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Impact of Mathematics Standing Instructions on Youth Employability in the Production and Sale of Nose Mask during COVID-19 Pandemic in Enugu Metropolis, Nigeria

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Abstract

This study sees Mathematics standing instructions as one of the ways to instill consciousness that translate mathematical thoughts and ideas to concrete actions for character building and development among secondary school students. The study investigated the impact of Mathematics standing instructions on youth employability in the production and sale of nose mask in Enugu metropolis. Using a survey design, the researchers sampled 165 students (within the age group 16 – 19 years) who produced and sold nose mask during the COVID-19 pandemic lockdown. Data was collected using Disciplinary Measures of Mathematics Standing Instructions Questionnaire (DMMSIQ), an eighteen-item researcher-developed instrument validated by five experts. The result of the study revealed that disciplinary measures of Mathematics standing instructions are

able to instilled consciousness of positive use of time, taking right action, right decision making and character building and development in the life of the students. Among recommendations made were that Mathematics teachers need to be strict adherents to standing instructions when marking students' Mathematics class work, assignment, tests and terminal examinations.

Keywords: Mathematics standing instructions, character building and development, consciousness, COVID-19 pandemic, rubric specification, nose mask production

Introduction

Education is not just storage of information; it is the development of habits, attitudes and skills as products of definite thinking which help human to live a full and worthwhile life. As such, studying Mathematics as an educational subject is often not an end in itself but rather a vehicle employed in the service of other goals (Takor, 2021). This means, the knowledge of Mathematics is not just for manipulating numbers in calculations; it goes beyond academic exercises by providing a framework for thinking, decision making and taking action for goals attainment. Again, it means that, before we can interpret and make sense of the world around us, our belief, value, interest or behavior must first come to play on the mathematical x and y variables. It is the x-raying of these variables that Aghadiuno in Iji (2019) posits that, for ideas and theories to be meaningful and understandable by the mind they must be presented in a mathematically understandable form. It implies that with mathematical understandable form, human affective responsiveness is been evoked.

In the light of these philosophical thoughts, Takor (2020) defines Mathematics as a science of symbolic transformation and representation of human thoughts and ideas into functional relations that serves as framework for simple to complex reasoning. In trying to put these functional relations in applicable terms, Odumosu, Oluwayemi, and Olatunde (2012) describes Mathematics as the carpenter's hammer, tailor's tape, artist's pencil, barber's clipper, hair dresser's comb, journalist's pen, broadcaster's microphone, doctor's stethoscope and lawyer's wig. These aesthetic expressions recognized *affect* as the driving force behind cognition and psychomotor development of every human career. These also explain why even though there is no Mathematics required in most job titles, there is plenty of Mathematics in every job execution. These may be the reasons why the Nigerian Government made Mathematics compulsory at the Basic (Basic 1 – 9) and Secondary School (SS1 – 3) levels and as well, a prerequisite for admission into most tertiary institutions for all Mathematics related courses.

Mathematics and all kinds of learning are viewed as the mental activity by which knowledge and skills, habits and attitudes, virtues and ideas are acquired, retained and utilized resulting in the progressive adoption and modification of conduct and behaviour (Okoye, 2010). It is also believed that mental changes acquired through Mathematics teaching and learning activities or experiences together with environment, social interactions and reflection, all contribute to a student's affective development that lead to formation of attitude, values, beliefs and interest (Wendee, 2015). To develop and maintain these attributes in students, Mathematics teachers have been making conscious efforts in class activities to engage students' affective system (emotion, value, interest and attitude) at

all times through the disciplinary measures of Mathematics standing instructions. Mathematics standing instructions are statements requiring students to either estimate or approximate an answer to certain decimal place, significant figure, nearest whole number etc., after successfully solving a given Mathematics problem. For affective control and subsequently cognitive gain, Mathematics teachers applied these through the preventive, supportive and corrective measures set to inculcate into students' attitude, the practice of show of consciousness and degree of certainty in their character or behaviour development.

In preventive disciplinary measure, standing instructions are taught to students during classroom learning activities under topics like approximation and estimation, units of measurement (in junior secondary school) and significant figures and degree of accuracy (in senior secondary school). These concepts gain their applications in almost all Mathematics theory questions as standing instructions, such that when students neglect compliance, they have to lose some marks even after successful stepwise simplification of a given Mathematics problem. In objective test questions, standing instructions appear as unique question number such that when a student does not understand the concept correctly he/she may fail to choose the right option. Since students have value for marks, if these measures are applied appropriately and consistently, their compliance may be assured, since students do not like to lose their marks. These measures instilled consciousness of time, action and decision making which are likely to translate to students' life changing behaviour. This may be one of the reason why Shechter, Durik, Miyamoto and Harackiewicz (2011) posits that, tasks associated with a wide range of motivational outcomes, including better achievement are perceived as valuable. Motivational outcomes and better achievement perceived as valuable are all functions of affective quality which Norman (2002) and Russell (2003) define as the ability of an object or stimulus to cause changes in one's *affect* (mood, emotion, feelings) which is a fundamental aspect of human found to influence reflex, perception, cognition, and behavior.

In supportive disciplinary measure, Mathematics teachers continuously circled spots of none compliance during marking of class work and assignment as a follow-up of what students are taught in classes concerning correcting a given value to a given significant figures, decimal places, nearest whole numbers, nearest hundred, etc. Corrective disciplinary measure take place during marking of coordinated tests and terminal examinations during which Mathematics teachers must deny students marks when such standing instructions are not obeyed according to rubrics specifications. These steps when properly followed, instilled consciousness of time, action and decision making in the students, hence help in building and developing students' character. These may be what stimulate Takor (2020) who posits that in every Mathematics classroom, teacher's attitudes and instructions/comments are the key to change in affective system of the students. This consciousness of decision making and taking right actions at the right time can ignite change in affective system of youth for self-employability in any given situation. In an event such as the COVID-19 world pandemic, experience gain from these instructions is likely to evoked students' consciousness of self-control measures, effective use of time and resources to serve others as well as the gains accrued from such services. This fact can be

extended to the consciousness of youth employability in the production and sale of nose mask during COVID-19 world pandemic in Enugu metropolis, Nigeria.

With the outbreak of the Covid-19 pandemic come new opportunities, particularly for youth employability in Nigeria. Covid-19 pandemic has created a huge market for face masks said to be worth \$74.90bn globally in the first quarter of 2021 (Olaoluwa, 2021). Youths including students dabbled into the design and sewing of cloth-type face masks from popular “Ankara” fabrics. Each nose mask cost ₦100, with fifty in each marketable pack. The value chain created by the nose masks comprises tailors who sew the masks and sell to retailers at between ₦2,500 and ₦3,000 allowing the retailers to sell at a profit making price of ₦5,000 (Olaoluwa, 2021). Among the entrepreneurs in this value chain are the secondary school students who attest to their involvement in nose mask production and sale in Enugu metropolis, Nigeria, establishing the curiosity for this present study.

In search for affective influential pedagogy, Farayola (2014) conducted a study on teaching of Mathematics at tertiary level through effective use of Information and Communication Technology and Mathematics Laboratory in Emmanuel Alayande College of Education, Oyo State. He used pre-test post-test research design. The sample comprised all the 200-level pre-service NCE Mathematics students (128) as subjects for the study. With Mathematics Achievement Test (MAT) instrument, the researcher elicited data and analyzed it using mean, standard deviation and t-test statistical tools. The result revealed generally that, there was improvement in students’ Mathematics achievement, and enhanced students’ performance in Mathematics. The result however, shows no statistically significant difference in the achievement of male and female pre-service NCE Mathematics teachers in Mathematics when taught using ICT and Mathematics laboratory. In the study, use of ICT and Mathematics laboratory serves as an affective motivational pedagogy, however, the focus was on evaluating cognitive achievement. The current study sought to investigate to what extent the consciousness gain from Mathematics standing instructions measures can help translate students’ reasoning to take specific and concrete actions in their personal life at any given situation.

Again, Tuchili and Ndhlovu (2016) in their research on affective development, investigated effects of guidance and counseling services on students’ interpersonal, study, vocational and problem-solving skills in some public universities in Zambia. The study used a correlational design and sampled 105 university students. They collected data using an in-depth interview guides, focus group discussions and questionnaires. The findings of the study reveal that there was statistically significant difference between students who received guidance and counseling services and those who did not. The researchers concluded that students who received guidance and counseling services were better developed in interpersonal, study, vocational and problem solving skills than their counterparts in the control group. This study was focused on identifying character formation among the respondents. This is in line with the current study which sought to investigate the extent to which Mathematics standing instructions measures can help build and developed positive characters in the students.

Takor (2020) conducted a study on counseling pedagogy and investigated its impact on students' affective variables of belief, value, interest and behaviour regarding Mathematics application outside the school system. Using a survey design, the researcher sampled 109 (65 male and 44 female) senior secondary school three students who were counseled and taken out on a field trip. With Mathematics Applications in Daily Living (MADL), a twenty-item researcher-developed instrument, the study elicited data which was analyzed using mean and standard deviation. The results of the study revealed that due to counseling pedagogy students' belief in, value for, interest in and behaviour towards application of Mathematics outside the school system were improved to a great extent. The study was focused on general affective variables of belief, value, interest and behaviour on Mathematics application outside the school system. The current study sought to investigate the extent to which Mathematics standing instructions measures can help instill consciousness of use of time, taking positive actions and decision making that defines character building and development in students.

The centrality of disciplinary measures of Mathematics standing instructions in building and developing students' affective attributes is rooted in affective-cognitive consistency theory which examines the relationship between affective variables of character building and development and posits that individuals are in an unstable state when their feeling towards an object, event or person and their knowledge about that object, event, or person are inconsistent (Simonson & Maushak in Miller, 2005). The theory suggests that the affective component of the attitude system may be changed by providing new information (changing the cognitive component) via a persuasive message. Thus, once the individual has processed the new information, he or she will undergo an attitude change to bring the knowledge and affect into harmony. This is what Dales' Cone of Experience stand to illustrate that, life is 10% what happens to you (information received) but 90% is your reaction to what happens to you (Davis & Summer, 2015). That means there is nothing either good or bad but only thinking and actions makes it so. Hence, the need for persuasive character building and development through the disciplinary measures of Mathematics standing instructions that instilled consciousness of timing, actions and decision making in students.

Statement of the Problem

Over the past decades, more attention is being focused to cognitive evaluation in Mathematics teaching and learning processes with less attention to affective learning and evaluation. But translating cognitive meaning of mathematical x and y variables in practice present Mathematics as an abstract task among students. This abstractness and its challenge of translating values to concrete activities in daily living may be attributed to Mathematics teachers' non-strictness to marking rubrics during class activities, assignments, test and terminal examinations which are the affective disciplinary stages that help in translating ideas to concrete reality. Though much affective pedagogy has been applied, these are done with the hope of improving students' cognitive gains in Mathematics. Students continue complaining that translating Mathematics variables to life changing activities is abstract.

Research has shown that learning at any point in time involves all the three domains; however, affect or emotion do occurs before cognition, then psychomotor. It is the “affective” in its judgmental functions that do assign positive or negative valence to the environment before “cognitive” can interpret and makes sense of the world. Research has revealed that tasks that are perceived as valuable are more likely to be associated with a wide range of motivational outcomes.

The inadequacies of focusing on approaches and methods only in translating Mathematics values to concrete actions for daily life changing activities has prompted Mathematics educators to advocate strict compliance to rubrics specifications during Mathematics class work, assignment, tests and examinations marking processes. Thus, will the use of Mathematics standing instructions and their disciplinary measures instill consciousness in students’ way of translating instructions to concrete actions?

Purpose of the Study

The main purpose of this study was to determine the impact of Mathematics standing instructions in instilling consciousness to students’ concrete actions. Specifically, the study sought to:

- i. Determine the extent to which disciplinary measures of Mathematics standing instructions have instill consciousness of time in students in the production and sale of nose mask during COVID-19 pandemic in Enugu Metropolis, Nigeria.
- ii. Determine the extent to which disciplinary measures of Mathematics standing instructions have instill consciousness of action in students in the production and sale of nose mask during COVID-19 pandemic in Enugu Metropolis.
- iii. Determine the extent to which disciplinary measures of Mathematics standing instructions have instill consciousness of decision making in students in the production and sale of Nose mask during COVID-19 pandemic in Enugu Metropolis, Nigeria.

Research Questions

The following research question guided the study:

- i. To what extent were disciplinary measures of Mathematics standing instructions able to instill consciousness of time in students in the production and sale of nose mask during COVID-19 pandemic in Enugu Metropolis, Nigeria?
- ii. To what extents were disciplinary measures of Mathematics’ standing instructions able to instill consciousness of action in students in the production and sale of nose mask during COVID-19 pandemic in Enugu Metropolis, Nigeria?
- iii. To what extent were disciplinary measures of Mathematics’ standing instructions able to instill consciousness of decision making in students in the production and sale of nose mask during COVID-19 pandemic in Enugu Metropolis?

Methodology

The design of this study was a survey design. This used a questionnaire drawn up to sought students’ opinion on impact of Mathematics standing instructions on their consciousness to time, actions and decision making during COVID-19 pandemic in the production and sale of nose mask. The target population for this study was the entire senior secondary students who are within the age bracket of 16 – 19 years old in Enugu Metropolis. The study engaged a sample of 165 senior secondary school students within the targeted age group.

The instrument used for the study was Disciplinary Measures of Mathematics Standing Instructions Questionnaire (DMMSIQ). The survey instrument, in three sub-sections, sought students’ opinion on the extent to which Mathematics standing instructions have instilled consciousness in them on a four-point scale in the form of Very Great Extent (VGE), Great Extent (GE), Less Extent (LE) and No Extent (NE) weighted 4, 3, 2 and 1 respectively. This instrument consists of eighteen (18) items on impact of the disciplinary measures of Mathematics standing instructions which were developed by the researchers. The instrument was validated by two experts in Mathematics Education, one expert in Measurement and Evaluation and two Mathematics teachers. A reliability index of 0.83, 0.80, and 0.85 (with an overall coefficient of reliability of 0.83) was established for the instrument’s three sub-sections using Cronbach Alpha.

The instrument was administered by the researchers to students on their return to school during the first phase of ease of lock down occasioned by COVID-19 pandemic in July 2020 in Nigeria. Participants were senior secondary school students within the age bracket of 16 – 19 years old who agreed to have engaged themselves in the production and sale of nose mask during the lock down. The data collected and collated was analyzed using the descriptive statistics of mean and standard deviation. To arrive at a decision, items that were positively skewed which had a mean score of 2.5 and above were accepted, implying Great Extent; while any item with a mean score less than 2.5 were rejected.

Results

Research Question One

To what extent were disciplinary measures of Mathematics standing instructions able to instill consciousness of time in students in the production and sale of nose mask during COVID-19 pandemic in Enugu Metropolis, Nigeria?

Table 1: Students’ translation of Mathematics Disciplinary Measures to conscious timing in the production and sale of Nose mask during COVID-19 pandemic

Items:	VGE	GE	LE	NE	\bar{x}	S.dev	Dec
1 Learning mathematical concepts of approximation and estimation instilled much consciousness of timing in me at any given situation.	114	51	0	0	3.69	0.46	GE
2 Learning mathematical concepts of significant figures and units of measurement instilled much	122	43	0	0	3.74	0.44	GE

	consciousness of timing in me at any given situation.								
3	Mathematics teacher's effort of circling none compliance spots during marking of class work and assignments instilled much consciousness of time and carefulness in me.	119	46	0	0	3.72	0.45	GE	
4	Mathematics teacher's effort of deducting marks from none compliance spots during marking of tests and examinations instilled much consciousness of carefulness and time in me.	110	55	0	0	3.67	0.47	GE	
5	Mathematics' standing instructions impacted in me the consciousness of value for carefulness and use of time at any given situation.	102	63	0	0	3.64	0.48	GE	
6	Mathematics teacher's strict adherence to standing instructions instilled in me consciousness of carefulness and use of time in my character building and development.	133	32	0	0	3.81	0.40	GE	
Cluster Mean						3.71	-	GE	

The data in Table 1 shows students' translation of Mathematics Disciplinary Measures to conscious timing. The result indicates that students to great extent have gain consciousness of time instilled in them. This is evident in the cluster mean ($\bar{x} = 3.71$) of the six items on students' consciousness to time in their personal life. This implies that disciplinary measures of Mathematics standing instructions are able to instill consciousness of positive use of time in their live.

Research Question Two

To what extents were disciplinary measures of Mathematics' standing instructions able to instill consciousness of action in students in the production and sale of nose mask during COVID-19 pandemic in Enugu Metropolis, Nigeria?

Table 2: Students' translation of Mathematics Disciplinary Measures to conscious action in the production and sale of Nose mask during COVID-19 pandemic

Items:	VGE	GE	LE	NE	\bar{x}	S.dev	Dec
7 Learning mathematical concepts of approximation and estimation instilled much consciousness of action in me.	115	50	0	0	3.70	0.46	GE
8 Learning mathematical concepts of significant figures and units of measurement instilled much consciousness of appropriate action in me.	120	45	0	0	3.73	0.44	GE
9 Mathematics teacher's effort of circling none compliance spots during marking of class work and assignments instilled much consciousness of careful action in me.	125	40	0	0	3.76	0.43	GE
10 Mathematics teacher's effort of deducting marks from none compliance spots during marking of tests and examinations instilled	111	54	0	0	3.67	0.47	GE

	much consciousness of careful action in me.							
11	Mathematics' standing instructions impacted in me the consciousness of taking positive action at any given situation.	101	64	0	0	3.64	0.48	GE
12	Mathematics teacher's strict adherence to standing instructions instilled in me conscious actions in character building and development.	145	20	0	0	3.88	0.33	GE
Cluster Mean						3.73	-	GE

The data in Table 2 shows students' translation of Mathematics Disciplinary Measures to conscious action. The result indicates that students to great extent have consciousness of action taking instilled in them. This is evident in the cluster mean ($\bar{x} = 3.73$) of the six items on students' consciousness of right action in their personal life. This implies that disciplinary measures of Mathematics standing instructions are able to instill consciousness of taking right action in their live.

Research Question Three

To what extent were disciplinary measures of Mathematics' standing instructions able to instill consciousness of decision making in students in the production and sale of nose mask during COVID-19 pandemic in Enugu Metropolis?

Table 3: Students' translation of Mathematics Disciplinary Measures to conscious decision making in the production and sale of Nose mask during COVID-19 pandemic

Items:	VGE	GE	LE	NE	\bar{x}	S.dev	Dec
13 Learning mathematical concepts of approximation, estimation and significant figures instilled much consciousness of positive decision making in me.	120	45	0	0	3.73	0.45	GE
14 Learning mathematical concepts of significant figures and units of measurement instilled much consciousness of careful decision making in me.	125	40	0	0	3.76	0.43	GE
15 Mathematics teacher's effort of circling none compliance spots during marking of class work, assignments instilled much consciousness of decision making in me.	117	48	0	0	3.71	0.46	GE
16 Mathematics teacher's effort of deducting marks from none compliance spots during marking of tests and examinations instilled much consciousness of careful decision making in me.	122	43	0	0	3.41	0.49	GE
17 Mathematics' standing instructions impacted in me the consciousness of positive and careful decision making in any given situation.	135	30	0	0	3.82	0.39	GE

18	Mathematics teacher's strict adherence to standing instructions instilled consciousness of careful decision making in my character building and development.	141	24	0	0	3.85	0.35	GE
Cluster Mean						3.71	-	GE

The data in Table 3 shows students' translation of Mathematics Disciplinary Measures to conscious decision. The result indicates that students to great extent have consciousness of positive decision making instilled in them. This is evident in the cluster mean ($\bar{x} = 3.71$) of the six items on students' consciousness of right decision making in everything they do. This implies that disciplinary measures of Mathematics standing instructions are able to instill consciousness of right decision making in their live.

Discussion

In all the research questions (1 to 3), the respondents opined from the given eighteen items on disciplinary measures of Mathematics' standing instructions that, these measures have instilled in them consciousness of time, action and decision making. They can now understand and explain the impact of Mathematics' standing instructions in their character building and development, and its attendant applications in an individual's daily live. These results support the assertion by Takor (2020) who posits that, in every Mathematics classroom, teacher's attitudes and instructions/comments are the key to change in affective system of the students. The finding also support the report of Tuchili and Ndhlovu (2016) that students who received guidance and counseling services were better developed in interpersonal, study, vocational and problem-solving skills. The findings also attests to Dales' Cone of Experience which state that, life is 10% what happen to you (information received), and 90% your reaction to what happen to you (Davis & Summer, 2015).

Conclusion

The result of Tables 1 to 3 above is an attestation that Mathematics teacher's strict adherence to disciplinary measure of Mathematics' standing instructions, made impressive impact on the students' character formation. The extent to which Mathematics standing instructions have impacted on students' character building and development is evidenced in the high mean ratings and standard deviations. The Mathematics teacher's strict adherence to set instructions in Mathematics teaching and learning processes serves as one of the ways of impacting positive affective attributes in the students. Hence, obedience to Mathematics instructions is the watch word to success, character building and development of every individual.

Recommendations

Based on the findings of the study the following recommendations were made:

- i. Mathematics teachers need to be strict adherents to standing instructions when marking students' Mathematics class work, assignment, tests and terminal examinations. This will instill in students the conscience of character building and development.

- ii. Mathematics teachers need to become effective facilitators of Mathematics learning process by use of psychological or therapeutic interventions with context-dependent tools.

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