The Perception of Preservice Mathematics Teachers on the Role of Scaffolding in Achieving Quality Mathematics Classroom Instruction

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Abstract

This paper was designed to investigate the perceptions of four preservice mathematics teachers on the role of scaffolding in supporting and assisting them achieves quality classroom teaching. A collaborative approach to teaching through a community of practice was used to obtain data for the three research objectives that were postulated. Two methods were used to collect data for the research which include classroom observations and the reflection meetings. While the researchers adopted the grounded theory approach to collate and discuss the data collected for the study. The findings of the study suggested that the researchers uses varied approaches to provide scaffolding to the teachers and the teachers' perception of the role of scaffolding was positive as they view scaffolding as providing the opportunity to observe one another's strength and weaknesses. It also provided opportunity for them to discuss, dialogue, debate and criticize one another's thoughts in the process of achieving quality classroom instruction. In conclusion the researchers suggested that scaffolding could be a useful approach to helping teachers achieve quality classroom teaching and to having positive perceptions to teaching in general. The researchers therefore, recommend that the adoption of scaffolding strategies to Nigerian mathematics classroom could help improve the teaching of mathematics.

Key words: Scaffolding, Mathematics teaching, Supports.

Introduction

Mathematics teachers' inadequate teaching strategies have been advanced as one of the major challenges confronting mathematics classroom teaching and its effectiveness in Nigerian secondary schools (Omorogbe & Ewansiha, 2013). Teaching mathematics in most classrooms in Nigerian secondary schools sometimes looks frustrating to teachers Wilson (1993) and boring to students (Onose, 2009). Onose went further to observe that it is painful seeing mathematics teachers teach mathematics in abstraction, thereby making the mathematics classroom instruction boring to students. This has made some students find it difficult to grasp some mathematical concepts, skills and principles that are vital to their educational development.

Similarly, Abdulahi (2007) and Ogbeba (2010) stressed that the mathematics classroom instruction has been reduced to descriptive exercises through the use of the traditional teaching approaches with very little of students centered classroom teaching approaches. Perhaps, that is why in an earlier study Ayodele (2006) suggested that the use of inappropriate non-effective teaching strategies are a major factor hindering students understanding and achievement in mathematics in most Nigerian secondary schools. The author went further to assert that effective teaching of mathematics do not require theoretical and lecture teaching approaches or the applications of the teacher-chalk teaching approaches that had dominated most Nigerian mathematics classrooms, (Ayodele, 2006). These challenges had made mathematics classroom instruction a cause for concern to teachers and sometimes make students dislike both mathematics as a subject, and indeed the mathematics teachers. Students sometimes demonstrate these by skipping mathematics classrooms particularly at the senior secondary school levels, not minding the fact that mathematics is a compulsory subject at this level (Onose, 2009).

Adopting a particular teaching strategy that will help resolve these problems had also become a great challenge to most mathematics teachers. Perhaps, this is as a result of insufficient methodological training these teachers

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received during their preservice years in the universities or colleges of education (Johnson 2004; Nwagbo, 1999). Abdulahi (2007) and Ogbeba (2010) observed that most mathematics teachers lack adequate knowledge of subject matter and competence to deliver quality mathematics classroom instruction to their students. This sometimes forced some of these ill-prepared mathematics teachers to adopt theoretical approaches to classroom instruction (Halai, 1997; Obodo, 2004) rather than the practical aspects of mathematics instruction that make mathematics real and practical to students in most developed countries around the world (Ngannu, 2001).

In view of these challenges, studies on mathematics classroom teaching effectiveness has revealed that, there have been some successful attempts to improving mathematics teachers teaching effectiveness. A range of educational policies and programmes on teachers' effectiveness had also been identified particularly in Nigerian mathematics classrooms (Oyedeji, 2000; Adewale and Amoo, 2004). Perhaps that is why the Federal Government of Nigeria through its National Policy on Education FGN (2004) asserted that no educational system can rise above the quality of its teachers. Boaler (2008) supported this view by suggesting that, effective teaching of mathematics does not only involve the precise presentation of knowledge through facts and following the lay down rules of legalistic formulas, but it involves changing the ways secondary school mathematics teachers think, and how they build on their current understandings of teaching, and the effort they made in addressing any prior misconceptions on their teaching approaches.

Research studies suggest that developing in teachers, particularly the preservice teachers, the ability to engage their students in solving life related problems (Anderson, 2003), choose tasks that require students use of higher-order thinking and sustain engagement (Henningsen & Stein, 1997), and helping students make connections between mathematical ideas (Lambdin, 2003), could lead to students attitudinal change to mathematics (Bature & Bature, 2006), attitudinal change to mathematics teachers and develop in teachers themselves some confidence towards teaching mathematics (Bature & Bature, 2005; Omorogbe & Ewansiha, 2013). This suggests that, becoming a quality mathematics teacher involves helping the teacher acquired some mathematics subject matter knowledge and its methodological approaches (Omorogbe & Ewansiha, 2013; Verenikina & Chinnappan, 2006).

It is worth to note that the teaching of mathematics globally has moved beyond mere dichotomized thinking where rules and procedures are strictly followed (Stacey, 2003). But it requires a broader appreciation of varied and complex roles in which quality teachers of mathematics need to engage their students into (Boaler, 2008; Kilpatrich, Swafford, & Findell, 2001; Lobato, Clarke, & Ellis, 2005; Okafor, 2007; Sherin, 2002). It is also important to note that, mathematics teachers need to develop the ability to transform written knowledge into forms that are pedagogically powerful and yet adaptive to students' abilities and backgrounds (Kilpatrich, et al, 2001; Lobato et al, 2005; Okafor, 2007; Sherin, 2002). These can be achieved, when mathematics teachers particularly during their teachers development programs or preservice years are trained to developed strategies that will make their students learn to achieve their goals and not just being able to repeat routine mathematical computations through recitations or the use of rules and routine formulas (Omoifo, 2012; Omorogbe & Ewansiha, 2013).

Deep understandings of the theoretical framework that support these pedagogical practices of helping preservice teachers achieved their goals are essential for the development of mathematics teachers' teaching competence (Abdulahi, 2007) and their ability to cause a change in the unfriendly mathematics classroom environment that had persisted in most Nigerian mathematics classrooms for decades (Ogbeba, 2010). However, from experience as a teacher educator in Nigeria, there seem to be lacking in the Nigerian teacher education development programs certain teaching approaches that will help both the practicing mathematics teachers and the pre-service teachers achieve quality classroom instruction. This is because, the teacher education development programs in Nigeria for decades has been too theoretical and not helpful for novice teachers to understand those pedagogical skills necessary to develop effective classroom instruction. Helping teachers acquire theoretical knowledge of effective teaching strategies is not sufficient, mathematics teachers also need to have practical knowledge on how quality classroom teaching strategies could be developed. This is an essential tool that will provide such mathematics teachers with quality teaching skills that will enhance their productivity during classroom instruction. One of these teaching skills called "scaffolding" is the focus of this paper.

Scaffolding

The term scaffolding was introduced by Wood, Bruner and Ross in 1976. This term can be interpreted and applied to mathematics classrooms instruction to mean the support given to students by their teachers and can also be used in terms of support given to teachers before, during and after their classrooms instruction. This is

with the aims of improving not just the mathematics classroom teaching but also students learning. This term was never used by Vygotsky (Verenikina & Chinnappan, 2006). However, it was introduced in an attempt to operationalize the concept of teaching and learning in the Zone of Proximal Development (ZPD) (Wood, Bruner, & Ross, 1976; Verenikina, 2004). The Zone of Proximal Development is viewed as the distance between what a teacher can do with help and what he can do without help (Vygotsky, 1978). This term is used to explain the social and participatory nature of teaching and learning in relation to the support the teacher received either from collegiate colleagues or from a more experienced teacher (Adult-teacher). This suggests that supporting mathematics teachers' active participation in their teaching practices and assisting them in becoming self-regulated teachers is essentially an important ingredient to mathematics classroom teaching (Verenikina & Chinnappan, 2006).

The main aspiration of teaching in the Zone of Proximal Development is to see mathematics teachers being actively engaged in their teaching-learning practices with the prospect of helping them becoming self-directed mathematics teachers. This suggests that the interpretation of the meaning of the Zone of Proximal Development points to the fact that effective teaching focuses on the transformation of socially constructed knowledge into that which is individually owned. This type of teaching assumes a specific paradigm of adult-teacher/teacher-learner interaction where the role of the adult-teacher is that of a collaborator and co-constructor of the knowledge being constructed (Verenikina & Chinnappan, 2013). This point to the fact that, strong emphasis made by the adult-teacher is aimed at making the teacher-learner an active self-depended teacher in his/her effort to improving the teacher-learner teaching skills and strategies. From the Vygotsky view, scaffolding could be viewed as the role of an adult-teacher supporting the teacher-learner development through the provision of supportive structures to get the teacher-learner to that next stage or level of his/her teaching competence (Raymond, 2000).

In interpreting the Vygotsky Zone of Proximal Development, it suffices to suggest that the educational process should be based on the ability of the adult-teacher and the teacher-learner's engagement in an individually and collaborative activity, where the teacher-learner is the director of the social environment in his/her classroom, the governor and guide of the interactions between the educational process and his/her students (Vygotsky, 1997), and the adult-teachers served as a support to the teacher-learner teaching effectiveness before, during and after the mathematics classroom instruction. Before, implies the adult-teachers' support and help the teacher-learner's preparation for the content of the lesson to be taught, the methodology to be adopted and the resources required to make the classroom instruction of the teacher-learner a fruitful and a successful one. During, implies the support the adult-teacher gives during the lesson. However, during the classroom instruction the adult-teacher does not influence the teacher-learner directly, but through shaping and reshaping the social environment of the teacher-learner through indirect instruction and support. And after, implies the support the adult-teacher gives after the lesson. This can be in terms of reflection, revision of the observed lesson on the areas of strength and weakness. The way the adult-teacher interacts with the teacher-learner suggest an essential tool for supporting teacher-learner active and self-dependent teaching learning practice (Diaz, Neal, & Amaya-Williams, 1990, in Moll, 1990).

The overall interpretation of the term scaffolding in current educational research is exceedingly diverse and often described as a term used for any kind of support given to teachers in order to increase their effectiveness and productivity during mathematics classroom instruction (Jacobs, 2001). It is also worthy to note here that one of the most important aspect of scaffolding is that which make the scaffolds temporary (Van Der Stuyf, 2002). This is because as the ability of the teacher-learner increases, the scaffolding provided by the adult-teacher is progressively and systematically withdrawn (Van Der Stuyf, 2002). Therefore, the goal of the adult-teacher when using scaffolding is to make the teacher-learner become independent and self-reliant in his/her teaching competence (Hartman, 2002). According to Vygotsky (year) the scaffolds provided by the adult-teacher can then be removed because the teacher-learner has developed some more sophisticated cognitive abilities in his/her teaching practices (Raymond, 2000).

A growing number of other teacher educators and researchers have also used the concept of scaffolding as a metaphor to describe and explain the role of the adult-teacher in assisting the teacher-learner teaching effectiveness during mathematics classroom instruction (Stone, 1998; Daniels, 2001). For example, scaffolding as a metaphor in teaching and learning is viewed as a process of temporary assistance given to the teacher-learner by the adult-teacher. During this process, the adult-teacher support the teacher-learner constructed his/her knowledge, in which the process continues until the teacher-learner is self-dependent. Since the introduction of this metaphor in the field of child psychology, it has become popularized, and currently seems to be a very powerful tool for conversation in general education (e.g. Dennen, 2004; Wells, 1999), and in teacher

education (Mercer, 1995; Oxford, 1997; Tudge, 1990; Van Lier, 1996, 2004, 2007, 2008; Walqui, 2006; Walqui & Van Lier, 2010).

Numerous studies have also detailed the elements of collective scaffolding. In their analysis of peer scaffolding in a community of practice, Brown et al. (1993) focused on differences in each teacher Zone of Proximal Development, analyzing the role that an individual's area of expertise played in a small group's ability to successfully scaffold teaching using the community of practice approach. From the findings of Brown et al, they were of the view that each member of the community made contributions based on his/her background knowledge, experience and strengths. Studies conducted by De Guerrero and Villamil (2000) on the evidence of symmetry/asymmetry of power distribution amongst collegiate colleagues brought about the interchangeability of ideas among the members of the community and the role it plays in forming and reforming the teaching ability of the members of the community.

Building on the earlier research findings of Ohta (1995) on the factors affecting the success of group scaffolding similar to the community of practice adopted in his study, Anton and DeCamilla (1998) emphasized the importance of inter-subjectivity, which they defined as the shared perspective of a task and ideas within the members of the group. This inter-subjectivity of ideas helped the members of the community to check the ways each other teaches and help keep them make sure they were all on tract (Boblett, 2012). Boblett in his own study suggest that collective scaffolding represented an important ingredient in the interpretation of the concept of metaphor as it applies to effective classroom teaching.

In particular, recent research findings globally had identified a number of roles and benefits for using scaffolding in developing mathematics teachers' competence. For example, scaffolding could be used to improve teacher-learners teaching effectiveness (Anghileri, 2006; Anton & DiCamilla, 1998; Brown et al., 1993; DEST, 2004; De Guerrero & Villamil, 1994, 2000; Donato, 1994; Nyikos & Hashimoto, 1997; Ohta, 1995; Siemon, & Virgona, 2003; Tudge, 1990, 1992, Walqui, 2006). Anghileri (2006) was of the view that the interactions that can be effective between the adult-teacher and the teacher-learner are also important ingredient for introducing scaffolding to support the practitioners' reflection and analysis of the teacher-learner actual classroom practices.

In another study, in an article 'scaffolding numeracy the pre-service teachers' perspective', Verenikina and Chinnappan (2006) were of view that, the preservice teachers' responses demonstrated the value of scaffolding as a helpful strategy for their future teaching practices and that scaffolding makes preservice teachers learnt better through social interactions with their collegiate colleagues. A central feature of interactions between members of the collegiate group makes classroom instruction a joint activity in which the members engaged in a community of practice, either during the classroom instruction or during reflective practices or meetings.In view of these most educational researchers and teacher educators have stress the importance of understanding the metaphor "scaffolding" in conjunction with the theory from which it originated (Verenikina & Chinnappan 2006).

Research Objectives

The paper will make use of some keywords to demonstrate how these skills could be developed using the concept of scaffolding in a community of practice. The term Adult-teacher, will be used to mean a more mature teacher helping other teachers achieve quality classroom teaching. The term collegiate colleagues will be used to mean a group of teachers working together to help one another improve their teaching practices. While the term teacher-learner will be used to mean the teacher that is being helped to improve his/her classroom teaching either by the adult teacher or the collegiate colleagues. In this paper the researchers examine the perception of four mathematics education preservice teachers working in the community of practice on the role of scaffolding in improving their teaching practices. Specifically, this paper seeks to examine the following objectives:

1.   To determine the sources of the scaffolding provided to the preservice teachers
2.   To discuss the various methods and means employed to provide and identify areas in which the preservice teachers needed scaffolding
3.   To determine the perceptions of the pre-service teachers on the role of scaffolding in achieving quality mathematics classroom teaching

Methodology

In order to explore pre-service teachers' perceptions of the role of scaffolding in improving their classroom teaching, the researcher adopted a collaborative approach to data collection using a community of practice. Community of practice suggests a situation where all the participants collaborate together in helping the members of the group achieve quality classroom instruction. (Eckert & McConnell-Ginet, 1992, 464; (Holmes & Meyerhoff, 1999; Lave & Wenger, 1991; Wenger, (1998)

Sample

Four final year mathematics education preservice teachers (3 males and 1 female) from one university in Northern Nigeria where selected to collect data for this research. The researcher selected these mathematics education final year preservice teachers purposively out of the 9 final year students for the 2011/2012 graduating set of the mathematics education department of the university. Six senior secondary two students (3 boys and 3 girls) from the classes taught by these mathematics teachers were sampled to have focus group discussions with the researcher on the teaching practices of these preservice teachers. The selection of the six students was done by a collective agreement between the members of the classes taught and the researcher. The researcher made it clear to the students that only students willing to talk shou8ld be nominated. Hence the class collectively nominated these six students to represent them.

In the study, the researcher introduced the participants to the principles of scaffolding through a two-day workshop. The purpose of the workshop was to help the preservice teachers understanding of the basic concepts of scaffolding they required to improve their teaching. The teachers used the knowledge they gathered during the workshop to teach mathematics for a period of 6 weeks through a community of practice.

Instrument

The researcher breaks the 6 weeks teaching period into three cycles of two weeks each. During this period there were teachings and observations and at the weekend the preservice teachers with the researcher will meet for reflection meetings. The researcher sometimes supports the preservice teachers during classroom instruction. However, such supports were uncommon as to avoid distractions. Most of scaffolding given was generally during the reflection meetings where issues raised and discussed. Similar meetings called focus groups were also held after every three weeks. Information collected from the students constitutes part of the scaffolding that will be given to the teachers during the reflection meetings and sometimes one-on-one discussions with the adult-teacher.

Three instruments were majorly used for data collection during the research. First, there were classroom observations of the teaching practices of the preservice teachers. These observations were done by the researcher and the collegiate colleagues. Secondly, there were reflection meetings after every two weeks of classroom teaching of the preservice teachers. And third there were focus groups meetings with the students at the end of each cycle. Discussions during the reflection meetings and the focus groups meetings were generally based on classroom observations of the preservice teachers.

Analysis

The data generated during these meetings were collated, coded, and analyzed using the grounded theory approach

Results

Three research objectives were postulated to guide this study. First, the researcher discussed the sources of the scaffolding provided. Second, the researcher discusses the methods and means employed to provided and identifies the areas the preservice teachers needed scaffolding and third, the perceptions of the preservice teachers on the role of scaffolding in helping them achieved quality classroom instruction were discussed.

Research Objective 1: To determine the sources of the scaffolding provided to the preservice teachers.

The researcher has taken a significant responsibility in choosing the scaffolding in the first place and has taken an active role in introducing the strategy to the preservice teachers. However, the researcher was not the sole source of scaffolding. The project was designed to involve the teachers themselves in a "community of practice" where they provided assistance to one another in expanding their understanding and use of the framework. Naturally, the researcher (adult Teacher) took a larger role in the first part of the project. However, as the project progressed, the preservice teachers played an increasing role in supporting each other towards reflection on their practice and commenting on each other's attempts to improve their teaching by incorporation of the strategy into their practice. For example Jackson asserted that;

> *The way the project was structured emphasizes very challenging learning objectives, we received and provided support to one another, and not only is feedback given throughout the program but we actively sought for it, not only from the researcher, but also from colleagues (Jackson: Research Journal, 2011).*

Similarly, students' views played an important role in providing scaffolding to the preservice teachers' classroom practice. Issues raised by students during the focus group meetings constituted a major source of scaffolding during the research. For example, in cycle 1, the students raised some important issues on the classroom teaching of the preservice teachers. These views were discussed during reflection meetings which constituted part of the scaffolding. Even though the participating teachers were not part of the focus group discussions, the information that the researcher collected was discussed during reflection meetings and some of the suggestions the students raised constituted important lessons that served as scaffolding to the preservice teachers.

One may be tempted to say the students were too young to determine the effectiveness of scaffolding in their classroom learning. However, from the interaction of the researcher with the students during focus group meetings, their comments and suggestions demonstrated that they knew what good and quality classroom teaching is. They also made profitable suggestions and criticisms that constituted important lessons the participating teachers needed to learn to improve their classroom teaching. One of the issues students raised questions on burthened on the traditional approached to mathematics classroom teaching adopted by most of the preservice teachers in cycle 1. For example, Julie argued that,

> *Mathematics teachers are not supposed to be strict and scare students away from participating in mathematics classroom practice. It is not a quality of a good mathematics teacher. To my own understanding mathematics teachers are supposed to be friendly to students. Students are finding it hard today to learn mathematics because of the strictness of some mathematics teachers. (Julie: Focus Group, 2011)*

Julie's suggestion above demonstrated that effective mathematics classroom teaching can only be achieved if there are good teacher-student relationships. From this view, Julie was trying to demonstrate the importance and the application of Support during classroom instruction. Janet concurred with Julie when she commented on Jackson's mathematics classroom teaching and suggested that students need a free and fair classroom climate that will give them the opportunity to approach their teacher in difficult situations. She claimed,

> *Students really need a free and fair classroom environment where everybody will have the opportunity to approach the teacher on areas of misunderstanding…, and Jackson created this atmosphere in cycle 2. So in short he improved. (Janet: Focus Group, 2011)*

Another lesson learned from these discussions is that the students did not only make suggestions on how teachers could make their classrooms teaching better. They also make some constructive criticisms that constituted the subject for scaffolding during planning and reflection meetings. For example, Julie suggested that some of the preservice teachers demonstrated a lack of confidence and courage in their classroom teaching, and that such lack of confidence and courage affected their teaching effectiveness. She said,

> *The teachers did not demonstrate courage and confidence in their work. In fact sir, this makes one of the teachers too fast, he made the class too boring and uninteresting, if you are lost out to come back and clique to what he is doing is difficult. (Julie: Focus Group, 2011)*

Julie also suggested that it is good for mathematics teachers to take teaching gradually, not to rush their students, if such teachers desire students' understanding of their classroom teaching. And that effective teaching should be done starting from simple to complex. She said,

> *I think, just that the teachers should have taken things gradually for students to understand. I think it's the best to work gradually so that students can really follow what you are doing. And one had to start from the simple to the complex, so that you don't lose your students interest. (Julie: Focus Group, 2011)*

In view of these one can argue that students' involvement in scaffolding teaching through their comments plays an important role in helping teachers achieved quality classroom practice which was demonstrated in this research.

Research Objective 2: To discuss the various methods and means employed to provide and identify areas the preservice teachers needed scaffolding

The need to implement a scaffold occurred when the adult-teacher realized that the teachers were not progressing on some aspect of a task or were unable to understand particular concepts. In this section the researcher discusses the methods adopted to provide scaffolding to the preservice teachers. Generally, data collected suggested that the scaffolding provided to the preservice teachers were in the form of the conceptual, material and linguistic tools that supported the preservice teachers understanding of appropriate classroom teaching strategies to achieve quality classroom teaching. These conceptual, material and linguistic tools were in the form of literature, and research articles from the extant Journals. They were also in the form of discussions, dialogues debates and interaction that the researcher had with the teachers during the workshop, reflection meetings and in several one-to-one discussions.

Similarly, the scaffolding provided to the teachers adopted dialogue, discussions, debates and explanations between the adult-teacher and the teacher-learners or between collegiate colleagues. These discussions were characterized by comparatively lengthy interactions in a context of collaboration and mutual support. In most cases these discussions came from the observations made by the preservice teachers on the classroom teaching of their colleagues, or issues raised by students and from the researcher's personal observations on either the classroom practice of the teachers or the interactions during reflection meetings. Similarly, these discussions also come from the questions raised by the teachers on areas where they needed further clarification to improve or to achieve quality classroom teaching.

One of the means employed to identify areas the teachers needed scaffolding was through classroom observations. This assisted the researcher determined what kinds of scaffolds are appropriate and how much scaffolding is appropriate for each of the teachers to achieved quality teaching. For example, the researcher monitored the teachers' responses to their students during their classroom teaching to find ways to ensure that the teachers made personal meaning of their experiences and develop a fuller understanding of the principles of effective classroom teaching. The researcher employed similar monitoring strategies during reflection meetings to identify the difficulties the teachers had and to provide scaffolding that assisted them achieved quality teaching.

Another area where observations were used as a means of identifying areas scaffolding was needed was what the researcher called peer observation. This is because observations and indeed the scaffolding was not only the responsibility of the researcher. Since the preservice teachers were working in a community of practice, they participated extensively in scaffolding their teaching practice. They were trained to observe their colleagues teaching practices particularly during the workshop and also through helps and assistance the received from the research. Generally, such classroom observations were used as a means to collect information about the progress and weaknesses of their colleagues. Information collected from such observations was used by preservice teachers during reflection meetings to reflect on their practice and provide possible suggestions to improve one-another's practice. It is important to not here that the researcher at the initial stage of the researcher was the sole provider of the scaffolding. However, as the research progressed the preservice teachers became more confident in their practice and hence contributed to the scaffolding on their practice. One of the teachers asserted that,

> *The way the program was structured emphasizes very challenging learning objectives, we received and provided support to one another, and not only is feedback given throughout the program but we actively sought for it, not only from the researcher, but also from colleagues. (Jackson: Research Journal, 2011)*

Research Objectives 3: To determine the perceptions of teachers on the role of scaffolding in achieving quality mathematics classroom teaching

Data collected from this study suggested that the 4 teachers viewed scaffolding as useful tools for improving their practice. For example, Jerry suggested that scaffolding provided, help them identify their areas of deficiencies and strengths. He was of the view that it will be difficult for a teacher to observe his/her areas of difficulties. As such, the need for collegiate colleagues to observe their weaknesses and strengths are very necessary. These helped them monitor their progress and identify their areas of strength and weakness. Jerry said,

> *when a teacher is teaching he may not consider a particular situation necessary…, he may be thinking that he may have handled it…, that is why we have the observers…, so they are in a better position to know whether a particular element is demonstrated or not…; I cannot be presenting my lesson and be observing myself at the same time …, (Jerry: Reflection Meeting, 2011)*

Similarly, the teachers were of the view that, the scaffolding provided helped boast their confidence and interest in teaching, as there is a feeling that someone somewhere is watching, and that what the teacher is doing stands to be criticized and corrected. Jennie was of the view that this encouraged her to do better during her classroom teaching.

> *This helps me approach my research with a sense of belonging that there are people that will support, encourage and criticize you at each stage of your work. (Jennie: Research Journal, 2011).*

Another observation made by one of the teachers suggested that group scaffolding can help teachers give and receive helps, not necessarily from the adult-teacher, but from collegiate colleague. Jackson supported this by asserting that,

> *The way the program was structured emphasizes very challenging learning objectives, we received and provided support to one another, and not only is feedback given throughout the program but we actively sought for it, not only from the researcher, but also from colleagues. (Jackson: Research Journal, 2011).*

Data collected during the research also suggested that scaffolding helped mathematics teachers develop new strategies for problem solving. This could be transmitted to developing students' problem solving skills. Jackson said,

> *The experiences of discussing with colleagues helped my problem solving skills, it provided opportunity for cooperative learning, and there is an enhanced level of immediate feedback. (Jackson: Research Journal, 2011).*

Another benefits observed from scaffolding according to the teachers was that there were opportunities for dialogues and discussions among collegiate colleagues and between the adult-teacher and the teacher-learner. For example, Jackson was of the view that

> *The program was designed to help us build understanding, explore ideas, practice thinking through and expressing concepts that will help us achieve quality classroom teaching (Jackson: Research Journal, 2011)*

> *Discussions and dialogue allow teachers to have thoughts we could not have had on our own, yet to recognize these thoughts as developments of our own thinking. (Jackson: Casual Interview, 2011)*

Jackson was also of the view that these discussions and dialogues assisted teachers in developing new strategies for reasoning, enquiry and negotiation of ideas and to provide opportunities for cooperation among collegiate colleagues. Jackson reflected that,

> *Personally, the experiences of discussing with colleagues helped my problem solving skills, it provided opportunity for cooperation, and there is an enhanced level of immediate feedback. (Jackson: Casual Interview, 2011)*

Still on the benefit of dialogues, Jennie was of the same view as Jackson and suggested that this form of scaffolding helps build a framework to guide the teachers in developing and constructing their own ideas, skills, concepts and or processes to improve their practices. Jennie reflected,

> *when problems are generated we all discussed together to find a common approach that could be used to address such problems, this help me approach my research with a sense of belonging that there are people that will support, encourage and criticize you at each stage of your work. (Jennie: Casual Interview, 2011)*

Finally, in Jackson's view, dialogues and discussions provided avenues for the participating teachers to receive immediate feedback from collegiate colleagues. They also helped to strengthen and broaden the understanding of the collegiate group and provided feedback on their strengths and weaknesses during classroom teaching. For example he said,

> *The way the program was structured emphasizes very challenging learning objectives, we received and provided support to one another, and not only is feedback given throughout the program but we actively sought for it, not only from the researcher, but also from colleagues. (Jackson: Casual Interview, 2011)*

Discussions and Conclusion

Scaffolding has been a useful metaphor for thinking about classroom instruction and indeed in teachers' development programs since its introduction by Lev Vygotsky (1978). This paper was designed to investigate the perceptions of four mathematics preservice teachers on the role of scaffolding in supporting and assisting them achieves quality classroom teaching. The analysis started with the sources of scaffolding, in which the researchers identified three major sources which includes the Adult-teacher (researcher), the four preservice teachers and the focus group students. From the findings it was observed that though the adult-teachers at the initial stage of the research took the greater role of providing scaffolding to the preservice teachers but as the research progresses the burg of the scaffolding was taken over by the preservice teachers. This supports the findings of Hartman (2002) and Raymond (2000) who were of the view that the goal of the adult-teacher when using scaffolding is to make the teacher-learner become independent and self-reliant in his/her teaching competence. According to Vygotsky (year) the scaffolds provided by the adult-teacher can then be removed because the teacher-learner has developed some more sophisticated cognitive abilities in his/her teaching practices (Raymond, 2000).Similarly, the findings of the study suggest that the students also provided scaffolding during the research and the information collected from the students constituted an important lesson that the teachers learnt in their effort to achieving quality classroom practice. Vygotsky viewed scaffolding as the role of the facilitator in supporting development and providing the necessary and effective support structures that will help teachers' development to move to the next stage or level (Raymond, 2000) as demonstrated in the findings of this research. The study suggested that as the teachers' knowledge, abilities and understanding increased; there was also an increase in their ability to achieve quality classroom teaching (Rogoff, 1995; Siemon & Virgona, 2003).

In the second research objective, it was observed that the scaffolding provided was in the form of conceptual, material and linguistic tools that supported the mathematics teachers understanding on how to achieve quality classroom teaching. These conceptual, material and linguistic tools were in the form of literature, and research articles from the extant journals. The findings also reveals that the scaffolding provided were also in the forms of discussions, dialogues and interaction that the researcher had with the participating teachers during the workshop, reflection meetings and in several unscheduled one-to-one discussions.

The findings on the third research objective suggested that the scaffolding provided to the teachers help them developed new understanding by linking their prior knowledge about classroom instruction to new knowledge and strategies which help them achieved quality classroom instruction. This prior knowledge and understanding became the subject of discussions, debates and deliberations among the collegiate colleagues through interaction between participants (Knezic 2011). The talk (theory) embedded in the actions (practice) of the teachers were observed in the study to have provided opportunities for the teachers to regulate the language and practice of one another in order to foster better understanding. From the Vygotskian perspective, dialogue between colleagues may range from casual talk to deliberate explanations about features of tasks to be performed (Dorn, 1996). Similarly, what may seem to be casual conversational exchanges between two or more people could

actually offer more opportunities for fostering cognitive and language development (Clay, 2005; Lai and Law, 2006).

Smagorinsky (2007) suggested that conversations between two individuals could facilitate generative, constructive, experiential, and developmental learning in an attempt to develop new ideas and knowledge. While Applebee (2002) believed that effective scaffolding provides opportunity for task-based dialogue between two or more participants which provides them with the opportunities to use their old knowledge and strategies necessary to complete and understand new tasks and principles and helps them to internalize the new knowledge and skills for eventual use in future tasks.

In conclusion, the finding of this study suggests a positive change of perceptions of the teachers towards their views about collegiate group teaching. They were able to see the members of the group as collegiate group rather than supervisors or inspectors of education. This implies that scaffolding activities has proven to be a useful tool in helping preservice teachers improved their practice. Its importance and uniqueness suggest that the teachers were actively involved in providing helps to their collegiate colleagues in a community of practice as supported in the study conducted by Clarke (2001). These perceptions also suggested that the knowledge the teachers received significantly add to their collective understanding of strategies to employ to achieve quality classroom teaching. In view of these the researcher will recommend the adoption of scaffolding strategies to mathematics classroom instruction particularly to preservice teachers in teaching practicum.

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