universities in South East Nigeria.

### **Statement of the Problem**

There has been low achievement of students in metalwork technology learning and assessment in universities in South East Nigeria. The low achievement or performance can be attributed to students in ability to understand and master the topics and continents before proceeding to the next level. Thus, this paper the effect of mastery learning strategy on the academic achievement of metalwork technology students in universities in South East Nigeria is being or investigated. For sometimes metalwork technology has been very difficult course for technical and engineering students as it involves practical. Based on this reasons majority of the technicians perform negatively. For this reason, the nation cannot achieve favourable technological breakthrough in science as graduates are deficient in skills and competence. To ensure that technological take off is achieve the effect of the use of mastery learning strategy can be guaranteed as a source of skill acquisition by technical and engineering students of universities in South East Nigeria.

### **Purpose of the Study**

The main purpose of the study was to:

1. Determine the differences in the mean achievement scores of students taught metalwork technology using mastery learning strategy and those students taught using conventional teaching method in South East Nigeria.
2. Determine the differences between the mean interest scores of students taught metalwork technology using mastery learning strategy and those taught using conventional teaching method.

### **Research Question**

The following research question guided the study:

1. What is the difference in the mean performance or achievement scores of students taught metalwork technology using mastery learning strategy and students taught using conventional teaching method in South East Nigeria?
2. What is the difference in the mean interest scores of students taught metalwork technology using mastery learning strategy and those students taught using conventional teaching methods?

### **Null Hypothesis**

**H<sub>01</sub>:** There is no significant difference in the mean achievement scores of students taught metalwork technology using mastery learning strategy and those taught using conventional teaching method in universities in South East Nigeria.



## Methodology

The design for the study is a quasi-experimental design. The study was carried out in universities in South East Nigeria that offer technical education. The universities were chosen because poor academic achievement and lack of skill observed among graduates of technical education in metalwork technology. The population for the study comprised three hundred and seventy-two students of Year II in industrial Technical Education Department in South East Nigeria. Seventy-two students were purposively sampled from the entire population. The seventy-two students were selected from the two intact classes involved in the study. But, later 40 students were for experimental group and 32 for control group. The first class tagged group A is considered as the experimental group which was exposed to learning metalwork Technology using mastery learning strategy. While the second group is tagged group B which was considered as the control group which the students were exposed to learning metalwork technology using conventional teaching method (lecture). The instrument for data collection was a structured metalwork achievement test (MAT) that covered the content (topics) studied. The MAT was used as a post-test instrument for data collection and contained 10 test items. Data collection was 10 test items to pass six (6) test items i.e., 10 to 6. The metalwork achievement test was validated by three experts in Department of Industrial Technical Education, University of Nigeria, Nsukka and university of Agriculture Umudike. The reliability of the study was determined using Cronbach Alpha. The reliability coefficient of the study was 0.81. The experimental group which comprised of forty (40) students was taught using mastery learning strategy and the remaining 32 students (control group) were taught using lecture methods for 4 weeks. The data collected were analyzed using simple parentages in answering the two research questions while t-test statistics was used in answering the research hypothesis at 0.05.

## Results

**Research Question 1:** What is the difference in the mean performance or achievement scores of students taught metalwork technology using mastery learning strategy and students taught using conventional teaching method in universities in South East Nigeria?

**Table 1**

### **Simple Percentage Scores of Students Achievement Test in Metalwork Technology**

| <b>Group</b> | <b>N</b> | <b>Pass</b> | <b>%</b> | <b>Fail</b> | <b>%</b> |
|--------------|----------|-------------|----------|-------------|----------|
| Experimental | 40       | 40          | 100      | 0           | 0        |
| Control      | 32       | 20          | 62.5     | 12          | 37.5     |

Data in table 1 revealed that 100% of the students in experimental group responded positively to metalwork technology achievement test items (MAT). All the students in experimental group passed MAT while 12 students out of 32 from control group passed the test and about 37.5% of students in control group failed the test. Hence, it is imperative from the analysis of the data that mastery learning strategy used in teaching of metalwork technology for still acquisition has positive effect or influence on students' academic achievement in metalwork technology in Universities in South East Nigeria.

**Research Question 2:** What is the difference in the mean interest scores of students taught metalwork technology using mastery learning strategy and those students taught using conventional teaching method?

**Table 2**  
**Simple Percentage Scores of Students Achievement Test in Metalwork Technology**

| Group        | N  | Pass Score |     |     |      | Fail Score |     |        |
|--------------|----|------------|-----|-----|------|------------|-----|--------|
|              |    | (10)       | (8) | (6) | %    | (4)        | (2) | %      |
| Experimental | 40 | 15         | 20  | 5   | 100  | 0          | 0   | 0      |
| Control      | 32 | 3          | 2   | 4   | 28.1 | 13         | 10  | 71.875 |

Data in Table 2 revealed 15 out of 40 scored the highest score (10) in the experimental group while only 3 students score 10 in control group. Similarly, 20 students out of 40 students score 8 out of 10 in experimental group. In the same vein, 26 students out of 32 students in control group failed the metalwork achievement tests. This indicated that 71.875% of student in control group are not highly interested in acquiring skills and competences in metalwork technology in universities in South East Nigeria.

### Research Hypothesis

**Ho<sub>1</sub>:** There is no significant difference on the mean achievement scores of students taught metalwork technology using mastery learning strategy and those students taught using conventional teaching method in universities in South East Nigeria.

**Table 3**

**T- Test for Academic Achievement of Student in Metalwork Technology**

| Group        | N  | X    | SD   | Df. | T. Value | T. Critical | Significance |
|--------------|----|------|------|-----|----------|-------------|--------------|
| Experimental | 40 | 8.15 | 1.50 | 70  | 9.73     | 1.65        | 0.05         |
| Control      | 32 | 4.87 | 1.09 |     |          |             |              |

The result in Table 3 indicated that the mean value of post-test experimental group is 8.15 is greater than that of control group which is 4.87. In the same way the t-test value 9.73 is greater than the t-critical which is 1.65 at P-value 0.05 level of significance and 70 degrees of freedom. The null hypothesis which stated that there is no significant difference on the mean achievement scores of students taught metalwork technology using mastery learning strategy and those students taught using conventional teaching methods (lecture) in universities in South East Nigeria was rejected. This implies that the students who were taught using MLS performed significantly better than the students who were taught using conventional teaching method in metalwork teaching in universities in South East Nigeria.



## Discussion of Finding

The study reveals that students in the experimental group who were taught metalwork technology using mastery learning strategy (MLS) performed significantly better than those students who were taught metalwork technology using conventional methods in universities in South East Nigeria. The findings of the study were in agreement with Achifusi and Mgbemena (2012) who carried a study on the effect of MLS on physics SSII performance as against conventional teaching method (CTM). The study found out that student taught using MLS performed better in physics SSII than students taught using CTM.

Also, Mwangi (2009) who carried out a study on effect of MLS on secondary school achievement test in Chemistry found out that the mastery learning strategy (MLS) facilitated students' academic achievement in Chemistry faster than conventional teaching method.

In the same vein, the findings of this study are in congruent with findings of the study carried out by Wabugu (2008) on group instruction which revealed that those students taught using mastery learning strategy performed about 98% better than their counterpart. However, it is good to note that student taught using MLS need more time to master the content to enable they acquire skills.

Also, the study revealed that the mean interest scores of students taught metalwork technology using mastery learning strategy is far much greater than students taught metalwork technology using conventional teaching method. The findings of this study is in line with Hazikiel (2012) who asserted that interest and academic achievement which student show in subjects like financial accounting and the mastery they demonstrate on completion of a course of study depends to a large extent on the teachers methodology which include the teacher and instructional model. Inference drawn from Hazikiel's assertion showed also that interest students show in metalwork technology determines the academic achievement they acquire to achieve mastery of the skills needed. In a similar way, Agoghoron (2014) who conducted any experimental study to investigated the effect of mastery learning strategy on secondary students Integrated Science achievement and concluded that mastery learning approach results in high achievement of students' interest to effect mastery. The author also found out that students taught using mastery learning strategy has higher achievement scores. Also, in a similar perspective Adeyemo and Babajide (2014) carried out an experimental study on the effect of mastery learning strategy on students' achievement on physics and concluded that students taught using mastery learning strategy performed significantly better than students taught using conventional teaching method.

## Conclusion

The study investigated the effect of mastery learning strategy on academic achievement and interest of metalwork technology students in universities in South East Nigeria. The study found out that there is significant difference in the academic achievement of students taught using mastery learning strategy in skill acquisition than their counterpart. The study also revealed that interest is a significant factor in learning when adopting a teaching model. Therefore, skill acquisition is effectively achieved by student taught metalwork technology using mastery learning strategy in universities in South East Nigeria.

## Recommendation

Based on the findings of the study, the following recommendations were made.

1. Conferences, workshop and seminars should be organized for teachers to adopt necessary skill needed when using mastery learning strategy for skill acquisition
2. Mastery learning strategy should be adopted by teachers of metalwork technology in teaching the course to achieve excellence in performance
3. Mastery learning strategy should be incorporate into school curriculum for effective implementation.
4. Mastering learning strategy should be adopted in school curriculum to induce interest in students in learning metalwork technology.

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