

PRE-SERVICE TEACHERS' EXPRESSED ATTITUDE TOWARD TEACHING OF FRACTIONS AND SOME CONCEPTS OF FRACTION

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ABSTRACT

The main intent of this study was to investigate the college of education pre-service teachers' disposition toward the teaching of fraction and concepts of the fraction as a consequence of the Institute of Education mathematics chief examiners' reports that have oftentimes raised concerns about the continuously low performance by pre-service teachers on items on the fraction. The study mainly investigated what these would-be teachers considered as difficult or easy of the concepts in fraction that would impact their teaching of the topic. The study was conducted in a college of education of the Republic of Ghana with a sample of twenty-six pre-service teachers using the qualitative case study design. The questionnaire was used to collect the data. The results indicated that almost all the participants found the addition of fractions quite easy; however, the whole concept of fraction algorithms was seen as abstract in nature and hence, appeared difficult to them. Those who saw themselves as not good at working fractions, attributed this to weak foundations at the basic schools due to non-availability of qualified teachers teaching them. Those who perceived themselves as good in the topic attributed this to personal likeness for the topic and what they considered as 'good' teachers' intervention. The implication of this is that subjects like mathematics need to be taught at whatever level possible by those who are well versed in it. It was recommended that specialist mathematics teachers be turned out to teach it as subject-teachers from basic one (first-grade).

INTRODUCTION

College pre-service teachers have looked at mathematics as the most difficult among the school subjects. Particularly, the understanding of fractions (in different forms) has been very challenging to them. This goes back decades and studies in the past have confirmed how pre-service teachers have grappled with the topic (e.g. Ball, 1990; Tirosh, Fischbein, Graeber, & Wilson, 1998; Leopard, 2008; Lin, 2009). The rationale for this study is therefore to investigate pre-service teachers towards the topic and how they intend to teach fraction in basic schools in Ghana.

To teach fractions effectively in the basic schools, teachers need not only have a strong background in mathematics content but also a deep conceptual understanding of the content. This type of knowledge is referred to as the knowledge of mathematics for teaching (Hill, Rowan & Ball, 2005; Ball, 1990). This is underscored by what Ma (1999) refers to as profound understanding of fundamental mathematics (PUFM). This is because it provides a vision of the ideal structure of elementary teachers' conceptual and procedural knowledge. For the child to be counted among the comity of the 21st-century intellectuals, the Ghanaian teacher needs to be equipped adequately to the demands of possessing this kind of understanding for mathematics. The response to these changing demands on teachers to demonstrate conceptual understanding for mathematics by Ghana, was the outcome of the Joint School Project (JSP) initiative, (Lockard as cited in Mereku, 2000). This was to bring about a change in the method and approach to teaching and learning mathematics from rote memorization to problem-solving

and problem-posing; and also from giving and receiving to facilitating and constructing (Fletcher, 2000). For these changes to take place, there were corresponding policy changes and change in institutional direction towards effective implementation of the new mathematics curriculum.

Yet these policy changes alone will not bring the desired change without the human attitudinal change to the problem – the mathematics teacher. However, quality education can only be given through quality teacher development. This is because, ‘teacher quality makes a difference in student learning’ (Hinchey, 2010, p.1).

It is in line with this that the Educational Reform Review Committee of Ghana (Ministry of Education Science and Sports [MOESS], 2002) acknowledged the deciding role of teachers and suggested, among other things, the upgrading of teacher education through the reform of teacher training institutions to update trainees’ competencies and skills to enable them offer prime teaching and quality learning schemes in the basic schools.

Because teachers are in a pole-position to leave an indelible impression on their students’ learning experiences, it is important to identify and address such issues that affect these experiences. School experiences mold, shape, and, to a large extent, “can influence how children view themselves inside and outside of school. These school memories have the potential to last a lifetime in students’ minds and can play a consequential role with present and future decisions” (Gourneau, 2005, p.2). Pre-service teachers report that these experiences go a long way to influence their interest to teach, experiences with fractions in school, learning to teach, being good in fraction, and having difficulty in learning fractions.

For the interest to teach fractions in a mathematics class, the teacher must have developed some effective attitudes and actions of affinity toward teaching. According to Gourneau (2005), these attitudes and actions, by large, have a positive influence on students. It is of no wonder that some pre-service teachers believe they exhibit such attitudes and therefore had an interest in teaching the topic. That, they can demonstrate “a sincere sensitivity to the students’ diversity, a motivation to provide meaningful learning experiences for all students, and an enthusiasm for stimulating the students’ creativity” p. 3.

Briefly, here, interest is used to refer to the stored knowledge, value and feelings with which the pre-service teachers re-engages *fractions*; it also refers to both the affective state and to the pre-service teachers’ predisposition to *working with and liking fraction* (Hidi & Renninger, 2006). These, some of the pre-service teachers have found missing in some of the encounters they have had with their teachers in the basic and secondary schools before being enrolled as teachers. So, even though they appear to have had high levels of interest in mathematics, they possess a weak understanding of mathematics.

Being good at fractions is by extension a function of being good at mathematics which could be influenced by appropriate teacher effect (Hill, Rowan & Ball, 2005). So, pre-service teachers who are likely to explain themselves as being good at fractions are more inclined to attribute it partly to their teachers. But interesting it is to note that, in-service teachers who needed to become as concerned about students who have difficulty with a *fraction* as they are for students who have difficulty with reading, currently do not have this mindset (Milgram, 2005). If those who are to inspire enthusiasm in the students before they come to the college failed, then what is left in them would only be innate: the students’ own self-motivation to be good at fractions. This is what most of them brought to the college. There is every agreement that students have

to learn as much as can be taught to them about fractions. However, the existing discussions of this seemingly recondite topic are not very good, and the outcomes for today's students have been discouraging. However, some pre-service teachers still consider themselves as being good at fractions.

Pre-service teachers still express having difficulty in doing fractions. This is because, most teachers failed to 'learn to create a supportive and trusting environment so that students feel comfortable asking questions and take ownership of their learning' (Milgram, 2005, p. 487; An, Tillman, Shaheen & Boren, 2014). There should, therefore, be no occasion for students to say they are not good at fractions. But these situations are missing in most of our basic and secondary schools; because teachers themselves have difficulty having conceptual understanding for a fraction (Tirosh, Fischein, Graeber, & Wilson, 1998) and so cannot create such environments for learners.

Even though there have been conscious efforts to change fractions teaching and learning in mathematics over the years (Fletcher, 2000), there had been little or no real impact on the change in the ways that fraction has been taught over the years. A review into why teachers teach in ways that are referred to as 'traditional', showed that, 'Mathematics is *still being* treated as isolated bits and pieces packaged as "today's lesson" and focused on a single skill or topic' (Schram, Wilcox, Lanier & Lappan, 1988, p. 11). When pre-service teachers are confronted with new ways of teaching, which Ma (1999) calls a profound understanding of fundamental mathematics (PUFM), they are amazed at how they had been taught to learn fractions as an abstract, mechanical, and meaningless series of symbols and rules over time. Pre-service teachers that have been exposed to teaching fractions in conceptually understanding ways, normally express appreciation for the importance of the use of appropriate language in the classroom. Schram et al, (1988) identified four factors that should create congenial situations for pre-service teachers to learn to teach appropriately. These include: (a) the framework that organized the course with an emphasis on patterns, relationships among mathematical ideas, and multiple representations of mathematical concepts; (b) the introduction of new topics in the course with an interesting and challenging problem situation; (c) the richness of the mathematics embedded in each problem situation; (d) an environment where students could cooperatively learn ways to make sense of mathematics, invent strategies to solve new problems and build models to understand mathematical concepts, p. 26. However, the study found out rather disturbingly that, if faced with realities of time constraints, lack of TLMs among others, pre-service teachers would persist with their belief that group work and frequent opportunities to communicate mathematics conceptually in the classroom are not realistic. Hence, they would teach in similar ways they were also taught.

Among the topics in mathematics, the fraction has been taken for granted as it seems to be of everyday life, and yet it has never been considered on critical bases as we do with whole numbers. However, it tends to be one of the difficult aspects to comprehend conceptually by both pre-service teachers and students (Tirosh, Fischein, Graeber, & Wilson, 1998). This is so because, according to Tirosh et al, children find it difficult to accept a given fraction as a number and tend to view it as two whole numbers, as some students failed to see fraction as a unit or a quantity in their own right because of the divisional character that fractions assume; students often incorrectly attribute observed properties of operations with natural numbers to those with fractions. The International Dyslexia Association [IDA] (1998) observes that in learning fractions, some students are able to remember ideas or formulae but may not understand why it makes sense; and others can do the paper and pencil work and are attentive

to the details, but do not see the interconnections. All these problems may lead pre-service teachers to conclude that fractions are difficult.

However, it is critical to point out that, pre-service teachers' problems are not in computations of fractions but rather in the concepts of fractions (Rizvi & Lawson, 2007). Most of the difficulties identified in these studies for which fraction is difficult, have to do with the difficulty in explaining why and how a rule works and difficulties in representing fractions in different forms. The difficulties of the concepts of fractions to the Ghanaian pre-service teachers are even compounded with the fact that, the teachers here are confounded with large class sizes, lack of or inadequate proper teaching-learning materials.

Most pre-service teachers look forward to teaching fractions in the best ways possible. However, they tend to express their frustrations in handling fractions: how to make fractions meaningful to young children if they teach them, as demonstrated in the following expression, "I would consider the process, but it may be a source for more confusion" (Leopard, 2008, p.16). There seems to be some twilight at the end of the tunnel though, as some express the feeling that, "...having a tangible, visual object *will* really *help* students understand fractions better and know exactly what a fraction is rather than just thinking about it in the abstract first" p.16. This is suggestive of the fact that teaching-learning materials are a must for conceptually understanding fractions, and these are the missing links in almost all Ghanaian basic school classrooms. When pre-service teachers are provided with an excellent platform, they would be able to effectively teach their craft. This is because "pre-service teachers' interest and their mathematical beliefs appear to influence develop a more process-oriented stance towards" *fractions* (Ray & Renninger, 2008, p.7)

The problem

Most newly trained teachers will readily offer their services for teaching mathematics if there were no other vacancies except for mathematics; and yet it is the subject taught in a most bizarre manner in all our educational facilities. This is evidenced in what two in-service teachers said they will do when asked 'how do you teach $\frac{1}{3} + \frac{1}{5}$ in primary four?': "Add the numerator and add the denominator" Amissah (2000, p. 8). Further, the Colleges of Education chief examiners' reports indicate that pre-service teachers show weakness in manipulating fractions, negative numbers, and supporting answers with reason or geometric facts (Institute of Education [IOE], 2008; 2006; 2005). If teachers who are to deliver the mathematics curriculum suffer from such deficiencies, then we have every cause to worry. Eshun and Sokpe (2009) pointed out that teacher trainees who enter the colleges with low grades in mathematics are more likely to exit with relatively low grades; implying that these trainees have, by extension, relatively low conceptual understanding in the subject and therefore inadequately prepared to teach the subject well.

Studies on fractions (Li & Smith, 2007; Ball, 1988; Pang, 2008) show that when teachers are presented with critical classroom situations they are unable to explain and represent those contents to students due to insufficient understanding that limit their capacity to do so, lacking what Ma referred to as "profound understanding of fundamental mathematics" (Baumert et al, 2010, p.138). Despite these findings, little or no studies of the Ghanaian pre-service teacher's attitude in teaching fractions have been conducted. It is also important to note that pre-service teacher's attitude poses a problem in teaching mathematics in our schools, which is worth investigating. By exploring the Ghanaian pre-service teacher's attitude towards fractions and basic operations, this study attempt to bring to the fore, what constitutes the nature of the pre-

service teacher's attitude and their preparedness to teach fraction (and by extension, mathematics in general).

Method and Materials

The design for the study under discussion was a case study and qualitative in nature. 'It provides a unique example of real people in real situations, enabling readers to understand ideas more clearly than simply by presenting them with abstract theories or principles' (Cohen, Manion, & Morrison, 2000, p.181).

The design was used to study the state of how and what the nature of things was. In this instance, non-numeric data were collected to describe the phenomena as they pertain currently of the situation. Thus, I was interested in the meanings that prospective teachers make of their situations, experiences, and the holistic picture of the situation created. The study made an intuitive investigation of issues that contributed to the individuality of a social group. By its nature, a case study is fraught with "subjectivity and intuition and are generally oriented towards the solution of a particular problem at an individual or group level rather than towards the derivation of generalizations that have scientific validity" (Sidhu, 2001, p.224).

Since the research intended to investigate to understand through the description, and report aspects of a naturally occurring phenomenon (explanation and attitudes), it was appropriate that the method of the case study was used. This helped to describe the phenomena of interest in detail, in the manner the respondents have presented them. Efforts have been made to address the issues as explicit as practicable.

Participants

The focus of the study was on prospective teachers in the second year because they were deemed to have sufficiently completed the required course contents (fractions) in mathematics for the teacher training programme. More so, they were also considered to be prepared enough to go on an internship at the end of the second year and so were the appropriate respondents in this instance.

The study was therefore targeted at them at the time when they would be exiting the teacher education colleges. A sample size of twenty-six was used. This was against the backdrop that this was of a case study and qualitative in design. There was a need especially for typical cases, "since case studies cover many facts of the total picture and extend over a long period of time and are therefore time-consuming and costly, it is common practice to restrict the study to the thorough investigation of a few cases" (Sidhu, 2001, p.226).

The respondents were of different academic backgrounds from the Senior High Secondary school that can be placed in two categories: science and non-sciences. The sciences include those who offered all pure science subjects in addition to elective (further) mathematics and technical subjects and continue same at the college. They consist of 14 respondents.

The non-sciences comprised all other programmes offered in the Senior High Secondary school (SSS/SHS) [without having to do elective (further) mathematics and continued same in the college of education]. They were 12 in number.

Research questions

1. What is the disposition of pre-service teachers toward the teaching of fractions?
2. How do school experiences and interest affect the disposition of pre-service teachers toward the concepts of fractions?

3. What constitute the difficulties in fraction to pre-service teachers?

Instrument

The tools used in this study were questionnaire and semi-structured interview. The questionnaire was used to collect information on the participants' perceived dispositions toward fraction and teaching. The interview was conducted on an individual basis to get in-depth information on respondents to corroborate their revealed attitudes from the questionnaire and hence on the articulateness of their preparedness to teach.

Some of the interview schedules were an adaptation from Ball (1990) and the others personally constructed. A semi-structured interview schedule was employed to seek the pre-service teachers' understanding of what they know by way of being good at fractions; their feelings of being interested in doing fractions; and having to reveal what they considered as difficult in doing fraction.

In this semi-structured interview, all interviewees were asked the same questions in the same order. Again, data were complete for each person on the topics addressed in the interview guide and therefore respondents answered the same questions; thus, increasing comparability of the responses (Cohen, Manion & Morrison, 2000, p. 271). It was hoped that this would lead to knowing the revelations of the respondents' frame of references and reasons for their responses.

To ensure the validity of the instrument, a pilot test was conducted on respondents with similar backgrounds and characteristics as those of the sample. The results of the pilot test suggested that some of the responses were not captured as intended. Hence, some of the interview items were eliminated; some were reconstructed and others merged to properly capture the intended responses from respondents. This was then used for the main study, from where all transcribed interviews were sent to participants to cross-check by way of proof-reading and where inconsistencies arose in what had been said and transcribed, the audio record was played back for verification and correction. The validity of this study was based on the four proposed criteria of Guba and Lincoln as cited in Trochim (2007) as credibility, transferability, dependability and confirmability. The interview session lasted between 26 and 50 minutes for a participant. The process started on or about 3:30 to 5:00 pm each day and lasted for four working days. Thematic descriptions were used for the analyses since the information so collected was all qualitative in nature.

Data Analysis

For data analysis, the thematic approach was used which posits that emerging themes from the responses become the guides around which analysis of the qualitative data was made as from (An, Tillman, Shaheen & Boren, 2014, p.156). The data were so collected was coded into themes which then form the subject for discussions.

Results

The interest to teach

This answered research question one, in which respondents expressed their disposition toward teaching. It was important to know at close range, the respondents and the enthusiasm with which they entered the colleges of education since this would help in understanding better their disposition toward teaching. A few of them said they wanted to take up teaching right from infancy and some only considered it at the time they were about to leave secondary school. However, 58% of them made teaching an afterthought (that is, after school and having taught as a pupil-teacher); and read what one said, "I did not dream to teach in future when I was at

the basic level but immediately after Senior Secondary School, I had a change of mind". This respondent indicated that he taught as a pupil-teacher. Though, with these sentiments, respondents were of the view that teaching is noble and important for personal development as there exists opportunity for higher education leading to the development of their society in general; and serving as role-models and imparting knowledge to children. But only two of them were self-motivated to teach and 73% either once taught as a pupil-teacher or were influenced by their teachers, and the rest said they were motivated by parents or peers to enter into teaching.

Experiences with fractions in school. In an answer to research question two, experiences with fractions in school, learning to teach and being good at fractions were looked at. Respondents' dispositions toward fractions when they were in basic and secondary schools were varied and this was critical in knowing whether they still carried those feelings about the topic at the time they would be leaving the college. While over 60% of them expressed their frustrations in terms of fear for the topic, and that it was confusing, lengthy and boring, complex and abstract, difficult (especially multiplying mixed fractions with different denominators and operating with subtraction), removing brackets and division of fractions by fractions; thus always getting wrong answers, others felt the topic was interesting and easy, particularly so with addition. A respondent who felt fraction was easy wrote, "It just follows some basic principles so whilst I know those principles, I will not even border to take fraction seriously". Another who felt fraction was difficult wrote, "I became a little bit confused by not understanding the concept and the teacher who takes us through was not able to express herself very well". In both cases, there were very important matters raised that needed to be considered.

Learning to teach. Although respondents have received the needed tuition on teaching fractions, they still expressed reservation of their readiness to properly deliver on the topic. They felt constrained in understanding how to change mixed numbers to improper fractions, dividing fractions by a whole number, and how to explain multiplication of fractions and subtraction of mixed numbers using teaching and learning materials (TLM). Some of these respondents considered themselves as slow at doing math, math-phobic and therefore become worried about encountering fractions even in their examinations. Their fears were about the fact that they may easily confuse pupils with inappropriate use of TLMs since children want to see and feel concrete objects. Many of them felt they were on top of affairs since they understood the concepts and can solve problems on them.

Being good in fractions. To the respondents, anyone who knows how to solve fraction problems correctly, confidently and has different approaches to working fraction was deemed as naturally gifted in fractions. The person must have had the basic concepts about fraction and can teach well using concrete materials, having practiced daily though. To be good at working fractions, therefore, means one can systematically, sequentially and effectively solve fraction problems. This also includes the ability to understand, interpret and clearly use the operations very well involving all types of fractions.

On the other hand, the fear for and perceiving fraction as merely acquiring skills as an end in itself make it difficult to understand fraction concepts. Thus, one was considered not good at working fractions when one always got solutions wrong, did not understand fraction concepts; leading to showing apathy and frustration about the topic. Respondents, therefore, make a claim that those who considered themselves as not good at fractions conditioned their minds that fraction was difficult and hence worked them wrongly such as using lowest common factor (LCF) instead of using the least common multiple (LCM) and finding LCM for fractions that were being multiplied; and would not attend and ask questions in fraction class nor practice.

Those who described themselves as being good at fractions attributed it to having good teachers at the Junior High Secondary school (JHS) and constant practice of it. And others who perceived themselves as average or bad at fractions assigned this to inability to understand fraction concepts because it “looks abstract” and therefore they were unable to work fractions successfully.

The addition of fractions was easy to go with among most respondents though few others indicated they were at home with subtraction, multiplication and have a knack for comparing or arranging fractions in orders, including word problems. The inclination towards fraction addition was that “it is simple” and “easiest part in fraction” since “I was taught well” and “always get answers right”. For most of the respondents, what they knew and thought they understood in fraction came to them at the JHS, though some others had theirs as they climbed the academic ladder from even primary four through remedial classes and some at the training college. According to them, they came to know it by applying the rules, principles and procedures involving fraction; continuous practicing, teacher assistance and “resolved to learn it”. This tendency of knowing it by applying “rules” or “principles” was an indication of the mechanical approaches that these respondents would have towards the teaching of the topic.

Difficulty in learning fractions. This answered research question three. Division of fraction by fraction ranked high among the respondents as the most difficult; followed by story problems, subtraction of fraction and manipulation of mixed fractions, identifying fractions in ascending order and multiplication of fractions. Even though they passed through the various stages of learning these aspects of fraction, they still live with the fear of these difficulties. Most research participants still felt that they have not grasped the understanding of “division of smaller fractions by bigger fractions” and “why division changes to multiplication” on working with the division of fraction by fractions. Their ability to understand fractions was further hampered by dislike for mathematics and hence fractions, framing of fractional questions, the involvement of mixed fractions, lack of concentration when doing fractions, and lack of encouragement when at school, all due to weak foundations.

For why the research participants had problem understanding fractions, were such reasons as difficult to understand why “we reciprocate and multiply”, impatience of teachers to explain the concepts, “teachers with little or no knowledge about the subject were made to teach it”. These compounded problems for learners who could not understand explanations given as the topic continued to appear “abstract and confusing”, not able to convert mixed numbers and became disillusioned in always getting incorrect answers. These had been the dispositions of the would-be-teachers who were about to exit training for internship and hence on to the teaching field.

DISCUSSION

Considering the dispositions expressed by these pre-service teachers toward teaching, it can be said that it is one of the unfortunate case that resonates with the general attitude for teaching in Ghanaian schools. This is because while as many as 58% made teaching an afterthought, only the rest few view teaching as a profession they should pursue. Even though many of these respondents made teaching a second thought, the majority of them resorted to teaching as a means of survival until they found it prudent to be trained professionally as teachers. Their quest to be trained as teachers was not borne out of the ‘interest for teaching’. With this situation, it was possible that a higher ratio of unenthusiastic teachers are being turned out into the teaching profession. Life circumstances can lead people to change of mind and attitude

toward what they would primarily not have desired to do but could end up being the best at it though. It can also create a situation where the government spent a lot of tax payers' money on people who would eventually not offer themselves for teaching. Since some 'did not dream to teach in future'. This only reflects the position of Gourneau (2005) that if people do not have a good attitude and interest towards teaching and hence, fractions, they are likely not to make any positive influence on students' lives; thereby providing them with the means of diversity in creativity in learning fractions.

Whatever experiences one might have had with fractions could build or destroy the self-confidence that one might have. Some of the pre-service teachers who were about to step out onto the professional platform still hold the belief that knowing the 'rules' for working fractions was sufficient to teach pupils the appropriate way of doing fraction. From the experiences of the respondents, it can be determined that some had the confidence about doing fractions because they know the rules and some others still had the fear of it. It is regrettable to say that for those who believed that they understand because they know rules were more likely to return to the classroom teaching the fractions the way they knew it before. These are likely to be teachers who would fail to 'learn to create a supportive and trusting environment' so that their students will feel comfortable asking questions and take ownership of their own learning as observed by Milgram (2005, p. 487). For those who still had the fear of fractions, it was found out that it was not merely the fear to fail to do fractions but also the fear of not being able to teach it with confidence. They seemed to be lacking what An, Tillman, Shaheen & Boren, (2014) found out about their subjects: failure to have integrated and multiple means of solutions for doing fractions. Hence, their fear of returning to the classroom ill-equipped.

Even though Fletcher (2000) had identified that there has been efforts to change fraction teaching, little or no progress has been made. This is because to the pre-service teachers, fractions were still being taught them in isolated bits and pieces as though they were separate topics to be taught (Schram, Wilcox, Lanier & Lappan, 1988).

The responses of the pre-service teachers were in line with what Ma (1999) describes as meaningful mathematics learning and teaching. The respondents were of the view that those who are good at fractions were those who can express it in different forms, understand the basic concepts of fractions and can teach it well using TLMs. Going into the classroom without the ability to sufficiently understand, interpret and clearly use the operations very well of all types of fractions, therefore, undermines the confidence level of the pre-service teachers. What this means is that, tutors of mathematics of the colleges together with their mentor institutions must reconsider the pedagogy and pedagogical content knowledge, time, type and volume of contents needed for presenting fractions to college pre-service teachers in integrative and multiple approaches. It is only then that presenting fractions in new ways can be meaningful to pre-service teachers who then will profoundly teach them to their students.

Fractions are part of our everyday life but seemed to be very difficult to understand and also difficult to teach it. This is, even so, when pre-service teachers engage in the division of a fraction by another fraction. This is the area that the pre-service teachers express most of their difficulties, which is consistent with the findings from other studies (Ball, 1990; Tirosh, Fischbein, Graeber, & Wilson, 1998). In this study, the pre-service teachers countered that having to deal with word problems is as difficult as working division problems of "division of smaller fractions by bigger fractions" or why "we reciprocate and multiply". At this juncture, it is very important and necessary to take notice that most of the difficulties emanate basically from what is captured in the words of one of the pre-service teachers that, "teachers with little

or no knowledge about the subject were made to teach it". If this is anything to go by, then the ripple effect will be that the teacher who knows little will teach little of what he or she knows with the consequent cyclic effect that the product of this little tuition, will also teach a little of the little that was taught. In the end it was the innocent child that was denied the concept of the fraction who then transfer that to the next generation. In the very long run, we produce a society of math-phobia. Even though there are other factors such as the language used, the framing of questions involving fractions, and so on, influencing the difficulty that pre-service teachers face in handling fractions, the teacher factor cannot be underestimated.

CONCLUSION

This study was conducted to report on aspects of the pre-service teachers that were here thereto considered as a matter of course, which in fact, was a hindering block to the pre-service teachers' conceptual development in fractions. They were reported to have had an interest in teaching even though the majority of them considered teaching only as a second choice as a profession. Some have reservations about their own readiness to teach fractions although they see themselves as being good at fractions. Having to know about the dispositions of the pre-service teachers, gives a deep insight into what effects the system of teaching has on them; the need to redesign a new form of teaching strategies to equip the pre-service teachers to break both the ripple and consequential cyclic effects of making fractions abstract and meaningless to them.

One of the most important goals of the teacher education programme is to develop pre-service teachers' abilities in totality, and to examine their dispositions toward teaching and learning fractions (and mathematics in general). However, it was found out that many pre-service teachers have been denied the opportunities by the current ways of teaching the school systems, to learn innovative ways for teaching fractions. As such, Teacher Educators Division of the Ghana Education Service and the National Curriculum and Continuous Assessment need to provide: 1) system where pre-service teachers are trained to do subject teaching at the basic school level so that those who are vested in the topic teach it, as it is done in the secondary level; 2) a variety of workshops and other professional development opportunities to introduce pre-service teachers and by extension, in-service teachers to more effective and innovative teaching strategies of fractions. Fractions methods course have the potential to positively shift teachers' attitudes and beliefs towards fractions through observing effective lessons, meaningful activities, and authentic experiences involving the development, implementation, and evaluation of fractions lessons in innovative ways.

I acknowledged that the current study has some limitations, including a small sample size; and the fact that only one college was chosen for the study among about 46 colleges, all of which may limit its generalization. A further study could be done over these limitations.

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