Effects of Prior Knowledge of Implications of Mathematics Concepts using ICT to Career Types and Gender on Students Achievements

By

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Abstract

This study investigated the effects of prior knowledge of implications of Mathematics concepts to career types and gender on the students' achievement in Geometry. A total of 245 students from three intact classes of three different schools were selected through purposive sampling technique. These classes were taught the concept 'Geometry' using computer package but prior to the actual teaching the classes except the non-career oriented control group were informed of the envisaged career type to which knowledge got could be applied. The Geometry Achievement Test (GAT) was validated and used for data collection. Data collected was analyzed descriptively using the mean and standard deviation and inferentially using the analysis of variance (ANOVA). The result indicated that prior knowledge of career implications of 'Geometry' facilitated the achievement of the career coincided with the objective derivable from the concept. Based on this, implications to Mathematics education were drawn and recommendations were made among is that Federal Government should introduce Career Education in secondary schools.

Introduction

The world is growing rapidly in technology, the secret of technological development of any nation lies in the study of mathematics. Okereke (2008) stressed that the absence of mathematics will posse absence of many physical quantities and non- availability of daily basic activities. This may be one of the reasons that have compelled the Federal Government of Nigeria to made mathematics education compulsory right from primary to secondary levels of educational system (FRN, 2004).

Despite these noble roles of mathematics to life and modern civilization, it is highly regrettable that the strategies for the teaching and learning of this subject at both primary and secondary levels are still not encouraging. This tends to leave an apparent doubt in

the minds of the learners on the real importance of the mathematics knowledge provided in the nation's schools which also increase mathematics phobia among the learners. There is a general fear and hatred for mathematics, a situation which has resulted into decline in students' performance in mathematics. Cotton (2001) attributed students' poor performance to factors such as:

* Notion that mathematics is an abstract and difficult subject.
* Inadequate number of qualified teachers in the subject
* Method of teaching mathematics/ lack of mathematics laboratories
* Lack of incentive to mathematics teachers and educators

Zeeman, (2004); Okereke, (2004); Okereke, (2002); Ojo, (2002) and Examine bodies have tried to find suitable reasons for the poor performances which they linked up with lack of students proper orientation on choice of career. Okerere (2008) defined "career as a person total life pattern, which includes both work and non-work factors. Career Choices are poorly random events. Career education is one of the essential roles of a school to make career choice less random

Career education is more important when seen rather as integrated effect to help learners create the most satisfying match between abilities, work and play. Okerere (2008) viewed the role of the school in career education as where much of career behavior is learnt, it can be unlearned or relearned. Education can neutralized a lack of information as well as lack of encouragement to explore, to plan to choose, and indeed most career development theorists now advocate the systematic development of programmers that can be organized to facilitate positive career behavior of young people.

Generally, individuals have different weaknesses and strengths, therefore, resourcefulness in mathematics teaching demands that the mathematics teachers / learners match these against the requirements/ importance of the mathematics task and concepts under discuss. This approach has potential of enhancing learner's moral zeal, achievement because it capitalizes on the functional roles of such curriculum elements in order to enhance learners understanding.

It is envisaged that if the learners are informed of possible areas of life in which the specific mathematics knowledge we hope to provide could applied, positive feeling would be encouraged, mathematics phobia will be reduced and learning becomes thorough. The belief is that if learner's educational goals of curricula elements such as use of ICT in education are identified in terms of the learners proposed career, and the implications of the specific mathematics task under discussion is related to the learners proposed career type and achievement of such learner will be enhanced.

Gamdari (2009) defined ICT as computer based tools used by people to work for the information and communication processing needs of ICT on education. It is observed that the influence of each learner to generate access, adopt and apply knowledge and information to solve complex problems (Ajayi 2001). All these are virtues/ qualities required for possible success in the laws profession, psychology or administration. Encyclopedia Britannica (2005) contended that gender is the behavioral, cultural or psychological traits typically associated with ones Sex- femininity muscularity. Becta (2005) indicated factors responsible for the disparity in mathematics to genetic rather than personality traits.

Davis and Rimm in Okereke (2005) attributed the disparity to both internal and external factors; the external factor includes sexism and lack of resources while the internal factor is that women remain primary responsible for childcare and this compelled them to achieve less than their actual potential. Shea and Baver (1994) listed Cinderella complex and imposter phenomenon as personal factors responsible for the low achievements of women in mathematics. Although in Nigeria gender differences in mathematics is a known problem, the situation is made worse and less resourceful teachers in the area of mathematics in our educational circle. In view of the above prevailing situation in our school system, the need to develop a resourceful teaching approach suitable need or goal of the learners which should encourage less gender specificness in mathematics education is a necessity in Nigeria educational system. This study attempted to ascertain the interaction effects of prior knowledge of career implication of ICT as a mathematics task and gender on students' achievements in Geometry concept.

Purpose of the study

The purpose of the study is to investigate the effects of prior knowledge of career implications of geometry task to proposed career types and gender on students' achievements. Specifically the study sought to establish the extent prior knowledge of implication of tasks to students proposed career types and gender of students will determine students' achievements.

Research Questions

What effects has prior knowledge of implications of Geometry tasks to career types and gender on students' achievements.

Research Hypothesis

HO1: There are no significant effects at the 0.05% level of significance between prior knowledge of career implication of Geometry tasks to career types and gender achievement of students.

Material and Method

Intact classes of SS2 students were drawn through purposive sampling technique from Zone A of Niger State and were used for the study. Purposive sampling technique was used because only schools in which computer facilities were available and the students were grouped on the basis of the anticipated career types were used. The career types which were considered important are: Arts Oriented Career Group, Science Oriented Career Group and Non- Career in View Control Group. Each of the three intact class of the three schools used was assigned to one of the treatment groups. Each treatment group consisted of different number of girls and boys. The three treatment/career of each school received treatment as indicated below.

(a) Science oriented career group -: This group consists of students who are more disposed towards Mathematics, Biology, Chemistry, and Physics combination in addition to other subjects. Students in this group were taught the concept Geometry using computer package. They received pretreatment exercise information on the usefulness of the concept (Geometry) to the development of logical thinking; reasoning and sharpness in arguments, its contribution to classification and classification of issues, events, objects were also highlighted. They were also told that these are virtues/ qualities expected from anybody to be a successful lawyer, psychologist, doctors, pharmacists, administration and specialists in science related courses.

(b) Arts oriented career group-: This group consisted mainly of students who were better disposed towards the Arts subjects than any other subjects. The students in this group indicated their intention/ view to specialize in English, law, history, psychology and other Art related Careers. They were taught Geometry using computer in the same way as the students in science oriented career group and were also informed of the usefulness of the concept to many professions as those in science oriented career group.

(c) Non- Career in view Control Group-: This group consisted mainly of students who are disposed towards the Arts and Social Sciences but had no specific career view. This group was taught the Geometry in the same way as the other two groups but they were not informed of the usefulness of the career implication of the concept.

All the three groups were taught the concept by their regular teachers who were trained on the use of computer package to teach this concept. The instrument used for data collection was Geometry Achievement Test (GAT). The "GAT" was subjected to both face and content validations by experts in the field. The instrument was assessed for internal consistency using the Kuder Richardson formula (KR20) and a reliability coefficient of 0.84was recorded. They GAT consists of 20 multiple – choice item with four option only one option is the correct option for each item. The research questions and the hypothesis formulated were answered and tested respectively using mean, standard deviation and Analysis of variance (ANOVA).

Table 1.0 Post Treatment Performance of the Students Achievement Scores by Career Orientation Type and Gender

Gender		Science Oriented	Arts Oriented	Control	df	F- Cal	F- Crit	P
Male	No	67	33	21	243	0.43	1.48	0.05
	Mean	18.13	14.12	7.67				
	SD	1.02	0.92	1.46				
Female	No	23	56	45				
	Mean	8.41	14.24	5.83				
	SD	1.62	0.78	0.87				

Table 2.0 Overall Post Treatment Performances of Students Achievement Scores by Career Type.

Student	Science Oriented	Arts Oriented	Control	Overall
No	90	89	76	245
Mean	14.45	10.96	8.24	11.02
SD	1.96	1.25	1.14	1.42

Table 3.0 Overall Post Treatment Performances of Students Achievement Scores by Gender

Gender	No of Student	Mean	Standard Deviation
Male	121	12.34	1.89
Female	124	10.78	0.42

Discussion

The Science oriented career group obtained a mean achievement of 14.45 with a corresponding SD= 1.96. Arts oriented career and the Non- career in view control groups recorded mean achievements of 10.96 and 8.24 with standard deviations1.25 and 1.14 respectively (see table 2). The male recorded overall means achievement of 12.34 with

SD= 1.89 while female recorded mean achievement of 10.78 and SD= 0.42 (see table 3). These indicated that prior knowledge of career implications of Geometry enhanced the achievement of the science oriented career group. It also facilitated the achievement of male students (see table 1). A corresponding hypothesis on students achievements tested at 0.05% level of significance in table 1 indicated that career orientation types and gender significantly affected the students' achievement in Mathematics (Geometry). This is in line with Okereke and Opara's (2006) recommendations that the elimination of gender stereotyping, bringing in more women into policy making positions, training and encouraging career counseling. Uses of girl- friendly curricular/ instructional materials, creation of a contusive democratic classroom environment are possible barriers to achievement in Mathematics Education and gender differences.

The hypothesis as it affected this section revealed that the gender prior knowledge of career implication of Geometry and interaction of gender and prior knowledge of career implication to career types are all significant at 0.05% level of significance. This implies that gender registered different effects across all the career orientation types. The result from the study revealed that the achievement are enhanced when they realized that the objectives and aims for which a particular concept is included in the curriculum is highly facilitative to their success in their intended career. The finding supports Okereke and Opara (2006) recommendations that refining our teacher education programmer, gender fair curriculum, and de- sexing the mathematics textbooks, use of sex role models in schools and provision of facilities could be adopted as useful strategies to improve the performance of students especially that of female students in mathematics.

Educational Implications

The results of the study have implications to the mathematics teachers, Mathematics and mathematics curriculum planners. The results of the study showed that prior knowledge of career implication facilitated the achievement of students, thus providing prior knowledge of career implication of mathematics tasks and concepts to learners. Intended life long career would help heighten the learners understanding of mathematics (Geometry). In addition, gender differences on learners' achievements in mathematics education would be minimized by providing prior knowledge of career implication of tasks under discussed. Finally, prior knowledge of the implications of mathematics tasks and concepts to some career orientation types would reduce the abstractness and foreign nature of mathematics concepts. It would increase its utilitarian values, functionally and applicability of the knowledge to real life situations.

Conclusion

Linking the teaching of mathematics task and concepts to some students' intended career types is a resourceful approach for teaching learners with properly defined educational aims, career of interest and goals. It is one of the ways of using career education to enhance mathematics teaching-learning environment.

It simply emphasized the need to capitalize on the applicability of mathematics task and concepts to the real life situation to enhance learners' understanding of the mathematics concepts and task. It is an approach which is easily realizable and which can encourage transfer of learning. Its application has provided worthwhile solutions to some of the distributing problems of mathematics education such as poor achievement of students in Geometry concepts.

Recommendations

1. Secondary School Students should be properly guided on their choice of career.
2. Federal Government should introduce Career Education in secondary schools
3. Women should be incorporated in educational policy making and career counseling.

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