



Full Length Research Article

PROFESSIONALISM IN MATHEMATICS TEACHER EDUCATION AND ITS INFLUENCE ON TEACHER PRACTICE IN LIBERIA: A CASE STUDY OF KRTTI AND ZRTTI

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ARTICLE INFO

Article History:

Received 02nd November, 2016
Received in revised form
29th December, 2016
Accepted 17th January, 2017
Published online 28th February, 2017

Key Words:

Professional education versus teachers' performance practices, Mathematics teacher education, ZRTTI and KRTTI, On-the-job training, Continuous professional development.

ABSTRACT

This paper investigates professionalism in mathematics teacher education and its influence on teacher practice in Liberia with special reference to the KRTTI and ZRTTI. In the study, we used samplesize of 100 teachers and 23 administrators. We employed a combination of both quantitative and qualitative research methods. The quantitative approach used was a self-administered questionnaire and the qualitative approaches included use of interviews and an observation guide. The study reveals the following findings: a teacher's professional education does affect his/her practices on the job. This means teachers who have basic professional training exhibit better practices than those who do not. It was also observed that there is a significant correlation between on-the-job teacher training and teacher practices. Additionally, the study found that continuous professional development of teachers has a very significant positive relationship with teacher performance practices. This implies that teachers who engage in continuous professional development are best suited to showcase better performance practices as compared to those who do not. The study also made the following findings:

- Teachers in Zorzor District rated higher on continuous professional development and teacher practices than those of Kakata District
- When matched up against those of Zorzor District, teachers of Kakata District showcased better performance practices springing from on-the-job training
- As far as basic professional education versus teachers' performance practices is concerned, teachers of Zorzor District stand above those of Kakata District

Based on these findings the study concluded that basic professional education, on-the-job training and continuous professional development are factors affecting the performance practices of teachers in ZRTTI and KRTTI. If these areas are properly attended to, our teachers and students will keep pace with the current standards of others in the world.

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INTRODUCTION

"The continuing search for standards and for best practice is at the heart of professionalism in teaching" (Socket, 1993). The public school teaching profession in the Republic of Liberia has always undergone a process of change and reform due to the need for better and quality education, and the concept of professionalism lies at the heart of this change and reform. Professionalism in teaching, amongst other things, implies having professional status, methods, character or standards, and the question of how to achieve it is a matter of on-going

debate amongst educators and other stake holders in Liberia. We looked at four perspectives in this study, the historical, theoretical, conceptual and contextual perspectives. These perspectives sought to establish the contribution the basic teacher education can make to the quality and effectiveness of the educational experience and wider personal development of young people.

Historical perspective: Liberia's pressing need for professionally trained teachers was first addressed when The William V. S. Tubman School of Teacher Training was founded in March, 1947 as a cooperative enterprise of the Government of Liberia. As the need for more trained teachers

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was stirred up, The Methodist Church Mission and The Episcopal Church Mission in Liberia, through the College of West Africa, provided a two-year program of academic and professional training for high school graduates preparing to teach in elementary schools (Reeves, 1995). By the year 1950, the William V. S. Tubman School of Teacher Training had become an independent institution fully supported by the Government of Liberia, and had extended its program to four years. In November, 1950, it awarded its first degree, the Bachelor of Science in Education to nine persons—six men and three women. In 1951, it was merged with Liberia College and five other schools to become the University of Liberia. Since 1962, this school of the University of Liberia has been known as the William V. S. Tubman Teachers' College (Reeves, 1995). As a means of reinforcing its teacher training education program, the Government of Liberia, through a grant from the World Bank, built the Zorzor Rural Teacher Training Institute (ZRTTI) in Zorzor District, Lofa County and the Kakata Rural Teacher Training Institute (KRTTI) in Kakata District, Margibi County in 1961 and 1964 respectively. The sole aim of this was to provide training for rural teachers (MOE, 2010). Education in Liberia was severely affected by the Liberia Civil War between 1989 and 2003. The many years of civil unrest that took the lives of hundreds of thousands of Liberians and displaced many more, also left the education system bereft of qualified teachers. All regular teacher training programs at the universities collapse and other institutions face the joint problem of recruitment. Currently, pre-service and in-service teacher training courses of different durations are being started and maintained by UN programs or some mother institutions, the greatest actor of which is the United States Agency for International Development (USAID). Despite all these glitches, the search for professional standards and best practice continues. Socket (1993) identified that the continuing search for standards and for best practice is the heart of professionalism in teaching.

Theoretical perspective: The study was guided by the 'Human Capital Theory' propounded by Becker (1993) cited in Heery and Noon (2001). The Theory states that individuals can affect their value in labor market by choosing whether or not to take advantage of educational opportunities and training. Throughout Western Countries, education has recently been re-theorized under Human Capital Theory as primarily an economic device. Human Capital Theory is the most influential economic theory of Western education, setting the framework of government policies since the early 1960's. It is seen increasingly as a key determinant of economic performance. A key strategy in determining economic performance has been to employ a conception of individuals as human capital and various economic metaphors such as 'technological change', 'research', 'innovation', 'productivity', 'education', and 'competitiveness'. Economic considerations per se in the past, however, have not determined education. Human capital theory suggests that education or training raises the productivity of workers by imparting useful knowledge and skills, hence raising workers' future income by increasing their lifetime earnings (Becker, 1964). Becker (1964) and Mincer (1974) provide an explanation that links investment in training with workers' wages. In particular, their theory draws a crucial distinction between general education and firm-specific training. Over the past thirty years or so, hundreds of studies have been conducted to estimate rates of return to education (RORE); most such studies show that formal schooling is a crucial

factor in explaining variations of salary and wages in well developed countries (Cohn & Addison, 1998). Comparative studies have been conducted in some less developed countries, focusing on investment in formal education (Psacharopoulos, 1985, 1994). While formal education has expanded rapidly in many countries, a large portion of human capital accumulation in the forms of on-the-job training and other modes for working adults actually take place both inside and outside the workplace. Studies in some developing countries find that a mix of education and training is available for skill acquisition and there are multiple paths to skill development for a given occupation (Middleton, Ziderman, & Adams, 1993; Ziderman and Horn, 1995). Based on this theory, if teachers in ZRTTI and KRTTI benefit from normal school training, on-the-job and off-the-job training opportunities their value on the job increases hence an improvement in their practices at work. However, failure to benefit from the professional training practices would lead to poor teacher practices hence the relevance of the theory to the study.

Conceptual perspective: Adeogun (2005) defined a teacher as a person who manages teaching and learning activities. Gove et al (1993) defines a teacher as a person who teachers in a school. Yet a practice was defined as putting a plan into action. In this study, teacher practices will refer to appropriate selection of content taught, methodology planning for teaching, use of proper assessment techniques, managing time and providing feedback to pupils. Teacher professionalism has relevant significance in education in that it affects the role of the teacher and his or her pedagogy, which in return affects the student's ability to learn effectively. Professionalism was defined by Gove et al (1993) as skills or qualities of a profession. In this study, professionalism referred to the ability to reach students in a meaningful way, developing innovative approaches to mandated content while motivating, engaging, and inspiring young adult minds to prepare for ever-advancing technology. However, this definition did little to exemplify precisely how a professional teacher carries himself or herself. Teacher professionalism contains three essential characteristics, competence, performance, and conduct, which reflect the educator's goals, abilities, and standards, and directly impact the effectiveness of teaching through the development of these qualities.

To begin, the characteristic of competence is fundamental in an educator's pursuit of excellence. A discussion on competence focuses on three important ideas: preparation, knowledge of subject area, and defined pedagogy. The first, preparation, prepares the professional for the adversity of the classroom. From language and cultural barriers to socio-economic differences, all educators face deterrents in the classroom that must be broken down by individualized techniques. "Decision making by well-trained professionals allows individual clients' needs to be met more precisely, and promotes continual refinement and improvement in overall practice" (Darling-Hammond, 1988, p. 59). Thus, by bridging these barriers, the educator will be better prepared for classroom management and create an effective learning environment. Furthermore, by doing this, the professional teacher leads students by his or her example: one who is prepared for difficulties would be able to overcome them. Along with preparation, a professional educator with a strong knowledge of his/her subject area has the opportunity to concern themselves with preparing innovative techniques to teach material rather than spending significant amounts of time

studying the material. With the advantage of knowing one's curriculum material well, the educator has more confidence in their teachings, having already placed significant thought on the material being taught. Thus, a professional is able to dwell on how to relate subject matter to the students and their cultures in an original method. The final portion of competence is discovering and assuming a defined pedagogy. A professional teacher who has a defined pedagogy has already journeyed through several trials to discover which pedagogical techniques are most effective. According to Lunenburg and Ornstein (1996), "Hiring teachers by subject and skill presumes that curricular priorities have been established, which means that decisions have been made about how much time will be devoted to each segment of the curriculum" (p. 9). Although this may take years to fine-tune, a professional is willing to self-evaluate his or her pedagogy as he/she develops it, revise their edification when deemed necessary, and apply one's ideas to a practical situation. Furthermore, by acquiring a defined pedagogy, a professional creates more autonomy for him or herself, allowing for a partial release from the constraints constructed by the administration, school board, or parents.

Although competence is essential to teacher professionalism, it is only useful if the educator is able to perform. Performance is the ability to effectively teach the concepts of a curriculum. However, this is performance defined at its most fundamental level. A professional teacher educates so that students learn concepts and apply them to their lives. The final characteristic of teacher professionalism, conduct, is equally as significant as the first two. The manner in which an educator carries himself or herself is a reflection on one's classroom, school, community, and educational system. Conduct is a representation of how well one takes care of himself or herself, from aesthetics to language and behavior. However, these are minor qualities of conduct. Conduct also includes one's ability to initiate and maintain quality communication with all the parties involved in education: students, fellow teachers, school board, administration, and parents. It is through energetic communication by a professional that initiates understanding, whether it be a student grasping their potential or the professional voicing their displeasure on a newly implemented regulation. A professional teacher desires to locate effective communicative skills to achieve preferred educational goals.

Contextual perspective: The Zorzor Rural Teacher Training Institution (ZRTTI) is located in Zorzor, a district in Lofa County which is located in the North-Western corner of Liberia. ZRTTI was chosen for this research because it is the oldest rural teacher training institution in the Liberia. It was established in 1961 with the aim of producing teachers with a rural bias in their training and possible placement in rural schools. Established in 1964, the Kakata Rural Teacher Training Institution (KRTTI) is located in Kakata, Margibi County about 45 minutes' drive from Monrovia. As a result of the civil war the Republic of Liberia has witnessed a sharp decline in the quality of teaching and teachers' education nationwide. Most teachers go to the class room with the sole aim of making ends meet, as, in the Liberian context, teaching is a job easiest to get. Teacher performance and teacher practice was looked at as one of the ways in which academic excellence in schools can be enhanced, students are motivated to work hard, teachers' competence reflected and teachers brought out as agents of social change. Unfortunately, the

Zorzor District report (2006) reveals that students are often left without being given class work. It further states that teachers absent themselves from school duties or come late and leave early, and head teachers are hardly seen in their offices executing their duties. This failure to fully embrace their professionalism was breeding several negative results such as poor academic performance, student indiscipline, and high student turn-over. In turn, this was affecting teachers' adherence to their code of conduct, and adversely affecting their attitude towards the core values of the code of conduct, their dedication, willingness, voluntarism, belongingness, cooperation, excitement and pride. If the current trend is not urgently addressed, we stand the risk of losing out on the purpose of education. There is, therefore, the need to relate professionalism to teacher practices. This study looked at how professional identity is formed in teachers and what impact it had on teacher education and teacher practices in Liberia. The purpose of the study is to establish the relationship between teacher professionalism and teacher practices in Kakata Rural Teacher Training Institution and Zorzor Rural Teacher Training Institution in Liberia.

Review of the Related Literature

Review of the related literature will be focusing on the relationship between basic teacher education, on-the-job and off-the-job training on teacher practices in Liberia.

Basic teacher education and mathematics teacher practices: Maicibi (2007) identified that the traditional training methods uphold the relationship between two parties involved in the sense of a trainer versus a trainee, a teacher versus the student or superior versus inferior and super ordinate versus subordinate and adds that such training is good but is criticized as it does not model an individual into an independent person. A synthesis of findings from six evaluation studies of alternative (secondary) provision in (Kirk, 2003), suggests that school-based teacher education itself does not guarantee valuable and accelerated training outcomes. This means that formal training of teachers in teacher training institutions may not yield required practices at times. Brouwer (2007) identifies the role of teacher educators in modeling action research as a practice embedded in professional inquiry. However, none of these studies was directly relating teachers' basic education on teachers' practices in the two Districts which this study did.

On-the-job training and teacher practices: Maicibi (2007), pointed out that on the job training techniques (counseling, coaching, monitoring, workshops) impact and enhance skills which impact employee performance which subsequently increases the individual's and the organizations' competitive advantage. Heery and Noon (2001) identified that on-the-job training is whereby an employee receives instruction within the work place usually through observing the tasks or guided through them by experts and then practicing them. Brouwer (2007) identified that the quality of mentoring programs determines much the productivity of an individual. Supervising teachers need opportunities for professional development in mentoring to facilitate reflective learning and to reduce the practice shock associated with school based outcomes.

Mentoring and induction is important in that these help the retention of teachers. Several studies have calculated that between 40 and 50 percent of new teachers leave within the

first five years of entry into teaching due to lack of a professional mentor (e.g., Murnane *et al.* 1991; Hafner and Owings 1991; Ingersoll 2001).

A systematic review of research literature on induction and mentoring found ‘*strong support for claims that induction and mentoring improves teaching effectiveness and promotes new teachers’ sense of wellbeing*’ (Totterdell *et al.*, 2004: 2). This review noted that effective induction systems attend not only to the development needs of newly qualified teachers, but also provide support for mentor teachers and school leaders. Successful mentoring requires adequate release time to support the role, in addition to opportunities for face-to-face meetings with mentees. Research by Carter and Francis (2001) on workplace learning in New South Wales, Australia, suggests that effective learning for beginning teachers is linked to mentoring and induction into a vibrant collective learning culture in a school supported by partnership with a university. The survey and case studies undertaken through this research suggest that teacher-mentor relationships are potentially important components of workplace training but require sustained and sophisticated collaboration between universities, schools and education systems. Howe (2006) reviewed induction programmes in Australia, Britain, Canada, France, Germany, Japan, New Zealand and the United States and concluded that the best approaches were based on: development of an organizational culture in which there is collaborative exchange involving a range of professionals aimed at supporting newly qualified teachers, reduction in responsibilities in addition to reduction in teaching workload - time for reflection, and individualized induction plans and funding for mentor training.

Professional knowledge is the foundation of the practice of teaching and learning. This professional knowledge includes a range of roles, responsibilities and relationships:

- *The Teacher and Student*
- *The Teacher and Parents*
- *The Teacher and Curriculum*

The Teacher and Student: Instructional communication scholars have found that the relationship that occurs between teachers and students can, and does, influence student understanding, directly and indirectly. According to past research, positive teacher-student relationships facilitate affective learning (addressing, changing, and/or reinforcing students’ attitudes as they relate to knowledge and skills acquired), which, in turn, influences cognitive learning (the acquisition of and ability to understand and use knowledge) (Carrell&Menzel, 2001; Chesebro&McCroskey, 2000; Witt &Wheless, 2001). The link between the teacher-student relationship and learning outcomes, however, remains small (Witt *et al.*, 2003). Research indicates that lower levels of learning, such as recall and comprehension, can and do occur when students read the textbook and/or listen to lectures (Titworth, 2001), but higher levels of learning such as analysis, synthesis, and evaluation may require more interaction between student and teacher (Frymier& Houser, 1999). Although one may argue that interaction is, indeed, taking place when a student engages in reading or listening to a lecture, it may be the nature of the interaction (i.e., impersonal versus interpersonal) between teacher and student that facilitates the understanding we hope our students will achieve. Interpersonal communication has been defined as “the

exchange of symbols used to achieve interpersonal goals” (Bettinghaus& Cody, 1994). The goals between two communicators may vary, but many times refer back to the interpersonal needs of affection, inclusion, and control (Schutz, 1958). Schutz argued that we develop interpersonal relationships to satisfy such needs. To elaborate on the nature of interpersonal relationships, five characteristics have been identified to qualitatively define interpersonal communication (Miller & Steinberg, 1975). Arguably, four out of the five characteristics provided in this framework may also be applied to teacher-student relationships. The first is uniqueness, which is referred to above, in which the two parties within a relationship communicate based on personal factors, rather than sociological factors. The second characteristic is irreplaceability, indicating the impossibility of any relationship to replace any other relationship. This characteristic is the one that we will drop from this study since often teacher-student relationships are not irreplaceable, because (in most cases) students have the option to take the same class from a different teacher and develop a relationship with him/her. Next, there is usually some degree of interdependence within interpersonal relationships. This is evident within teacher-student relationships since the teacher is dependent on the student’s communication in order to aid in the facilitation of learning. The student is also dependent on the teacher for fulfillment of course goals, academic pursuits, and perhaps even help with personal matters. Disclosure has also been identified as a feature of interpersonal relationships, that is, personal self-disclosure that ultimately binds together the two relational partners. Finally, interpersonal relationships are said to produce intrinsic rewards for both persons within the relationship.

Good teacher-student relationships are fundamental to engagement in the teaching/learning process. These are developed through communication which is built on mutual respect and trust. Teachers recognize that differences in students’ backgrounds and identities can shape experience and impact on learning. They respect, value and accommodate diversity including those differences arising from gender, marital status, family status, sexual orientation, religion, age, disability, race, ethnicity, membership of the Travelling Community and socio-economic status. They apply their knowledge of students’ backgrounds, identities, experiences and learning modes to their teaching. Teaching is shaped by knowledge of human development and learning. Teachers apply their knowledge of students’ holistic development to their teaching and to the promotion of social responsibilities. Teachers recognize the individual potential of students. They know that those with special/exceptional needs and potential require access to appropriate expertise and resources in the context of a whole school approach.

The Teacher and Parents: While the value of the home/school partnership is universally accepted, it is not always easy to promote or maintain. Teachers must be aware that as we have moved from small communities with intimate connections to a very diverse mobile culture, the increasing complexity of relationships, roles, and functions has often complicated the collaborations. “Teachers are really the glue that holds the home/school partnerships together” (Patrikakou&Weissberg, 1999: 36). Most teachers think about having a good relationship with parents. However, just as images of teaching and learning environments vary, so do images of “good” parent-teacher relationships. At one end of the spectrum, the

image of a good relationship is an effective separation of roles and functions between home and school, an optimal social distance combined with mutual respect. The family meets the school's expectations efficiently, and the school effectively educates the child without undue demands on the home (Henry, 1996; Powell, 1989). At the other end of the spectrum is the image of the school functioning as an extended family, a more open system. Family and school intersect around the life of the child (Powell, 1989).

The degree of success that teacher has in developing a partnership with parents and hence the education of the child depends heavily on the "fit" between parental cares and concerns and those of the teacher. Unlike many other kinds of relationships in peoples' lives, the parent-teacher pairing occurs by assignment rather than choice. The common interest is the schooling of a child. What all good parent-teacher relationships have in common is the "absence of conflict." Effective parent-teacher relations are founded on (1) the understanding of the unique elements of the parents and teachers' roles and how they complement each other and (2) subsequent modifications of their roles growing out of negotiations that reflect the unique needs of both parent and teacher. In effective partnerships, parents and teachers educate each other during open two-way communication. Each point of view enlightens the other. "Mutually responsive relationships seem more likely to flourish if such programs focus more on the interconnectedness of parents and teachers through their mutual commitment to children and on exploring ways to enhance and celebrate this connectedness" (Sumsion, 1999). Teachers must appreciate that parents are the primary educators of their children. They build trust with parents and actively communicate and collaborate with them in the education of their children. They exercise their professional integrity and judgment in communicating with students and parents.

The Teacher and Curriculum: Teachers should engage in the dynamic processes by which curriculum is designed and implemented and students' learning is facilitated and evaluated. "The term curriculum encompasses the content, structure and process of teaching and learning which the school provides in accordance with its educational objectives and values... It is concerned not only with the subjects taught, but also with how and why they are taught and with the outcomes of this activity for the learner" (*Charting our Education Future*, 1993). However, on the job training had not been researched on to relate with teacher practices in the two districts.

Continuous professional development and teacher practices.

Lifelong learning is a necessary commitment for any discipline of teaching, but especially for areas of practice in career and technical education (Wright, 2002). The term Continuing Professional Development (CPD) is said to have been coined by Richard Gardner, who was in charge of professional development for the building professions at York University in the mid-1970s. It was chosen because it did not differentiate between learning from courses, and learning 'on the job'. The term is now common to many professions. CPD embraces the idea that individuals aim for continuous improvement in their professional skills and knowledge, beyond the basic training initially required to carry out the job. In teaching, such development used to be called 'in-service training', or INSET,

with the emphasis on delivery rather than the outcome. Arguably, the change in terminology signifies a shift in emphasis away from the provider and/or employer, towards the individual. In other words, the individual is now responsible for his or her lifelong career development, under the umbrella of the school or schools that employ the teacher. The concept of continuing professional development (CPD) in education is often ill-defined, with the separate notions of formal training and on-the job learning serving to confuse the issue further. However, Day's (1999) definition of CPD encompasses all behaviors which are intended to effect change in the classroom:

"Professional development consists of all natural learning experiences and those conscious and planned activities which are intended to be of direct or indirect benefit to the individual, group or school, which contribute, through these, to the quality of education in the classroom. It is the process by which, alone and with others, teachers review, renew and extend their commitment as change agents to the moral purpose of teaching; and by which they acquire and develop critically the knowledge, skills and emotional intelligence essential to good professional thinking, planning and practice with children, young people and colleagues throughout each phase of their teaching lives" (Day, 1999: 4).

The environments in which teachers work, and the demands placed upon them by society are increasingly complex. Teachers strive to equip learners with a wide range of skills that they will require to take their place in a world that is in constant evolution; this hastens the need for the development of more competence-centered approaches to teaching, together with greater emphasis on learning outcomes. Pupils are increasingly expected to become more autonomous learners and to take responsibility for their own learning. The learners in any class may come from an increasingly wide range of backgrounds and may have a very broad range of abilities. In this context, even initial teacher education of the highest quality cannot provide teachers with the knowledge and skills necessary for a lifetime of teaching. Teachers are called upon not only to acquire new knowledge and skills but also to develop them continuously. The education and professional development of every teacher needs to be seen as a lifelong task, and be structured and resourced accordingly. To equip the teaching body with the skills and competences needed for its new roles, it is necessary to have both quality initial teacher education and a coherent process of continuous professional development to keep teachers up to date with the skills required in a knowledgebase society.

As schools become more autonomous, with open learning environments, teachers assume greater responsibility for the content, organization and monitoring of the learning process, as well as for their own personal career-long professional development. Furthermore, as with any other modern profession, teachers have a responsibility to extend the boundaries of professional knowledge through a commitment to reflective practice, through research, and through systematic engagement in continuous professional development from the beginning to the end of their careers. Systems of education and training for teachers need to provide them with the necessary opportunities. This in turn presents teacher education institutions, teacher educators and schools with fresh challenges when developing or implementing programs for both student teachers and practicing teachers.

Professional development is a lifelong process which is influenced by personal, social and educational contexts. It is most effective when it is embedded in practice. Few research studies have examined the relationship between characteristics of professional development and change in teachers' practice in the long-term. A questionnaire by Boyle et al (2004) investigated the professional development of primary and secondary teachers across England. In this self-report study, 77% of the 779 participants in longer-term professional development activities reported making changes to at least one aspect of their practice as a result of involvement in CPD. Change most commonly occurred in relation to planning (51%), teaching style (43%) and assessment practices (40%). Observation of colleagues and sharing practice were the most common longer-term development activities. Coaching' and 'research inquiry' were rated as the most effective activities (Boyle et al, 2005).

Beyond both pre-service basic training and mentoring, professions also expect ongoing in-service technical development and growth on the part of practitioners throughout their careers. The assumption is that achieving a professional-level mastery of the complex skills and knowledge required of a profession is a prolonged and continuous process of learning. Moreover, in addition to upgrading, this view holds that professionals must continually update their skills with advances in their field of technology, skill, and knowledge. As a result, professionalized workplaces typically both require and provide support for employee development and, in addition, recognize and reward employee growth through formal avenues of promotion and mobility (Hall 1968; Wallace 1994; Hodson and Sullivan 1995). Heery and Noon (2001) defined off-the-job training as a process whereby an employee is instructed away from the work place, either in training room on the premises or at a separate location such as a college. This training is more often theory based and might take the form of self-training packages. Niemi (2008) pointed out that career professional learning away from the job improves on the teacher quality and has been found to be desirable. Individual professional learning needs school learning and collaboration with external partners. One's training needs e identified and given training opportunities like attending seminars, conferences, workshops and study leaves. In this study, professional development is defined as activities that develop an individual's skills, knowledge, expertise and other characteristics as a teacher. Despite this review it appears like continuous professional development and how it relates with teacher practices had not been researched on widely.

MATERIALS AND METHODS

The target population was 160 teachers and 24 administrative staffs. The study content scope was teachers' professionalism particularly basic formal training, on-the-job, and continuous professional development which were related with teachers' practices. The population breakdown to be considered for this study was as follows: 4 administrators, 10 tutors (from content area, psychology, curriculum, and foundations), and 108 teacher-students from the RTTIs. There were 8 secondary schools in Kakata and a total of 8 mathematics teachers from two private and two public schools were considered. In Zorzor there are 4 secondary schools. This research considered a total of 8 mathematics teachers from two private and two public schools. Sixteen (16) administrators from the eight schools in question were interviewed. The two District Education

Officers of Kakata and Zorzor districts were interviewed. Questionnaires were used for that collection from the responds.

Reliability of the instrument: Reliability of the instrument was ensured through the use of Cronbach's Alpha co-efficient index. The researcher first carried out a pilot study where after reliability index was computed and the standard value was 0.7.

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum \sigma_k^2}{\sigma^2} \right)$$

Where α = reliability Alpha coefficient (Chronbach)

K = Number of items in the instrument

$\sum \sigma_k^2$ = variance individual items

σ^2 = variance of the total instrument

\sum = summation. When the computed value is greater than 0.5 the instrument is considered reliable

Table 1. Cronbach's Alpha Co-efficient

Variable	Constructs	Number of items	Alpha
Dependent		12	0.847
Basic Teacher Practices			
Independent	Basic education	10	0.744
Teacher	On the job training	10	0.946
Professionalism	Continuous professional development	10	0.845

The table 1 shows that the co-efficient was above 0.5 implying that the questionnaire is reliable.

Validity: Validity of the questionnaires was done with and content validity index, which was calculated thus:

$$CVI = \frac{\text{Number of items related as relevant}}{\text{Total number of items rated}} = \frac{889}{1050} = 0.8467$$

The instrument was considered to be valid as it gave a validity value of 0.8467, which is above 0.5.

Pearson's Correlation Co-efficient Index with Statistical Package for Social Scientists (SPSS) were used to analysis the obtained data.

DISCUSSION OF RESULTS

Results from Table 2 show that 77.4% of the respondents from Zorzor were male compared to 22.6% who were female. In Kakata, however, 85.5% of the respondents were male compared to 14.5% who were female. In all districts, the findings showed that most of the teachers were male. This would be attributed to the African cultural setting which, in the past, denied female opportunity to have access to formal education. In addition, just over half of the teachers in 45.2% and 43.5%, respectively, were single. Most teachers from Zorzor District were certificate holders represented by 35.5% followed by diploma holders totaling to 36.7%. Degree holders were totaled 22.6% and those in the category of others were 3.2%, but in Kakata District, most of the teachers were degree holders (40.3%), followed by certificate holders totaling to

37.1%. Despite all this, few of the teachers in Kakata, represented by 4.8% belonged to the category of others. These percentages suggest that Kakata District had teachers with higher qualification than Zorzor District.

achieve common ends. Teachers agreed that they counsel and offer guidance to students (79%) compared to 4.8% who disagreed. This means that teachers are willing to guide and counsel learners at school.

Table 2. Description of respondents' background characteristics in Zorzor and Kakata

Zorzor		Kakata			
Bio-data		Frequency	Percent	Frequency	Percent
Sex	Male	44	77.4	53	85.5
	Female	14	22.6	09	14.5
Marital status	Single	28	45.2	27	43.5
	Married	33	53.2	34	54.8
	Others	01	1.6	04	1.6
Qualification	Diploma	24	38.7	11	17.7
	Certificate	22	35.5	23	37.1
	Degree	14	22.6	25	40.3
	Others	02	3.2	03	4.8
Age in years	21-30 years	13	21	12	19.4
	31-40 years	20	32.3	24	38.7
	41-50 years	17	27.4	23	37.1
	50+ years	12	19.4	03	4.8

Table 2 results showed that most teachers in Zorzor District belonged to the age group 31-40 years represented by 32.3%, and followed by those in the age group 41-50 years (27.4%), followed by those in the age group of 21-30 years totaling 21%. Few (4%) belonged to age group 50 plus years. These findings were more or less similar to those of teachers in Kakata for most of the teachers were aged between 31-40 years (38.7%) followed by those in the age group 41-50 years (37.1%) and few of them belonged to the age group 51 plus years represented by 4.8%. It was observed from Table 3 showed majority of teachers from Zorzor District agreed that they select teaching content based on the level of learners (96.8%) compared to 1.6% who disagreed while 1.6% were uncertain. In addition, most teachers (96.8%) agreed that they use most appropriate methodology when teaching as compared to 1.65 who disagreed while 1.65 were uncertain. Furthermore, (90.4%) of the teachers agreed that they use local aids known to learners when teaching compared to 3.2% who disagreed while 6.5% were uncertain. These findings meant that aids used in teaching are selected from the environment of Zorzor District. Most of the teachers (98.4%) agreed that they make lesson plans as compared to 1.6% who were neutral. This implied that teachers adequately made lesson plans. In addition, 88.7% of the teachers agreed that they assess students after each lesson they teach compared to 1.6% who disagreed whereas 9.7% were neutral. It suggests that teachers do assess learners. Teachers agreed that they give learners feedback from assessment carried out (96.8%) compared to 3.2% who disagreed. Overwhelming majority (91.9%) of the teachers agreed that they have the opportunity to learn by working daily with students compared to 8.1% who were uncertain. This suggests that teachers are willing to work with students in the teaching process. Teachers agreed that students work in small groups to come up with a joint solution (82.2%) compared to 4.8% who disagreed although 12.9% were uncertain. This meant that teachers also agreed that they successfully carry out the responsibilities given by their head-teacher (82.3%) compared to 1.65 who disagreed while 16.1% were uncertain. This meant that teachers in Zorzor District undertake responsibilities as assigned.

Teachers (85.5%) agreed that they feel they are able to influence other teachers in school to work towards improving teaching in their classes, despite this, 14.5% were uncertain. It implied team work and cooperativeness in work done to

Teachers agreed that they are involved in co-curricular activities (66.1%) compared to 22.6% who disagreed while 11.3% were uncertain. These findings meant that teachers in Zorzor District participate in co-curricular activities held at school. The cumulative percentages on teacher practices implied that the practices exercised by teachers are effective on their jobs. To be in position to compare teacher practices between the two districts. Table 3 also revealed that majority of teachers (85.5%) agreed that they select content based on the level of learners compared to 11.3% who disagreed while 3.2% were uncertain. However, those who rated that they select teaching content based on the level of learners were more in Zorzor District than in Kakata District. In Kakata District, over 90% of the teachers agreed that they use the most appropriate methodology when teaching, while 9.7% were uncertain. This meant that methodology used in teaching mathematics in Kakata is carefully selected. Worth mentioning is that, those who agreed were more in Zorzor (96.8%) than in Kakata.

Teachers agreed that they use local aids known to learners when teaching (69.4%) compared to 9.7% who disagreed, nevertheless 21% were uncertain. Again teachers in Zorzor rated higher on this item implying that they most of them select learning aids derived from the local environment of learners than teachers in Kakata District. Teachers (93.5%) agreed that they prepare lesson plans compared to 4.8% who disagreed while 1.6% were uncertain. When these findings are compared with those for teachers in Zorzor District, they suggest that more teachers in Zorzor District prepare adequately their lessons than those in Kakata District. Over three quarters of teachers (83.8%) in Kakata agreed that they assess their students after each lesson they teach compared to 4.8% who disagreed in spite of 11.3% who were uncertain. This meant that teachers in Zorzor District also do assess learners. However, those in Zorzor do more assessment of learners than those in Kakata. More teachers in Kakata also give students' feedback from assessments carried out (87%) compared to 3.2% who disagreed but 9.7% were uncertain. It suggests that students' feedback would allow them to improve on what they did not master in the learning process. However, the rate at which teachers give students' feedback is higher in Zorzor than it is in Kakata District. Over 93.5% of the teachers agreed that they have the opportunity to learn by working daily with students compared to 6.5% who were uncertain. On this

item, teachers in Kakata do learn more from students daily than teachers in Zorzor District learn from students. More teachers in Kakata District (75.8%) showed that their students work in small groups to come up with a joint solution to a task compared to 9.7% who disagreed still 14.5% were uncertain. This meant that teachers allow collaborative learning among students in Kakata District. However, teachers in Zorzor District promote joint group learning of students than teachers in Kakata. Teachers in Kakata District (88.9%) agreed that they successfully carry out the responsibilities given to them by their headmaster compared to 1.65 who disagreed; nevertheless, 9.7% were uncertain. In this regard, teachers showed that they are ready to work cooperatively with managements. However, the level at which teachers engage students in small groups of learning is higher in Zorzor than it is in Kakata.

Teachers (90.3%) in Kakata agreed that they can influence other teachers in their school to work towards improving teaching in their school compared to 2.2% who disagreed while 6.5% were uncertain. This meant that teachers in Kakata District can influence one another towards improving teaching in their school. These findings showed that teachers in Kakata can influence one another more than those in Zorzor District do. Teachers in Kakata District showed that they counsel and offer guidance to students (77.4%) compared to 11.3% who disagreed while 11.3% were uncertain. This suggested that teachers in Kakata District also guide and counsel students. However, more teachers in Zorzor District compared to Kakata District do more guidance and counseling. Teachers in Kakata District agreed that they are involved in co-curricular activities (64.6%) compared to 19.4% who disagreed but 16.1% were neutral. The cumulative percentages on teacher practices in Kakata District showed that teacher's practices are fairly effective in promoting the teaching and learning of mathematics. The mean values showed that teachers in Kakata District rated highest on item, "I prepare lesson plans mean = 1.4516. Teachers rated low in item "I am involved in co-curricular activities mean = 2.2258. These mean values to a great extent showed that teacher practices are not bad in Kakata. These findings on teacher practices are presented graphically using histogram curves as in Figure 1 for Zorzor and Figure 2 for Kakata.

Figure 1 demonstrates the fact that majority of teachers in Zorzor District exhibit a very high degree of requisite teacher practices. These findings agreed with the qualitative findings of the study. One administrator in Zorzor District noted that, "I have teachers who exhibit high degree of professionalism at work; they willfully take responsibilities, show high cooperation and end up achieving higher in their teaching profession." Figure 2 shows that teachers in Kakata were slightly concentrated on the left side of the histogram curve. However, those who agreed in Zorzor were more than those in Kakata. This signified that teacher practices were better in Zorzor District than they were in Kakata. Moreover, one head teacher of Kakata identified that, "my teachers at times do not cooperate as I expect them to. In some cases, they wait for me to give orders, supervise and monitor their work process". These findings therefore meant that teacher practices were better in Zorzor District than they were in Kakata District.

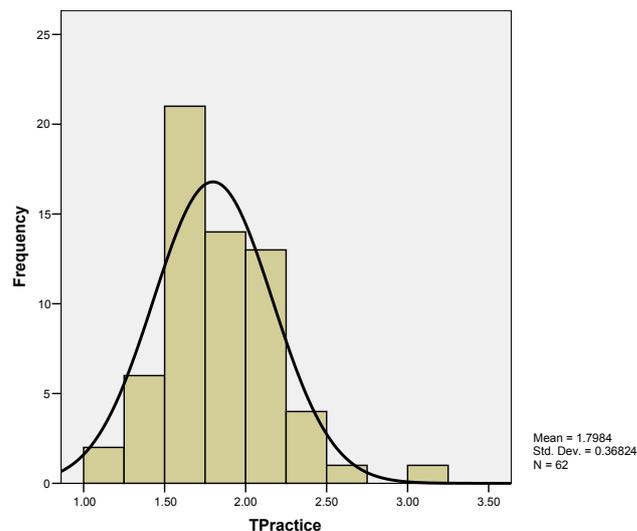


Figure 2. Histogram and curve on teacher practices in Kakata

Testing of Hypothesis

Hypothesis One: This hypothesis intended to establish the relationship between basic teacher professional education and teacher practices in Zorzor and Kakata Districts. Table 4 gives the distribution of teachers' ratings on professional education in Zorzor. Table 4 shows that most teachers in Zorzor District (88.7%) agreed that they had good mathematics background at primary level compared to 9.7% who disagreed while 1.6% was neutral. In addition, teachers agreed that they had competent mathematics teachers in secondary schools (93.5%) compared to 4.8% who disagreed whereas 1.6% was neutral. This meant that mathematics teachers in Zorzor District could effectively teach mathematics to teacher trainees. Majority of mathematics teachers agreed that they enjoyed mathematics at secondary school level (90.4%) compared to 1.4% who disagreed while 8.1% were uncertain. It meant that mathematics teachers in Zorzor District have love for the subject. Just over half of mathematics teachers agreed that they specialized in mathematics on their own at senior high level (56.1%) compared to 16.1% who disagreed though 32.3% were uncertain. This meant that more mathematics teachers desire and love the subject. Mathematics teachers agreed that they passed mathematics very well at all levels of their education (53.2%) compared to 16.1% who disagreed although 32.3% were uncertain.

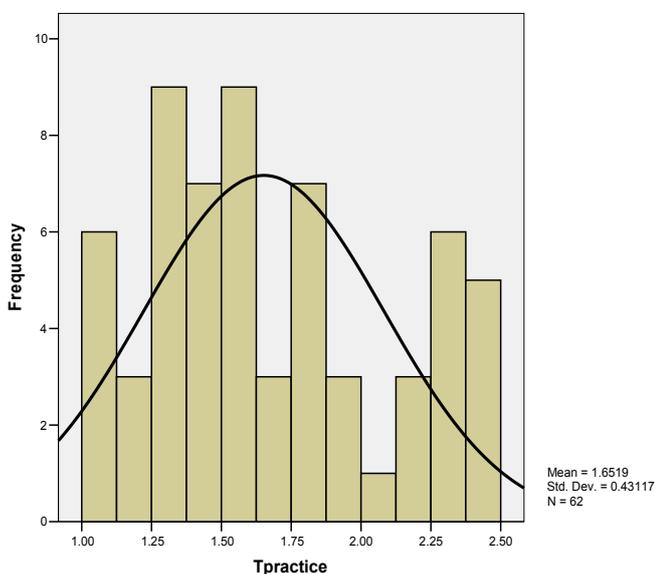


Figure 1. Histogram and curve on teacher practices in Zorzor

This meant that majority of mathematics teachers had much desire and love for the subject. Again just over half of mathematics teachers agreed that they passed mathematics very well at all levels of their education (53.2%) compared to 22.6% who agreed while 24.25 were uncertain. It means that mathematics teachers have a reasonable level of competence to teach mathematics to primary school children. In addition, majority (82.3%) agreed that they do to handle mathematics concepts with teachers compared to 9.7% who disagreed but 8.1% were uncertain. This meant that mathematics teachers went through thorough training in the teaching of mathematics in primary schools. In the same way, majority of mathematics teachers agreed that their role as teachers is to facilitate students' own inquiry (80.6%) compared to 11.3% who disagreed yet 8.1% were neutral. It suggests that mathematics teachers in Zorzor District allow pupils to inquire about mathematics concepts they did not grasp during mathematics lectures. Mathematics teachers agreed that they use the skills acquired in counseling to help students overcome emotional barriers (80.7%) compared to 3.2% who disagreed while 6.1% were uncertain. This suggests that mathematics teachers competently strive to ensure that students' emotional barriers that would interfere with the teaching and learning of mathematics are detected and dealt with by mathematics teachers in Zorzor District.

In addition, majority of mathematics teachers (70.9%) agreed that they use knowledge acquired in psychology to address the needs in culturally diverse classrooms compared to 8.1% who disagreed. Finally, mathematics teachers in Zorzor District agreed that they use skills acquired in curriculum studies to help improve on students' learning (83.9%) compared to 9.7% who disagreed. These findings suggest that more teachers apply professional skills in their practices at work. Teachers rated highest on the item, "I had competent mathematics teachers in secondary schools" (mean=1.6129) and rated lowest on the item, "I passed mathematics very well at all levels of my education" (mean = 2.5484). These mean values generally meant that mathematics teachers' professional education was high. The standard deviations on all items of profession education training were all low implying that mathematics teachers in Zorzor District had similar views and opinions about their professional education. These findings were compared with those of teacher professional education in Kakata District. Majority of teachers in Kakata District (88.7%) agreed that they had good mathematics background in primary schools compared to 11.3% who disagreed. This meant that teachers were provided with a firm foundation for teaching mathematics. Teachers agreed that during their professional training they had competent mathematics teachers in secondary schools (85.5%) compared to 4.8% who disagreed. This implies that teachers of mathematics were trained effectively. Mathematics teachers in Kakata showed that they have enjoyed mathematics at secondary school level (80.7%) compared to 6.4% who disagreed but 12.9% was uncertain. However, those who enjoyed mathematics in Zorzor District were more than those in Kakata District. Just over half of mathematics teachers agreed that they specialized in mathematics at senior high level on their own (56.5%) compared to 32.2% who disagreed; nevertheless, 11.3% were uncertain. This meant that mathematics teachers were competent since many had specialized in the subject. However, those who specialized in mathematics at senior high level were more in Kakata than they were in Zorzor District. In addition, 53.3% of the teachers in Kakata agreed that they

passed mathematics very well at all levels of education compared to 33.9% who disagreed while 12.9% were uncertain. This suggests that mathematics teachers know the mathematical concepts they teach to students. However, on the same item mathematics teachers slightly passed it more in Kakata than teachers in Zorzor District. Majority of mathematics teachers in Kakata District (72.5%) agreed that they used to strive well to handle mathematics concepts with teachers compared to 22.6% who disagreed while 4.8% were uncertain. This meant that students were taught using discovery approaches and participatory learning methods with their teachers. However, more teachers in Zorzor District handled mathematics concepts more with their students. Teachers agreed that their role as teachers is to facilitate students' own inquiry (77.45) compared to 3.2% who disagreed. This meant that teachers use discovery methods. However, more teachers in Zorzor District welcome learner inquiry more than those in Kakata District. Teachers in Zorzor District agreed that they use skills acquired in counseling to help students overcome emotional barriers (79.1%) compared to 11.3% who disagreed while 9.7% were uncertain. Teachers in Kakata District apply counseling skills to deal with students' emotional problems about mathematics. However, teachers in Zorzor District rated higher in this item than teachers in Kakata District. Teachers agreed that they use knowledge acquired in psychology to address the needs of students in culturally diverse classrooms (72.5%) compared to 8.1% who disagreed while 19.4% were uncertain. In addition, more teachers in Kakata District rated highly on this item. Finally, teachers in Kakata District agreed that they use skill acquired in curriculum studies to help students improve learning 87.1% as compared to 9.7% who disagreed while 3.2% were uncertain. However, teachers in Kakata rated higher on this item than those in Zorzor District.

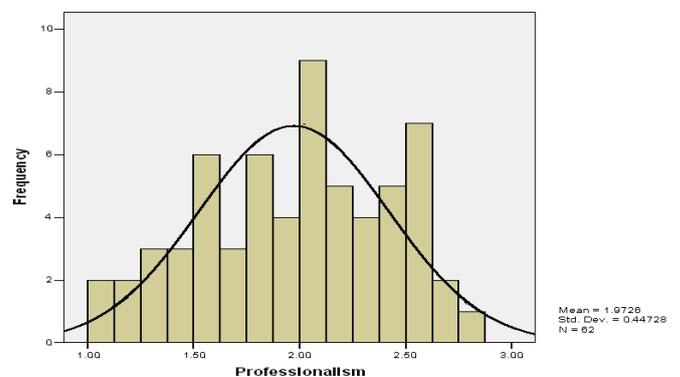


Fig. 3. Histogram and curve showing distribution of teachers on professional education in Zorzor

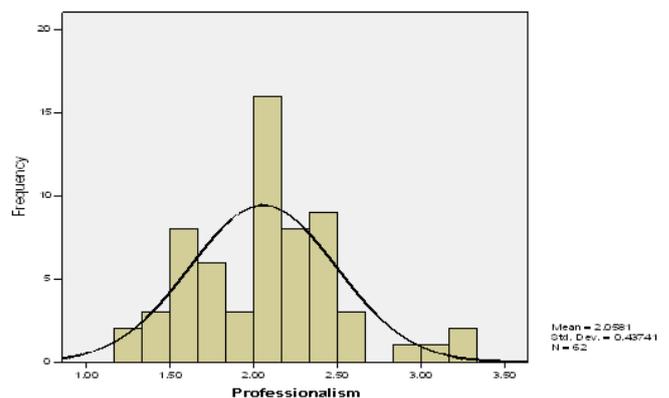


Fig. 4. Histogram and curve showing distribution of teachers on professional education in Kakata

Table 6. Pearson’s correlation co-efficient between teacher professionalism and practices in Kakata District

		Teacher practice	Professionalism
Teacher practice	Pearson correlation	1	.421**
	Sig. (2-tailed)		.001
	N	62	62
Professionalism	Pearson correlation	.421**	1
	Sig. (2-tailed)	.001	
	N	62	62

Teachers in Kakata District rated highest on item, “I have good mathematics background at primary level” (mean = 1.6129) and rated lowest on item, “I specialize in mathematics at senior high level on my own” (mean = 2.7259”. These mean values when compared with those in Zorzor District imply that teachers in Kakata District rated higher on professional education in mathematics than those in Zorzor District. The standard deviations on teacher professional education were low suggesting that mathematics teachers had similar views and opinions about their professional education in mathematics. To confirm the difference between the rating on professional education between teachers in Kakata and Zorzor Districts, the two districts ratings on professional education were presented using a histogram curve as in Figure 3 for Zorzor and Figure 4 for Kakata. The figure 4 above shows that most of the teachers agreed they had adequate professional education thereby empowering them to teach mathematics (mean = 1.9823). However, this mean implies that teachers in Kakata District agreed more when compared with that of teachers from Zorzor (mean=2.058). Nevertheless, in general, the teachers in both districts had adequate professional education to teach mathematics. Interviews held with head teachers in both districts revealed that teachers had adequate professional training in mathematics.

Table 5 shows Pearson’s correlation co-efficient index between teacher professional education and performance practice in Zorzor District ($r = .431^{**}$, $sig. = .000$) less than 0.01. This showed a highly positive significant relationship between teacher professional education and teacher practices at the one percent level 2-tailed. This meant that the higher the professional teacher education one has, the better one’s performance practices. Teachers who have more professional training could accomplish more in terms of professional practices on the job as compared to those with less professional education. These findings were compared with those of the relationship between teacher professional education and teacher practices as in Table 6 below. Table 6 shows Pearson’s correlation co-efficient index between teacher professionalism and teacher practices ($r = .421^{**}$, $sig. = .001$) less than 0.01. This suggests that there is a highly positive significant relationship between teacher professionalism and performance practices in Kakata District. Teachers who are professional at work were in a better position to exhibit better practices at work. But when compared with those of Zorzor it was found out that teachers in Zorzor had a stronger positive relationship between their education professionalism and teacher performance practices. This suggests that were more professional and exhibited better practices than their counterparts from Kakata.

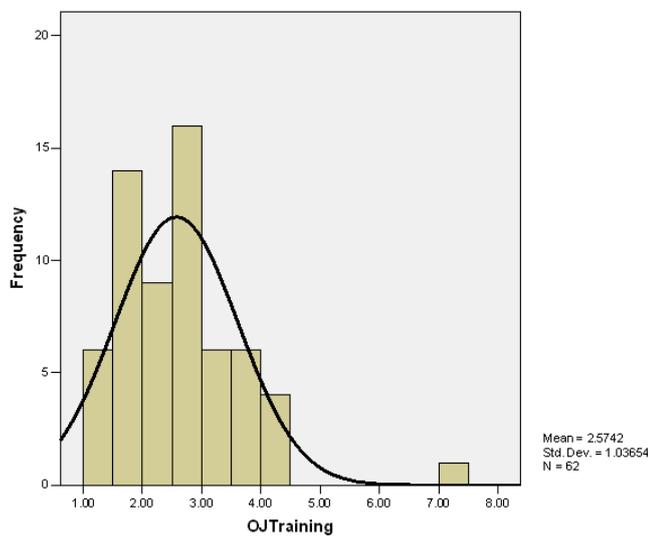


Fig. 5. Histogram and curve showing distribution of teachers in Zorzor for on-the-job training

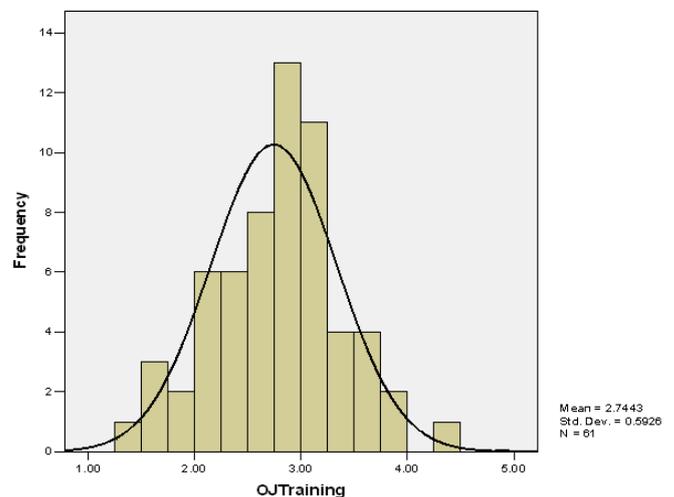


Fig. 6. Histogram and curve showing distribution of teachers in Kakata for on-the-job training

One head teacher from Zorzor District identified, “all the mathematics teachers I have specialized in the subject, they know how the subject is taught, the steps followed when solving problems and explaining concepts”. Another head teacher from Kakata pointed out that “my mathematics teachers underwent thorough training in mathematics during primary and secondary level education; I have confidence that they know how to teach mathematics.” This meant that mathematics teachers were adequately trained to teach mathematics to learners.

Hypothesis Two: The second hypothesis of the study was aimed at examining the relationship between on-the-job teacher professional education and teacher practices in and Zorzor and Kakata Districts in Liberia. Table 7 gives respondents findings from Zorzor District. Majority of teachers in Zorzor District (66.1%) agreed that they were offered an experienced mathematics teacher to work with compared to 17.7% who disagreed while 16.1% who were uncertain. This meant that there is a possibility of experienced teachers training the inexperienced teachers in mathematics

teaching. Mathematics teachers agreed that they were monitored on how mathematics is taught in the schools where they teach (58.5%) compared to 22.6% who disagreed, but 19.4% were uncertain. Just less than half (45.1%) of the teachers slightly agreed that they were offered a coach in mathematics to train them compared to 43.5% who disagreed and 11.35% who were neutral. This meant that in some schools' coaches are provided to mathematics teachers.

Table 8. Pearson's correlation co-efficient index between teacher practices and on the job training in Zorzor

		Teacher practice	On the job training
Teacher practice	Pearson correlation	1	.425**
	Sig. (2-tailed)		.001
	N	62	62
On the job training	Pearson correlation	.425**	1
	Sig. (2-tailed)	.001	
	N	62	62

** Correlation is significant at 0.01 level (2-tailed)

Table 9. Pearson's correlation co-efficient index between teacher practices and on the job training in Kakata District

		Teacher practice	Professional education
Teacher practice	Pearson correlation	1	.465**
	Sig. (2-tailed)		.000
	N	61	62
Professional education	Pearson correlation	.465**	1
	Sig. (2-tailed)	.000	
	N	61	61

**Correlation is significant at the 0.01 level (2-tailed)

Mathematics teachers agreed that they attend counseling sessions on how mathematics should be taught (54.9%) compared to 29.0% who disagreed while 16.1% were neutral. This meant that teacher counseling on the teaching of mathematics is done in schools of Zorzor District. Mathematics teachers agreed that they are mentored by their head of department on how they teach mathematics (62.9%) compared to 25.8% who disagreed and 9.7% were uncertain. It shows that heads of departments monitor the teaching process of mathematics. In addition, teachers agreed that they are supervised during mathematics lessons (77.4%) compared to 12.9% who disagreed and 9.7% who were uncertain. Mathematics teachers in Zorzor District agreed that they are involved in decision making about the school curriculum (46.8%) compared to 38.7% who disagreed and 14.5% who were neutral. Teachers in Zorzor District agreed that they are allowed to express their personal views at staff meetings (70.9%) compared to 21% who disagreed while 8.1% were uncertain. This meant that mathematics teachers give their views and opinions freely in staff meetings.

Just less than half (45.1%) mathematics teachers agreed that they are given responsibility of mentoring new teachers in their schools compared to 43.5% who disagreed while 9.7% were uncertain. Finally, mathematics teachers in Zorzor District agreed that they are involved in planning school improvement activities (58.1%) compared to 35.5% who disagreed while 6.5% were uncertain. The percentages in the whole showed that on the job training of teachers in Zorzor District is adequately done. The mean values on the whole agree that teacher on-the-job training is adequately done. The standard deviations to some extent were high implying that there was a variance in opinions about on-the-job training of mathematics teachers on Zorzor district from one teacher to another. These findings were compared with those of teachers' ratings of on-the-job training in Kakata District. Results from Table 7 also showed that teachers in Kakata District agreed that they were offered an experienced mathematics teacher to

work with 52.2% compared to 30.7% who disagreed even though 16.1% were uncertain. However, teachers who agreed on this item were more in Zorzor District than they were in Kakata District. Mathematics teachers agreed that they were mentored on how mathematics is taught in the school where they teach 61.3% compared to 21.0% who disagreed while 17.7% were uncertain.

However, as the results shows, teachers in Kakata were mentored more when compared to those in Zorzor District.

Just over half (53.2%) of mathematics teachers agreed that they were offered a coach in mathematics to train them compared to 25.8% who agreed and 19.4% who were uncertain. This differed from those of Zorzor who agreed that they are offered coaches. Just fewer than half (46.8%) of mathematics teachers in Kakata disagreed that they attend counseling sessions on how mathematics should be taught.

Mathematics teachers in Kakata agreed that they are mentored by their head of department on how to teach mathematics (70.9%) compared to 16.1% who disagreed while 12.9% were uncertain. Teachers from Kakata District rated highest on this item when compared with teachers rating in Zorzor District.

Mathematics teachers in Kakata agreed that they are supervised on how they teach mathematics (79.1%) compared to 17.7% who agreed while 3.2% were uncertain. It was teachers in Kakata who reported more supervision compared to those from Zorzor District. Teachers from Kakata (49%) disagreed that they are involved in decision making about the school curriculum compared to 37.1% who agreed while 12.9% were uncertain. This meant that teachers in Kakata District are not as involved in decision making especially when it comes to deciding about the curriculum as those in Zorzor District.

Majority of teachers in Kakata District (74.2%) agreed that they can express their personal views at staff meetings compared to 22.6% who disagreed and 3.2% who were neutral. This suggests that teachers in Kakata District are allowed to express themselves. Those who reported that they can express themselves in Kakata were more than those from Zorzor District. Teachers disagreed (46.8%) that they are not given responsibility of mentoring new teachers in the school where they teach compared to 41.9% who agreed and 11.3% who were uncertain. This implies that fewer mathematics teachers in Kakata District are given responsibility to mentor new teachers compared those in Zorzor. Finally, majority of

teachers in Kakata (64.6%) agreed that they are involved in planning schools improvement activities compared to 26.45% who disagreed while 8.1% were uncertain. Teachers in Kakata District rated higher on this item. The percentages in general indicated that mathematics teachers in Kakata District are offered more on-the-job training compared with those in Zorzor District. The mean values, in addition, are low implying that the mathematics teachers' on-the-job training was okay. For instance, the lowest mean was on the item, "I was offered a coach in mathematics" (mean = 3.3770) and the highest mean was on the item "I can express my personal views at staff meetings" (mean = 2.1613). The standard deviations of on-the-job training of teachers in Kakata District were low suggesting that teachers' views did not vary too much from one mathematics teacher to another. This was different from the case of teachers in Zorzor District who had divergent views about on-the-job training.

To confirm these findings histograms and curve were generated and appeared in Figure 5 and Figure 6. Figure 5 shows teachers in Zorzor District were concentrated on the left side of the histogram curve suggesting that their on-the-job training is good. This was compared with the Figure 6 representing on-the-job training of teachers in Kakata as presented below. Figure 6 shows that most of the teachers were slightly concentrated on the right side of the histogram curve, the side of disagreement on the Likert's scale. This means that teachers' on-the-job training is higher in Zorzor District than that of Kakata District. The qualitative findings of teachers' ratings for on-the-job training in Zorzor District showed that teachers are provided with more training on the job, this is done mainly through mentoring, counseling, coaching among others. One administrator noted that,

"I always assign senior teachers responsibility of ensuring that junior teachers are helped to develop the most appropriate skills in the teaching of mathematics."

To find out whether on-the-job training had a positive significant relationship with teacher practices, the two variables were related using Pearson's correlation co-efficient index as in Table 8 and Table 9. Table 8 shows Pearson's correlation co-efficient index between teacher practices and on the job training in Zorzor District ($r = .425^{**}$, sig. = .001) less than 0.01. This showed that there is a highly positive significant relationship between teacher practices and on-the-job training of teachers at the one percent level 2-tailed. This meant that teachers who are trained on the job are in position to exercise high job practices compared to those who are not adequately being trained. These findings were compared with those of the correlation between the two variables in Kakata District. Table 9 shows Pearson's correlation co-efficient index between teacher practices and on the job training ($r = .465^{**}$, sig. = .000) less than 0.01. This signified there is a highly positive significant relationship between teacher practices and on the job training of mathematics teachers in Kakata District. However, the level of significance at Kakata District is higher than that of Zorzor District, meaning that teacher practice was correlated with professional education. i.e. teachers in Kakata were better qualified and were more professional in their practices.

Hypothesis Three: The third hypothesis of the study was to find out the relationship between continuous professional development and teacher practices in Kakata and Zorzor

Districts. Mathematics teachers' continuous professional development was operationalized using the quantitative questions and qualitative items. Findings there from are presented in Table 10. Table 10 shows that teachers (50%) disagreed that they are offered opportunities to attend mathematics seminars compared to 37.1% who agreed and 12.9% who were uncertain. Mathematics teachers (61.3%) agreed that they get chances to attend workshops in mathematics education compared to 29% who disagreed while 9.7% were uncertain. Less than half of mathematics teachers in Zorzor District (46.8%) agreed that they attend mathematics conferences to upgrade their content knowledge compared to 36.1% who disagreed while 16.1% were uncertain. Further, mathematics teachers disagreed that they are offered a study leave for professional development in mathematics (50%) compared to 35.5% who agreed while 14.5% were uncertain. This meant that mathematics teachers in Zorzor District are not adequately offered leave for preparation for professional development in mathematics.

Mathematics teachers (71%) agreed that continuous professional development was too costly for them as compared to 16% who disagreed while 12.9% were uncertain. These findings meant that mathematics teachers in Zorzor District cannot afford continuous professional development on their own. In addition, mathematics teachers agreed that professional development conflicts with their work schedule (46.8%) compared to 35.5% who disagreed while 17.7% were uncertain. However, just over half of mathematics teachers in Zorzor District (59%) disagreed that they do not have time for professional development because of family responsibilities compared to 38.7% who agreed and 9.7% who were uncertain. These findings on continuous professional development meant that mathematics teachers' family responsibilities cannot deny them to attend professional development if offered the opportunity to attend. Mathematics teachers in Zorzor District (69.3%) further agreed that there is no suitable professional development offered to them as compared to 13% who disagreed and 17.7% who were neutral. Mathematics teachers from Zorzor District agreed that they receive meaningful feedback on performance from other teachers (72.6%) compared to 14.5% who disagreed yet 2.9% were neutral. Mathematics teachers finally agreed that they try to make sure that every student in class makes academic progress (90.4%) compared to 9.7% compared to 9.7% who disagreed.

The percentages on the whole suggest that mathematics teachers in Zorzor District willing to have continuous professional development but limited by other factors beyond their control. Teachers rated highest on item, "I try to make sure that every student in my class makes academic progress" (mean = 1.8226) and rated lowest on item "I am offered a study leave for professional development in mathematics" mean = 3.1452. This meant that teachers' continuous professional development in Zorzor District was high. The standard deviations were slightly low meaning that mathematics teachers continued professional development was the same from one teacher to another. Results from Table 10 also show that mathematics teachers in Kakata District disagreed that they are offered opportunities to attend mathematics seminars (59.75) compared to 32.3% who agreed while 8.1% were uncertain. However, 66.2% of the teachers agreed that they get chances to attend workshops in mathematics education compared to 24.2% who disagreed but 9.7% were uncertain. Half of mathematics teachers in Kakata

District (50.0%) disagreed that they attend mathematics conferences to upgrade their content knowledge as compared to 35.4% who agreed while 14.5% were uncertain. These implied mathematics teachers in Kakata District do not frequently attend conferences to upgrade their knowledge. On this item, the rating between teachers in Zorzor and Kakata Districts is the same. Mathematics teachers in Kakata District (66.1%) disagreed that they are offered a study leave for professional development in mathematics as compared to 24.2% who agreed and 9.7% who were uncertain. This suggests mathematics teachers in Kakata District are not encouraged to pursue professional development as required. Mathematics teachers in Kakata District (62.9%) subscribed to the fact that professional development is too expensive for individual teachers to undertake as compared to 25.8% who disagreed while 11.3% were uncertain. Again teachers from Zorzor District rated highest by agreeing more that it is not easy for them to afford profession development. Just under half of mathematics teachers (46.8%) disagreed that professional development conflicts with their work schedule as compared to 30.6% who agreed and 22.6% who were uncertain. Mathematics teachers from Kakata District (70.9%) disagreed that they do not have time for professional development because of family responsibilities compared to 16.1% who agree while 12.9% were uncertain.

“Policymakers should reach out to key stakeholders such as local board members, school administrators, teacher leaders, and university faculty and engage them in discussions about the adequacy of existing professional development opportunities and the alternatives. We need to be convinced that new forms of professional development are required to effectively support reforms in standards, curriculum, and instruction. The campuses of our teacher training institutions need to be fitted with state-of-the-arts research facilities for the development of our teachers”.

On the other hand, the District Education Officer of Kakata, outlining strategies to improve professionalism amongst of schools in the district, was quoted as saying

“Teacher Educators are the key players in the endeavor to improve the quality of teacher education; they should therefore be supported to be the linchpins in innovation both within teacher education and in schools. From them, many teachers acquire the competences (knowledge, skills and values) that they deploy in the classroom. These need to be provided with continuous professional development opportunities. Their development has a ripple effect on their teacher-students, and hence pupils’ outcomes”.

Table 11. Pearson’s correlation co-efficient index between teacher practices and continuous professional development in Kakata District

		Teacher practice	Professional continuous development
Teacher practice	Pearson correlation	1	.303**
	Sig. (2-tailed)		.017
	N	62	62
Continuous professional development	Pearson correlation	.303**	1
	Sig. (2-tailed)	.017	
	N	62	62

Table 12. Pearson’s correlation co-efficient index between teacher practices and continuous professional development in Zorzor District

		Teacher practice	Continuous professional development
Teacher practice	Pearson correlation	1	.333**
	Sig. (2-tailed)		.009
	N	61	61
Continuous professional development	Pearson correlation	.333**	1
	Sig. (2-tailed)	.009	
	N	61	61

**Correlation is significant at 0.01 level (2-tailed)

Teachers who disagreed on this item were more from Kakata than they were from Zorzor District. Teachers in Kakata District (72.6%) agreed that there is no suitable professional development opportunity offered to them compared to 19.4% who agreed while 8.1% were uncertain. Teachers who agreed on this item were more from Kakata than they were from Zorzor District. Majority of mathematics teachers (88.7%) agreed that they receive meaningful feedback on their performance from other teachers as compared to 6.4% who disagreed while 4.85 were uncertain. This means that mathematics teachers give meaningful feedback on the performance of their counterparts. Still, teachers who get meaningful feedback were more in Kakata District than in Zorzor District. Mathematics teachers in Kakata District (88.7%) agreed that they try to make sure that every student in class makes academic progress compared to 3.2% who disagreed while 8.1% were uncertain. The District Education Officer of Zorzor, when identifying strategies that could improve professionalism amongst teachers of secondary schools in the district, intimated

The mean values on the whole suggest that teachers’ profession development is better in Zorzor District than it is in Kakata District. The standard deviations on teachers’ continuous professional development were low suggesting similar views and opinions of teachers on continuous professional development. To confirm these findings histograms and curves were generated as in Figures 7 and 8. Figure 7 shows that the bars of the histogram are heaped on the right side of the histogram curve suggesting that continuous profession development is farfetched in Zorzor District. These findings were compared with those of the histogram showing distribution of teachers on continuous professional development in Kakata District. Figure 8 shows that teachers were greatly heaped on the right side of the histogram meaning that continuous professional development in Kakata is out of course Kakata District than it is in Zorzor District. To find out whether continuous professional development was related using Pearson’s correlation co-efficient index as in Table 11 and Table 12. Table 11 shows Pearson’s correlation co-efficient index between teacher

practices and professional continuous development ($r = .303^{**}$, sig. 0.017) less than 0.01. This implied that there is a high positive significant relationship between teacher practices and continuous professional development at the one percent level 2-tailed. However, this significance is not as high as that of teachers from Zorzor District. Table 12 gives results from Zorzor District. Table 12 shows Pearson's correlation coefficient between teacher practices and continuous professional development in Zorzor District ($r = .333^{**}$, sig. = .009). This showed that there is a highly positive significant relationship between teacher practices and continuous professional development at the one percent level. Table 12 shows Pearson's correlation co-efficient between teacher practices and continuous professional development in Zorzor District ($r = .333^{**}$, sig. = .009). This showed that there is a highly positive significant relationship between teacher practices and continuous professional development at the one percent level.

Conclusions

- From hypothesis one, it was concluded that basic professional education of mathematics teachers has a highly positive significant relationship on teach performance practices in KRTTI and ZRTTI. This means that teachers who receive this basic professional education perform better than those who are not provided with basic professional education. Comparatively, as far as basic professional education versus teachers' performance practices is concerned, teachers of Zorzor District stand above those of Kakata District. The inference here is that teachers of Kakata District come behind those Zorzor District in the sense that the former exhibit less degree of teacher practices emanating from basic professional education.
- From hypothesis two, this study concludes that on-the-job teacher professional education has a highly positive significant relationship on mathematics teachers' performance practices. Teachers who are trained on the job are in position to exercise high job practices than those who are not being adequately trained on the job. However, when matched up against those of Zorzor District, teachers of Kakata District showcased better performance practices springing from on-the-job training.
- From hypothesis three, this study deduces that continuous professional education has a highly positive significant relationship on mathematics teacher practices in ZRTTI and KRTTI. This implies that teachers who are allowed to upgrade show high practices on the job particularly in terms of teacher practices. Comparatively, the test of this hypothesis reveals that teachers of Zorzor District had a better standing than their counterparts from Kakata District. This suggests that teachers of Kakata District demonstrated less teacher performance practices resulting from continuous professional development than those of Zorzor District.

Recommendations

- From the study discussion and conclusions, the researcher recommends that if teacher mathematics practices are to be improved in ZRTTI and KRTTI, the following should be done:

- From objective one, which was to establish the relationship between basic professional teacher education and teacher practices in Zorzor and Kakata districts, it is recommended that the Ministry of Education in Liberia through its officials both at the ministry and county level, should ensure that basic professional education of mathematics teachers in Liberia is improved by providing adequate training facilities, incentives and teaching materials for mathematics teachers. The enhancement of mathematics teacher quality has a ripple effect on pupil's attainment. Whilst content knowledge is important, equally important is the parallel development of general pedagogical knowledge and the knowledge of child and adolescent development as applied to teaching.
- From objective two, which was to examine the relationship between on-the-job teacher professional education and teacher practices in Zorzor and Kakata districts, it is recommended that the Ministry of Education in Liberia through its officials, both at the ministry and county level, and through the principals of schools should ensure that competent and experienced teachers are retained in schools to provide on-the-job professional education of newly recruited teachers in mathematics. Teachers' conditions of service should be improved through rewarding teachers fairly and treating teachers in a more ethically accepted manner so that they can stay longer on the job. This will enable them acquire the teaching experience required for the effective mentoring of those teachers who are newly recruited. Mentoring new teachers should also be given paramount attention in schools of Liberia. This will ensure the retention new teachers.
- From objective three, which was to ascertain the relationship between teachers' continuous professional development and teacher practices in Zorzor and Kakata districts, it is recommended that the Ministry of Education in Liberia through its officials, both at the ministry and county level, should ensure that they put up opportunities to teachers to go for future training especially by providing them with sabbatical leaves, study leaves for degrees, seminars, workshops to improve on teacher practices on the job. Policymakers should reach out to key stakeholders such as local board members, school administrators, teacher leaders, and university faculty and engage them in discussions about the adequacy of existing professional development opportunities and the alternatives. New forms of professional development are required to effectively support reforms in standards, curriculum, and instruction. The campuses of our teacher training institutions need to be fitted with state-of-the-arts research facilities for the development of our teachers.

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