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Pre-Service Mathematics And Science Teachers' Entry Grades In Mathematics And Their Performance In Algebra II In Tamale College Of Educationin Northern - Ghana

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Abstract: ***This paper examined the entry grades of pre-service mathematics /science teachers' and the performance in Algebra II in colleges of education with specific reference to Tamale College of Education. The study involved the past record of first year pre-service teachers' who enrolled in either mathematics and science of the first year B.ED programme. A total of 135 made up of 60 Science major and 75 mathematics major were purposively selected for the study. Information regarding their grades obtained in core mathematics, elective mathematics and first year first semester examination in Algebra II were taken. The findings revealed that their entry grades in core and elective mathematics as obtained at the senior high reflect their performance in first year first semester examination in Algebra II. It is recommended that Colleges of Education mathematics teacher should find suitable methods of teaching and learning of mathematics that will help senior high school students integrate effectively with the system of teaching at the colleges***

Keywords; pre-service mathematics /science teachers, curriculum, performance in Algebra II, teaching and learning, senior high school

I. INTRODUCTION

BACKGROUND TO THE STUDY

The importance of mathematics in the scientific and technological development of countries cannot be under estimated (Enu, Agyman, & Nkum, 2015). This is because mathematics skills are essential in understanding other disciplines including engineering, sciences, social sciences and even the arts (Patena & Dinglasan, 2013; Phonapichat, Wongwanich, and Sujiva, 2014; Schofield, 1982). Abe and Gbenro (2014) point out that mathematics plays a multidimensional role in science and technology of which its application outspread to all areas of science, technology as well as business enterprises. Due to the importance that mathematics engulfs, the subject became key in school curriculum. According to Ngussa and Mbuti (2017), the mathematics curriculum is intended to provide students with knowledge and skills that are essential in the changing technological world.

Mathematical ability is crucial for the economic success of societies (Lipnevich, MacCann, Krumm, Burrus, & Roberts, 2011). Algebra is one of the most abstract strands in Mathematics and considered difficult (Egodawatte and Stoilescu, 2015). The fundamental difficulty for the students to learn Algebra is the use of symbolic language. Wagner and Parker (1999) highlight that the use of two different symbol systems (letters and numbers) at the same time in Algebra allows for confusion. Perso (2002) explain that the students' errors in the use of parentheses mean nothing for them, as seen on the following example: 2 (a + b) = 2a + b happens in Algebra. Sierpinska (2008) bears out a statement that the students do not have an adequate understanding toward the variables and they often think that letters are the names for the concrete objects based on their previous arithmetic knowledge. It is crucial for the teachers to realize and analyze

the students' difficulties in their learning process (Chick and Baker, 2005).

Several reforms at teacher training Colleges and now College of Education have taken placed over the past two decades (Educational reforms, 2008,). Each reform provides for an entry requirement for prospective applicants who would want to enroll into College of Education. These entry requirements are put into two main categories, that is: three credits pass in core subjects including Mathematics and English and any other three credits passes in the candidate electives area relevant to the course to be pursued at the College.

The general requirement for admission to the Bachelor of Education (B.Ed) Programme is as follows:

WASSCE Holders: CREDIT (A1-C6) in Six (6) subjects comprising Three(3) Core subjects, including English Language and Core Mathematics, and Three (3) Elective subjects relevant to the course of study.

SSSCE Holders: CREDIT (A-D) in Six (6) subjects comprising Three (3) Core subjects, including English Language and Core Mathematics, and Three(3) Elective subjects relevant to the course of study

Holders of TVET Qualifications: CREDIT in Three Core Subjects including English and Mathematics and PASSES in Three Elective Subjects relevant to the course of study.

Candidates awaiting the MAY/JUNE, 2019 WASSCE and NABPTEX RESULTS can also apply. (NTCE and PRINCOP, 2019)

The specific requirements for admission to the various COURSE OPTIONS on offer within the BACHELOR OF EDUCATION PROGRAMME are as detailed below:

Programme Options	WASSCE Applicants	SSCE Applicants
B.Ed. GENERAL(With Specializations in Primary and Junior High School).	Credit (A1-C6)in Three (3) CORE subjects, including English Language and Mathematics, and Three (3) Elective subjects relevant to the course of choice	Credit (A-D) in Three (3) CORE subjects including English Language and Mathematics, and Three (3) Elective subjects relevant to the course of choice
B.Ed. SCIENCE & MATHEMATICS	Credit (A1-C6) in Three (3) CORE subjects including English Language and Mathematics and Three (3) Elective Subjects relevant to the course of choice.	Credit(A-D) in (3) CORE subjects including English Language and Mathematics and Three (3) Elective Subjects relevant to the course of choice
B.Ed. EARLY CHILDHOOD EDUCATION	Credit(A1-C6) in Three (3)CORE subjects including English Language and Mathematics and Three (3) Elective Subjects relaxant to the course of choice	Credit (A-D) in Three (3)CORE subjects including English Language and Mathematics and Three (3) Elective Subjects relevant to the course of choice.

Source: (NTCE and PRINCOP, 2019)

Table 1: shows programme option and requirements

The above requirements shows a crucial role played by mathematics in our educational systems and how it is essential in our everyday life activities. The primary idea driving the philosophy of teaching prescribed in the delivery of the new 4-year Bed curriculum is a belief that skill and conceptual understanding are legitimate goals of instruction, in that each builds on the other, and therefore both need to be sought together in teaching.

Students' content knowledge is important in facilitating the learners' construction of knowledge. There has been much research on teachers' knowledge of mathematics that has focused on fractions (Carpenter, Fennema, Peterson, Chiang, & Loef, 1988) or numbers and operations (Ball, 1990; Ma, 1999). But little is known about the relationship between pre-service mathematics /science teachers' grades in algebra II course in colleges of education and their grades in SHS Mathematics. Hence this study seeks to bring to the forth the entering grades of mathematics and science trainees' in elective and core mathematics at the SHS their performance in Algebra II in Colleges of Education.

OBJECTIVES

The following were the objectives of the study.

- ✓ Find out the grades of pre-service mathematics /science teachers' in mathematics at the Senior High School (SHS) at the time of entry into the College.
- ✓ Find out trainees' performance in Algebra II at the end of the year one first semester Examination

RESEARCH QUESTIONS

The following research question were formulated to guide the study:

- ✓ What grades do pre-service mathematics /science teachers' obtain in SHS elective mathematics?
- ✓ What is the performance in terms of grades obtained by pre-service mathematics /science teachers' in Algebra II?

SIGNIFICANCE OF THE STUDY

The study will drive the interest of both college mathematics teachers and Pre-service teachers to have a first-hand informations on the entry grades of students they teach in the various mathematics courses that are mounted each semester. It is also hope that the finding will serves as a concrete bases for sound judgment as to the sort of teaching strategies that should be adapted to help pre-service mathematics teacher in their pursue to become mathematics teachers at the basic school level.

II. THEORETICAL FRAMEWORK

SCHEMA THEORY

Schema theory emerged in reaction to the machine metaphor of early cognitive theorists. It falls close to the interactionist view but leaning toward mind-centeredness. Following the philosophical notions of Kant (1781/1900) and Wittgenstein (1958), the mind frames perceptions and

experiences, actively interacting with sensory information from the environment.

Rumelhart and Ortony (1977) and Rumelhart (1980) suggested certain characteristics of schemas: (1) They have variables; (2) They can be embedded in each other; (3) They represent knowledge at various levels of abstraction; (4) They represent knowledge rather than definition; (5) They are active processors; and (6) They are recognition devices, determining the goodness of fit of the incoming information. Such schemas help to organize disparate bits of information into a meaningful system or network (Anderson, 1990).

According to schema theory, the individual's background knowledge influences the processing of incoming information. Thus, trainee-centered approaches, such as strategy instruction, metacognition, and selective attention, are recommended.

This theory resonates with this study because, the Colleges of Education Algebra II course content relies solely on both the Senior High School core and Elective (further) mathematics course content. Hence the SHS Mathematics serves as a pre-requisite or foundation course for the Algebra II. More importantly is the fact that the study is situated in the context of how background knowledge in SHS Mathematics relates to performance of trainees in College Algebra II hence the use of schema theory as my theoretical framework.

III. CONTENT OF THE SENIOR HIGH SCHOOL ELECTIVE MATHEMATICS CURRICULUM

The content of the Senior High School elective mathematics Curriculum comes with its aims as testing the students on the following;

- ✓ Further conceptual and manipulation skills in Mathematics
- ✓ an intermediate course of study which bridges the gap between Elementary Mathematics and Higher Mathematics
- ✓ aspect of Mathematics that can meet the needs of potential Mathematicians, Engineers, Scientist and other professionals (WAEC, 2013)

The curriculum of the SHS is broken down in to syllabus as indicated in Table 2.

Topic	Content	Notes
Circular Measure and Radians	Lengths of Arcs of circles. Perimeters of Sectors and	
Trigonometry	Segments (measure in radians)	For $0^0 < \beta < 360^0$
	i. Sine, Cosine and Tangent of angles	Identity without use of tables.
	ii. Trigonometric ratios of the angles 30^0, 45^0, 60^0	Graph of the functions of the form. $y = acosx + bsinx$
	iii. Height and distances	
	iv. Angle of elevation and depression	Graphs of the functions and the form. y =a cos x+b sin x
	v. Bearing, positive and negative angles	Simple case only
	vi. Compound and multiple angles	Their use in simple identities and solutions of trigonometric ratios
	(vii) Graphical solution of simple trig. Equation	A cos x +b sin x =c
	(viii) Solution of triangles	Include notion of radian and trigonometric ratio of negative angles.
Indices, logarithms and surds (a) Indices	(i) Elementary theory of indices	Meaning of a^o,
(b) Logarithms	(ii) Elementary theory of logarithm $Log_a xy=log\ x +log\ y$, Log x = nlog x	Calculations involving multiplication, division, power and n^{th} root: $\log a^n$, $\log\sqrt{a}$,$\log a^n$ Reduction of a relation Such as $y = ax^b$, (a,b are constants) to a linear form.
	(iii) Applications	$\log_{10} y$ = b $\log\log_{10} x$ x + $\log\log_{10} a$ a Consider other example such as $y = ax^b$,
(c) Surds	Surds of the form a,a $\sqrt{}$b, a+ b$\sqrt{}$n,$\sqrt{}$b Where a is rational, b is positive integer and n is not a perfect square.	Rationalization of the denominator: $\frac{a+\sqrt{b}}{\sqrt{c}-\sqrt{d}}$
(d) Sequences: Linear and exponential sequences	(i) Finite and infinite sequences	
	(ii) $U_n = U_1 + (n-1)d$, where d is the common difference.	
	(iii) $S=\frac{n}{2}(U_1+U_n)$	
	(iv) $U_n = U_1\ r^{n-1}$ Where is the common ratio?	
	(v) $S_n = \frac{U1(1+r):r<1}{1-r}$ Or $S_n = \frac{U1(rn-1):r>1}{r-1}$	
(e) Use of the Binomial Theorem for a positive integral index.		

	Proof of Binomial Theorem not required. Expansion of $(a+b)^n$ Use of $(1+x)^n$, nx for any rational n, where x is sufficiently, Small e.g. (0.998)			inequalities	
4. Algebraic equations	(a) Factors and Factorization. Solution of Quadratic equation using: (i) Completing the square (ii) formula (b) Symmetric properties of the equation $ax^2 + bx + c = 0$	The condition $b^2-4ac>0$ for equation to have a real root Sum and products of roots Graphical and analytical methods permissible.	8. Logic	(i) The truth table, Using P or Q, P and Q P implies Q Q implies P (ii) Rule of syntax: True or false Statement, rule and logic applied to arguments, implications and deductions	Validity of the compound statements Involving implications and connectives. Include the use of symbol P P∨q,p∧q,p=.q Use of truth tables
	(c) Solution of two simultaneous equations where one is linear and other is quadratic		9. Co-ordinate Geometry Straight line	(a) (i) Distance between points; (ii) Mid-point of the segment; (iii) Gradient of a line; (iv) Condition for parallel and perpendicular lines. (b) Equation of a line: (i) Intercept form; (ii) Gradient form;	Gradient of a line as a ratio of vertical change and horizontal change
5. Polynimials	(i) Addition, subtraction and multiplication of polynomials (ii) Factor theorem and reminder theorem (iii) Zero of polynomials function. (iv) Graph of polynomials functions of degree $n < 3$ (v) Division of a polynomial of degree not greater than 4 by a polynomial of lower degree	Not exceeding degree 4	Conic Sections	(iii) The general form. (i) Equation of a circle; (ii) Tangent and normal are not required for circle.	(i) Equations in terms of center and radius e.g. $(x + a)^2 + (y-b)^2 = r^2$ (ii) The general form: $X^2 + y^2 + 2fy + c = 0$
6. Rational functions	e.g: $f:x\rightarrow \frac{ax+b}{px+qx+r}$ (i) The four basic operations. (ii) Zeros, domain and range sketching not required.	(iii) Resolution of rational function into partial functions. Rational of functions of the form $Q(x)= \frac{F(x)}{G(x)}$ G(x) = 0	10. Differentiations	(a)(i) The idea of limit (ii) The derivation of a function. Application for differentiation (b) (i) Second derivatives and rates of change; (ii) Concept of maxima and minima.	(i) Intuitive treatment of limit. Relate to the gradient of a curve. (ii) Its meaning and its determination from first principles in simple cases only. e.g. $ax^n + b$, $n\leq 3$, $(n\in 1)$ (iii) Differentiation of polynomial e.g. $2x^4-4x^3 + 3x^2-x+7$ and $(a+bx^n)^n$ (i) The equation of a tangent to a curve point (ii)Restrict turning points to maxima and minima. (iii)Include curve sketching (up to cubic functions) and linear kinematics+
7. Linear Inequality	Graphical; and analytical solution of simultaneous linear Inequalities in 2 variables and quadratic		11.Integration	(i) Indefinite integral	(i) Exclude n=-1 in $\int x^2dx$ (ii) Integration of sum and difference of polynomials. 3 e.g

		$4x^3 + 3x^2-6x+5$
	(ii) The definite integral	Include linear kinematics. Relate to the area under a curve
	(iii) Application of definite integral	(iii) Plane areas and rate of change.
12. Sets	(i) Idea of a set defined by a property. Set notations and their meanings	(x:x is real), $\cup,\cap$ empty set {},Ø $\in$,U (Universal set) or A^1 (Complement of a set A)
	(ii) Disjoint sets, Universal set and complement of set	
	(iii) Venn diagrams to solve problems (iv) Commutative and Associative laws, Distributive properties over union and intersection	
13.Mappings and Functions	(i)Domain and co-domain of a function. (ii)One-to-one, onto, identity and constant mapping; (iii)Inverse of a function; (iv)Composition of functions.	The notation: e.g $f:x\rightarrow 3x+4$ $g:x\rightarrow x^2$ where Graphical representation of a function image and the range. Notation: fog(x) f(g(c)) Restrict to simple algebraic functions only.
14. Matrices (b) Linear transformation (c) Determinant	(i) Matrix representation (ii) Equal matrices (iii) Addition of matrices. (iv) Multiplication of matrix by a scalar (v)Multiplication of matrices	Restrict to 2x2 matrices. Introduce the notation A,B,C for a matrix (i) Notation I for the unit identity matrix (ii) Zero or null matrix
15. Operations	Binary Operations: Closure, Commutativity, Associativity, Distributivity, Identity elements and inversed	

Source: (WAEC, Regulations and Syllabuses, 2013)

Table 2: SHS Mathematics Curriculum

CONTENT OF THE ALGEBRA II CURRICULUM/ SYLLABUS

The content of Algebra II of the Colleges of Education in Ghana is premised on the basis that students have knowledge of basic Algebra in SHS Core Mathematics. The aims of the syllabus is capture in the course description and it is well articulated in line with the National Teaching Standard (SNT) and the National Teachers Curriculum Framework (NTECF). In essence, the course is designed to deepen and build on students understanding of basic algebra covered at the SHS level. It will expose students to the following: Set theory, Binary operations involving surds and rationalization, Algebraic Equations and Inequalities (linear and quadratic) including linear programming, Linear and Exponential sequences, polynomials and Rational Function. Exponential and logarithmic equations including change of base, application of linear and exponential sequences, Binomial expansion involving positive integral powers, and Matrices (up to 3x3 Matrices). A detailed description of the curriculum is shown in table 3. Emphasis were made on the practical applications of these topics through the use of word problem and semester projects.

The learning outcomes expected of the students among other things include;

Demonstrate a sound knowledge of mathematical concepts and procedures in the content area studied

Make connection between the course content and other disciplines and activities in daily life

Solve problems in the content area studied using appropriate procedures.

Kilpatrick (2011) contends that mathematical proficiency relies on teaching mathematics using the right methodology and that these proficiencies are conceptual understanding, procedural fluency, strategic experience, adaptive reasoning, and production disposition that will coherently build in the learner. It is in response to this that the mode of delivery of the Algbra ll for the New B.Ed programme led by the University of Cape Coast Institute of Education had adopted these, Face to Face, Practical Activity, Work-based learning, Seminar, Independent Study e-learning opportunities and Practicum. (Institute of Education, UCC, 2018)

Units	Topics	Subtopics(if any)	Teaching and learning activity to achieve learning outcomes
1	Set Theory	Operations on sets: De-Morgan's identities, complement of a set, and solving two and three set problems, differences between two sets. E.g. A-B= $A\cap B^1$ (reference to the union of A and B).	Encourage students to verify the laws using specific examples. Create suitable experience for students to establish the relation A-B = $A\cap B^1$
2	Polynomials and Rational functions	Evaluating polynomial functions, Remainder and factors theorems, Roots of polynomial function	Create context for polynomial functions and rational functions for students to get in-depth knowledge of the content Engage students in evaluating given polynomial functions Provide worthwhile opportunities for students to apply the remainder and factor theorems
3	Binary operations involving surds and	Properties of binary	Provide opportunities for students to verify the properties of binary

4	rationalization	operations ie. Closure, commutative, associative, and distributive. Finding	operations involving rational numbers and rationalizations of surds
5	Applications of Algebraic Equations and Inequalities including linear programming	identity elements and inverse. Evaluating binary operations involving surds (rationalization of surds). Solving quadratic equations by factorization, and by the use of quadratic formula. Solving word problems on equations and inequalities including linear programming,	Create practical and real life situations that involve application of inequalities. The use of relevant ICT software is encouraged eg. Graphical calculator and computer Provide relevant situations leading to:
6	Linear and Exponential Sequences	Linear sequences, Exponential sequences, The general term of linear and exponential sequences, sum of first n-terms of linear and exponential sequences	Generating linear sequences eg. Simple interest) and exponential sequences .eg. population growth Finding the nth term of a given sequence Sum of first n terms of given sequence Revise the laws of indices and logarithms with students. Provide relevant contextual tasks for students to work on in groups and as individuals
7	Exponential and Logarithmic equations including change of base,	Solving equations involving indices e.g. $9^x + 3^{x+1} - 4 = 0$. Solving equations involving logarithms including change of base eg. $\log_a x + 2\log_x a = -1$	Expose students to the Pascal triangles Provide opportunities to students to use the Pascal triangle to expand given binomial expansion to estimate given powers eg. 0.98^5
8	Binomial Expansion involving positive integral exponents	Binomial Expansion involving positive integral powers up to the 6^{th} power and its application.	Creating contexts for matrices and operations on matrices eg. Football League Tables Involve students in various activities to solve real life task on operations on matrices. Engage students in finding determinants and inverses of 2by2 matrices and apply this in solving simultaneous equations
	Matrices (up to 3x3 Matrices)	Operations on 2x2 and 3x3 matrices – adding, subtraction and scaler multiplication; finding determinants, and inverse of 2x2 matrices, application of matrices to solving simultaneous linear equations involving 2 variables.	

Source: (Institute of Education, UCC, 2018)

Table 3: Detailed Course Content for Algebra ll in Colleges of Education

IV. METHODS AND DISCUSSIONS

The mathematics curriculum at the S.H.S was reviewed. This was specifically done in the area of Algebra II. The various topics were examined to see the relationship that exists between that of the B.ED first year course in Algebra II. This was done through extensive literature review of both the Algebra aspect of the core mathematics and that of the elective Mathematics.

The study involved the past record of first year pre-service teachers' who enrolled in either mathematics and science programmes of the first year B.ED programme and are to major in either science or mathematics and minor in either of the two. A total of 135 trainees' made up of 60 Science major and 75 mathematics major were purposively selected for the study. Information regarding their grades obtained in both core mathematics and elective mathematics were taken from them. In addition the grades of the semester examination in Algebra II were also taken from their results of release by Institute of Education, University of Cape Coast, and the examining body for the first year B.Ed. programme 2018/2019.

This was later validated by cross checking each of the grades provide by the trainee with their confirm results from WEAC.

RESEARCH QUESTION ONE (1): WHAT GRADES DID MATHEMATICS AND SCIENCE TRAINEES OBTAIN IN SHS ELECTIVE MATHEMATICS

	Mathematics minor Science Major		Mathematics major Science Minor	
Grade	Core Maths	Elective Maths	Core Maths	Elective Maths
A_1	1	4	3	8
B_2	-	3	9	9
B_3	14	16	26	19
C_4	7	6	13	12
C_5	14	3	4	6
C_6	16	4	15	7
D_7	-	4	-	2
E_8	-	2	-	4
F_9	-		-	1
Total	52	42	70	68

Source: field Data, 2019

Table 4: Entry grades of pre-service mathematics /science teachers' in Tamale colleges of education

Table 4 indicates the entry grades of pre-service teachers' in both core mathematics and elective mathematics based on their major and minor programmes as pertained in the colleges of education. 22 pre-service teachers' from the science major class had grade C_4 or better, 14 of them had grade C_5 while 16 had grade C_6 or below. On the average, the grade performance is C_5. This therefore means that almost all the pre-service teachers' met the minimum general entry grade of C_6 for core mathematics. In the area of elective mathematics which is also a requirement for the course/program, 3 of the science major pre-service teachers' had grade C_5. 29 of them had grades better than C_5 while 10 of them had grades below C_5. This put

the average performance of the pre-service teachers' in science major programme at grade C_4.

Also, 41 pre-service teachers' from the mathematics major class had grade C_4 or better, 4 of them had grade C_5 while 16 had grade C_6 or below. On the average, the grade performance is C_4. This therefore means that almost all the pre-service teachers' met the minimum general entry grade of C_6 for core mathematics. In the area of elective mathematics which is also a requirement for the course/program, 6 of the mathematics major pre-service teachers' had grade C_5. 48 of them had grades better than C_5 while 7 of them had grades below C_5. This put the average performance of the pre-service teachers' in mathematics major programme at grade C_4.

The findings revealed that the performance of pre-service science teachers, regarding their entry grades in core mathematics is slightly one points better than the minimum entry grade of C_6 as indicated in the 2019 colleges of education entry requirements. Elective mathematics which is also a programme requirement, their performance was also two point better than the minimum entry grade of C_6 (NTCE and PRINCOP, 2019). On the part of per-service mathematics teachers' the indication was that a two point better than the minimum entry grade for mathematics and a two point better than the minimum entry grade for elective mathematics were recorded.

RESEARCH QUESTION ONE (2): WHAT IS THE PERFORMANCE IN TERMS OF GRADES OBTAINED BY MATHEMATICS AND SCIENCE TRAINEES' IN ALGEBRA II?

	Mathematics minor Science Major	Mathematics major Science Minor
Grade	Algebra II	Algebra II
A	-	5
B+	1	8
B	3	6
C+	5	8
C	7	15
D+	15	12
D	11	7
E	17	14
Total	60	75

Source: End of first semester result, 2019

Table 5: End of first semester result of pre-service mathematics /science teachers' in Algebra II in Tamale colleges of education

As shown in table 5 the performance of pre-service mathematics/science teachers' performance in Algebra II indicates that 7 pre-service science teachers' scored grade C and 9 of them had grades better than C while 43 of them scored grades below C in Algebra II. On the whole, the average performance grade for them was D+. This is an equivalent grade for admission into colleges of Education. In addition, the performance of pre-service mathematics teachers' show that 12 of them scored grade C and 29 of them had grades better than C while 38 had below C. the average performance was C which is one point better than the minimum entry requirement in to colleges of education.

What this reveals is that the average performance of pre-service science teachers' in Algebra II and their entry grades in both core mathematic and Elective mathematics is same with grade C_6 (D+) and that of their counterparts in the mathematics major programme is C_4 (C). This performance bring a lot of thing to the fore, this includes teacher mode of delivery, issues of students transition from Senior High School to colleges of Education students and many other variable.

V. CONCLUSIONS

This study seeks to bring to the forth the entering grades of mathematics and science pre-service teachers' in core mathematics and elective mathematics at the SHS and their performance in Algebra II in Colleges of Education. Based on the finding, the following conclusions were arrived.

On the average, the entry grade of pre-service mathematics /science teachers' was C_5. This therefore meant that they met the minimum grade for the general entry requirement of grade C_6 for core mathematics

The average entry grade of pre-service mathematics /science teachers' was C_4 for elective mathematics.

The performance of pre-service mathematics/science teachers' in Algebra II in Tamale college of Education was average with a grade of C which is two points on the scale of 0-4 grade points.

VI. RECOMMENDATIONS

In view of the fact that per-service teachers' entry grade in core mathematics was relatively same as the minimum entry grade, it is recommended that senior high school mathematics teachers should re-look at the method and approaches they adopt in teaching mathematics. Some approaches such as Problem-Based learning. Constructivist, social constructivist can be integrated during teaching and learning of mathematics.

On issue of elective mathematics as a requirement with a minimum grade of C_6. It is recommended that this should be enforced and possible be bought to C_5 for all students who will want to offer mathematics and science at the college of education.

Colleges of Education mathematics teacher should find suitable methods of teaching and learning of mathematics that will help senior high school students integrate effectively with the system of teaching at the colleges, this when is effectively than can enhance the performance of pre-service mathematic /science teachers not only in Algebra II but their general performance.

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