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Effect of Mnemonics Instructional Strategies (MIS) On Students' Academic Performance in Chemistry and Physics.

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ABSTRACT

The study investigated the effect of Mnemonics instructional strategies (MIS) on students' academic performance and retention in Chemistry and Physics. Four research hypotheses were formulated to direct investigation. The study employed non-randomized, non-equivalent pretest- posttest Quasi experimental design. A total of 200 students Chemistry and Physics students in the public secondary schools in Akamkpa Local Government area of Cross River State were used for the study as sample. The students were taught Electrochemical series using mnemonics instructional strategies while the control groups were taught with lecture method. The reliability of the Chemistry Performance test (CPT) and Physics Performance Test (PPT) were ascertained using Kudar-Richardson formular 20 which yielded a reliability of 0.82 and 0.84 respectively. Two experimental groups and two control groups were used for the study. The experimental and control respondents were taught selected Chemistry and Chemistry contents using Mnemonics instructional package for a period of six (6) weeks in 2016/2017 academic session. Data were collected using the instructional package designed by the researcher to measure the effect of treatment on students' performance and retention. Data were analyzed using independent t-test at 0.05 level of significance. Results of findings revealed that the experimental groups taught with Mnemonics in Chemistry and Physics had a higher mean score than their control counterparts taught with traditional method. Recommendations were made; teachers should adopt mnemonics in teaching Chemistry and Physics concept which help learning to be more flexible.

Keywords : Mnemonics, chemistry, physics and students.

1. INTRODUCTION

Teaching requires building of simple processes of knowledge that is essentially directed towards students-centered instructional activities using hands-on, Mnemonics and interactive approaches that promote learning and performance especially in Chemistry and Physics. Students find Chemistry and Physics concepts very abstract which possibly lead to poor performance.

The Science classrooms are dominated by teacher-centered strategies which emphasize rote memorization learning resulting in short retention. As such, students' achievement in Chemistry and Physics falls below expectation. The Chemistry and Physics Curriculum is packed with specific content geared towards motivating students' active participation in the learning process. Chemistry and Physics are vital subjects that are experimental-oriented in nature, therefore these subject demands active teaching with students at the center of the learning process to promote knowledge growth, science process skills, positive attitude, interest and values that would equip them to solve scientific problems. This instructional strategy will reduce the abstract nature of these subjects and help students understand and retain concepts adequately. Various Instructional strategies have proven efficacious have been advocated and used by different researchers in Science education in attempt to promote conceptual understanding of Science concepts.

Science teaching and learning is driven by goals, aims and objectives. For these to be achieved, effective teaching and students' involvement in the learning process are synergies for learning outcomes. In view of this statement, Svinick (2000), stated that for teachers to impart on the students' learning outcomes there must be effective, dedicated and committed teachers with good content knowledge and methods to enhance instructional delivery.. Teachers are essential tool and wheel in which successful teaching and learning revolves. According to Mushtaq and Kahn (2012) observed that the teacher is responsible for translating theory and content into actions based on practice during interaction with students. Therefore teachers play a major role in the education sector and their role is a major determinant of students' educational attainment in any institution.

Neji and Joda (2016), discovered that the performance and retention of students taught with instructional resources offers students the paradigm to learn creatively and positively impact on the students' learning. Mnemonics teaching strategy is the use of techniques for remembering concepts easily. This technique aids memory recall after a prescribed instructional process whereby learners are actively involved.

Tebabal and Kahssay (2011), observed that interactive strategy is a Mnemonic channel to makes teaching and learning meaningful and rewarding. To buttress this assertion, Kenyon and Reiser (2005) posited that practical- activity- strategy is a learning pedagogy that gives the learners ideas, knowledge for adequate self-directed collaborative learning that gives the students required skills of independence. More so, Neji and Meremikwu (2016), noted that for teaching strategy to be effective, it should not only be active but should be meaningful and real to equip students with skills knowledge and attitudes that can be used to solve problems in new direction. According to Neji, Ihejiamazu and Meremikwu (2016), students' interest and Science process skills can be aroused by involving the students in the process.

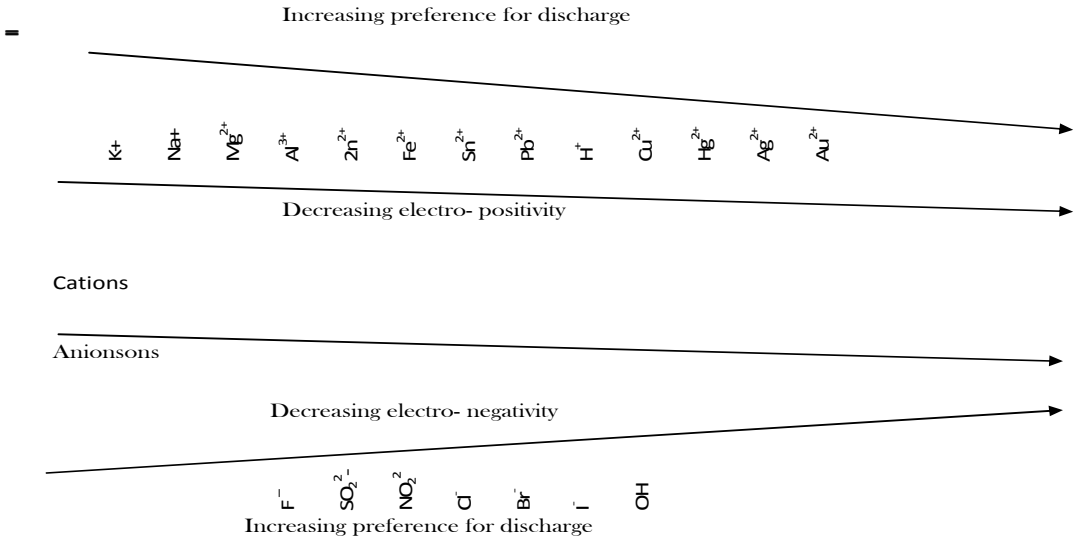

Fig. 1: Electro-Chemical Series of Cations and Anions In A Cell.

1.1 Purpose of the Study

The main purpose of this study is to find out the effect of hands-on activity on Chemistry and Physics students' academic achievement.

Specifically, the study aims at;

1. To find out the effect of mnemonics instructional strategy on students academic performance in Chemistry.
2. To find out the effect of mnemonics instructional strategy on students' performance in Physics.

2. RESEARCH METHODOLOGY.

The research design adopted in this study was quasi-experimental design. The design was specific with non-randomized control group and non-equivalent groups. The area of the study was conducted in Akamkpa Local Government Area of Cross River State, Nigeria. Ogoja Education Zone, Cross River State, Nigeria. The sampling technique adopted for the study was purposive sampling technique. The researcher selected four schools in the study area (two experimental and two control groups). Sample of this study was one hundred and sixty (200) senior secondary school (SS1) students representing (100) Chemistry and (100) in Akamkpa local government area of Cross River State.

The treatment packages employed for data collection in this study were;

a. Chemistry Instructional package for SS11 Class (CIP)
b. Physics Instructional Package (PIP)

The instructional package consisted of prepared lesson note on electrochemical series and simple harmony motion in Chemistry and Physics taught using Mnemonics instructional package. The treatment package was carried for a period of six weeks. The students were taught Chemistry and

Physics content using Mnemonics. While the control groups were taught with the traditional method. A posttest measure was carried out on the students to ascertain the learning outcome of students after prescribed instructional activity. The instrument used to obtain data was Chemistry Performance Test (CPT) and Physics Performance Test (PPT) consisting twenty (20) multiple test items covering the lessons taught. The reliability of the Chemistry Performance Test (CAT) and Physics Performance Test (PPT) were established using Kudar-Richardson's formular (KR-20) which yielded a coefficient of 0.86 and 0.88 respectively. The data obtained was analyzed using independent t-test statistics. Result is interpreted and discussed in table 1 below.

Hypothesis one
There is no significant difference in the academic performance of students' taught with mnemonics instructional approach in Chemistry.

Table 1: Independent t-test analysis of the difference in academic performance of Chemistry students taught electrochemistry with Mnemonics instructional package (MIP).

Variable type	N	$\overline{X}$	SD	t-cal
Students taught with mnemonics.	100	22.67	10.62	4.13
Students taught without mnemonics.	100	16.21	6.24	

P > 0.05; df = 148; critical t=value, 1.96

Mean scores, standard deviation and analysis of of students' academic performance based on treatment with mnemonics approach had higher mean score of (24.57) while their counterpart taught without mnemonics approach had mean score of (16.21). The null hypothesis was rejected at 0.05 level of significance and the alternate hypothesis restated. Thus, there is a significant difference in the mean performance of students taught with mnemonics instructional approach in Chemistry.

2.1 Hypothesis two
There is no significant difference in the performance of students taught simple harmony motion in Physics with Mnemonics.

TABLE 2: Independent t-test analysis of the difference in performance of students taught simple harmony motion in Physics using mnemonics instructional approach.
(N=200)

Variable type	N	$\overline{X}$	SD	t-cal
Students taught with Mnemonics.	100	20.72	8.62	
Students taught without Mnemonics.	100	14.81	5.67	3.81

P<0.05' df=158; critical-t=1.96

Hypothesis two sought to find out if the use mnemonics instructional approach has any influence on the students' academic performance in Physics in public secondary schools. Finding revealed that there is a difference in the students' academic performance taught with mnemonics in Physics. The null hypothesis was rejected at 0.05 level of significance. Thus, the alternate hypothesis is restated there is a significant difference the mean score of students taught simple harmony motion in Physics.

3. DISCUSSION OF FINDINGS.

The research was meant to find out the difference in academic performance of Chemistry and Physics performance taught electro-chemistry and simple harmony motion. Finding revealed that students taught with Mnemonics showed superiority to their counterparts taught with traditional method in Chemistry and Physics. Students were able to demonstrate different skills in the subjects. This finding is supported by Neji and Meremikwu (2016); that learning is more effective when students are engaged in the learning process to enable them gain more experience and enhance their entrepreneurial skills in Chemistry and Physics. In a similar view, this finding agrees with Neji, Ihejiamazu and Meremikwu (2016) whose work on promoting students' academic achievement and retention through the use of local resources emphasized that local materials encourage students 'hands-on activities in Chemistry and it is an effective mode of delivering Chemistry instruction. from pre-primary, secondary and tertiary institutions. Involvement of students in the lesson promotes critical thinking and reflective indices in Chemistry teaching and learning. In a similar trend, Nja and Neji (2013) in their study on a Chemistry class taught with kitchen resources and students' entrepreneurial ability, found that students' significantly differ in their entrepreneurial ability when taught Chemistry with kitchen resources and that the teacher should use the kitchen as a mini-laboratory to make students small entrepreneurs and enhance students' are economically empowered.

4. CONCLUSION

On the basis of the findings of this study, the following conclusions were drawn which the findings of the study revealed. The use of mnemonics instructional approach in teaching electro-Chemistry and simple harmony motion showed significant difference in the students' academic performance.

5. RECOMMENDATIONS.

Based on the findings of the study, the following recommendations were made teachers should be encouraged to use mnemonics innovative teaching approach that promote students' performance in Chemistry and Physics.

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