Title: Critical Evaluation of Teacher's Role in Implementing Cooperative Learning in the Mathematics Class in Fiji.

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Abstract:
The present study examines the roles that mathematics teachers need to follow for effective implementation of cooperative learning. In Cooperative learning students are divided into small groups where effective interaction should be taking place among group members to solve a given problem.
Research shows that teachers need to move from traditional approach of teaching mathematics to more child centered approach for effective implementation of cooperative learning. Thus there is a need for mathematics teachers to have a good understanding of cooperative learning before they actually incorporate in their teaching.
Keywords: teacher, cooperative learning, mathematics, education, academic achievement.

1.1 Introduction

According to Education Commission Report 2000 schools in Fiji have been encouraged to provide for effective education in mathematics to increase the numerous skills in students. It is evident through research that achievement of students is strongly linked to high quality teachers. Consequently the question would arise what makes a high quality teacher? As a result various research carried by theorists would justify teaching methodology which is best suited for student's achievement in mathematics. In order to bring success to students teaching and learning in mathematics and improve the student's achievement to reach the standard of numeracy skills in Fiji, it is crucial that primary schools in Fiji introduce effective teaching methods.

In order to succeed in today's challenging world learners require the "21st century skills". Thus to develop this skill in mathematics classroom teachers need to face the challenge to start shifting from 20th to 21st century classroom. One of the ways teachers could overcome this challenge is to move away from traditional chalk and board or jug and mug method of teaching to more student centered learning. According to Johnson and Johnson and Holubec (1992) in the current era of education, students are encouraged to discover and build their own knowledge through active participation. In this globalized world the emphasis is placed on learning mathematics by problem solving rather

than memorizing of facts and figures. In other words teaching mathematics with understanding is encouraged rather than memorizing rules and algorithms to solve problem (NCTM, 2000).

Tasker (1990) has suggested incorporating cooperative learning into primary school classroom is a way to bring changes in teaching methods for effective learning. Johnson, Johnson & Holubec (1992) also support that the primary means of achieving the new paradigm of teaching is to use Cooperative learning. Slavin (1995) stated that cooperative learning was introduced to teachers many years ago. Thus Johnson and Johnson (2004) have justified the main aim of cooperative learning is to improve motivation encourage positive attitudes and better social skills. Johnson and Johnsons (1989) study supported the finding that cooperative experiences promote higher self-esteem than competitive and individualistic experiences. Slavin (1995) in one of his studies also stated students who learn cooperatively tend to be more highly motivated to learn.

According to Artzt and Newman (1999) in cooperative learning small group of students work together, communicate their ideas and solve they given problem. Thus in any cooperative learning teachers role in the classroom is very crucial for effective implementation. The way in which the learning material is presented to the students and the way in which teachers communicate with students during the group work influences students learning interaction.

Research has shown that cooperative learning has positive influence on student's involvement in math's related material. (Ferreira, 2001) Students appear to enjoy working cooperatively and are willing to cooperate with others in the group (Knol, Janson , Neerman,Vander, Linder,2004).Though cooperative learning is used widely in mathematics classroom a growing need exists to examine the role of teachers how they use this technique in the mathematics classroom setting. The article will be focused in four folds firstly brief discussion on mathematics education in Fiji will be carried out. Secondly discussed in the article will be Neoliberalism in Education system in Fiji .Finally the definition and role of teachers in implementing cooperative learning in mathematics classroom will be discussed in detail.

1.2 Mathematics Education in Fiji

In Fiji poor performance in mathematics at the primary school level has been and still is a subject of much debate among politicians, teachers, parents, educational experts and other stakeholders. As stated in Education Commission Report (2000) poor achievement in mathematics at the primary level is a significant barrier which is continuing through secondary school and to further education and or employment. Consequently in order to improve the standards of mathematics in Fiji primary schools it is very crucial that teachers introduce effective methods to bring success in students learning. The Education commission report of Fiji (2000) showed that teacher trainees learn best practice pedagogy during their pre service training, but once they are posted in the classroom, they often revert to rote and dictatorial styles of teaching.

Moreover in Fiji primary schools, high performance in examination especially the external exam (Fiji Year 6 exam, Fiji Year 8 exam and LANA for Year 5 and 7) which is being prepared by Ministry of Education is given high priority. For teachers and stakeholders the exam results of the schools are of great concern to them. Thus due to exam oriented system teachers are too much concerned with finishing the syllabus and drilling students with the exam questions and answers. In some schools in Fiji even in Primary schools Saturday classes are being conducted by teachers to train and prepare students towards exam. Consequently because of this exam testing system teachers are reluctant and sometimes hesitant to use other approaches to the teaching and learning of mathematics as it would take up too much time and are deemed irrelevant to passing exams.

The traditional method that is chalk and talk method is still being practiced in some schools. Children are given rules, definitions and examples on the board by the teacher which is later being

used by the students to follow and solve the given mathematics task. In such types of teaching students are forced to memorize facts and formulas. As a result the learning in mathematics is not related to real life situation and learning with understanding is not taking place, the classroom is not lively without any social interaction which results students losing interest in learning mathematics and in turn there is a poor result in mathematics. According to Nairn, Harish, Tiko &Treacy (nd) An analysis of Fiji Islands Literacy and Numeracy assessment test items in one of their studies showed that students were experiencing difficulty in all areas of mathematics number, measurement, space and statistics.

1.3 Neoliberalism in Education system in Fiji

According to Toch (2010) the neoliberal ideology involved the concepts of competition, choice, and privatization which over the years have spilled into public education. In addition to this Levin & Belfeild (2003) and Toch (2010) have stated that public education slowly adjusted to new methods and terminology such as accountability, assessment, and site based management, evaluation products and global competition. Consequently due to globalization and Fiji government getting Aids from overseas countries the education system in Fiji is also slowly moving towards neoliberalism where most of the state owned services are being privatized, like wise education system is being affected due to neoliberalism.

Under this globalization world and neoliberalism education system lots of reforms has taken place all over the world in relation to improving quality of education and use of teaching methods to deliver to the best where no child is left out. Neoliberalism is not static in any country. Due to political process and interpretation vary between different countries and change overtime

Due to Education reform the education in Fiji for years 1 to 8 is being made compulsory. Government has started providing assistance as free text books, bus fare allowance, TELS loan scheme is being provided so that No Child is left behind in Fiji to achieve the basic compulsory education. This is very common with what is being practiced in United States. Thus according to US department of Education (2012) the No Child left behind act was a very clear that all students, homeless, migrant, special education, all social class and ethnic backgrounds must gain yearly progress and achievement in English language and mathematics in grades three, five and eight.

Thus under this neoliberal education system school management board or private run schools will gain greater power and authority, as a result they could impose conditions which could affect the children from poor homes to attend. In addition due to globalization and evolution of a knowledge based economy it has created additional pressures for nation states to improve and maintain their competiveness in the global economy environment. Looking at Fiji education system various reforms have taken place since 2000 to meet the demands of other developed countries. The curriculum of Fiji schools, teaching methods and mode of assessment has also been reviewed in order to maintain the natural competiveness in the global marketplace. In 2011 external exams in Primary schools was abolished and schools were encouraged to conduct internal assessment as the form of identifying the child's ability. In 2014 under the leadership of new elected government exams were brought in. Government started providing support to students in terms bus fare voucher , increase in schools grants to schools, however there was lot of pressure laid to teachers to produce better results in the schools they are teaching.

Due to reform and globalization Fiji's education system also started to change towards the neoliberal education system. Currently in Fiji most of the state owned institutions are being privatized and run by other governing bodies in Fiji and teachers are under the control of Ministry of Education, but still the schools that are run by school management board have their own agendas

to meet. Teachers are employed on contract basis and are to meet the demand of market. Those who cannot function are either demoted or pushed out from the system

In the Pacific there is clear evidence that some governments and regional organizations are also following the romantic trend of Neoliberalism. The South Pacific Forum Secretariat (SPF) has shown clear signs of believing Neoliberalism as highly romantic perception of the world, in accordance with policy prescriptions laid down by international Neoliberal institutions like the Asia Pacific Economic Cooperation (APEC), International Monetary Fund (IMF) and the World Trade Organization (WTO).

Huges (1998) has justified that Aotearoa, New Zealand and Australia are well advanced in their adoption of Neoliberalism having begun implementation in early 1980s. However Fiji is gradually moving towards Neoliberalism and because of external funding by New Zealand and Australia as well as other donors such as World Bank and International Fund (IMF) the education provided to Fiji is totally influenced by these donor countries. Hence because of globalization and its neoliberalism policies there is increasing impact on education system in Fiji. Consequently if neoliberalism is fully implemented in Fiji there will be reduction in the funding to schools in Fiji where cost sharing arrangements will be made. Thus with this globalization and neoliberal policies of development the education system needs to be given greater priority and sharper focus which must be integrated with economic development. The question that can be posed is how cooperative learning in mathematics can contribute to counter balance or contest neoliberalism.

Nikolakaki (2011) stated to counter neoliberalism schools need to cultivate a communitarian ethos. Consequently group teaching can be regarded as a tool of communitarianism and solidarity is necessary to assist the teachers to connect educational ideas to social action. Thus the neoliberal use of group teaching is to develop group working skills for the labour market. These small group facilitations give students opportunities to teach difficult topics related to neoliberalism. This small cooperative group work in mathematics is pivotal point of each student's experience. Thus this collaborative activity prepares student to work together across disciplines rather than situating them along traditional divisions of subject matter that are easily manipulated by the neoliberal ideology to segregate teachers and students. Gutmann (1999) has stated that given the intrusion of neoliberal ideology it is vital that teachers reclaim their position as political buffers from which to protect communities from state and federally mandated economic intrusion.

1.4 Cooperative Teaching and learning

Cooperative group work learning is where members of the allocated group work with their group members to accomplish a common goal. Cooperative learning according to Killen (2007) is where students work together in small groups to achieve a common goal. Cooperative learning is considered to be an effective method to improve teaching and learning processes in the classroom (Johnson & Johnson, 1990; 1999). Cooperative learning is based on the belief that education should be learner-centered and learner-directed, that learners can be teachers and that the teacher is a guide and facilitator rather than the source of all knowledge and direction (Coelho, 1994).

Thus to achieve all the goals the members in the group are interdependence among each other rather than a member working alone in the group and rest are just in the group for sake. Consequently the success of the group depends on the student's ability to cooperate. Kagan (2004) has justified that students in the group must trust each other, support each other and respect each other to overcome the difficulties that might hinder them. Johnson &Johnson (1994) had stated that cooperative learning does not take place in a vacuum. Consequently by dividing or placing students together in different group in a math's class doesn't mean that cooperative learning is taking place in mathematics class. Cooperative learning is not simple group work. According to Johnson and

Johnson (1994) and Kagan (2004) in cooperative learning the following principles should always be present: positive interdependence, face-to-face interaction, individual accountability, group behaviors, and group processing.

Positive interdependence means that students see the importance of working as a team and realize that they are responsible for contributing to the group's effort. Face-to-face interaction involves students working in environmental situations that promote eye contact and social space so that students can engage in discussions. Individual accountability suggests that each person is responsible to the group and must be a contributing member- not someone who lets others do all of the work. Group behaviors refer to those interpersonal, social, collaborative skills needed to work with others successfully. Finally, group processing is a time after the cooperative learning task is finished when team members analyze their own and their group's abilities to work collaboratively.

An important aspect of the "lesson instruction" component is the teacher's role. The teacher must (a) have students transition quickly after direct instruction, (b) have activities and materials ready, (c) monitor student progress in groups, and (d) reinforce the occurrences of collaborative behaviors. During cooperative learning activities, teachers should circulate among groups monitoring the students' ability to complete the assigned mathematics activity and demonstrate the targeted collaborative skills. The teacher can facilitate group work by asking questions to help students redirect their work, by providing additional instruction to some students who may be struggling with the task, and by reinforcing students' efforts for working collaboratively and seeking solutions to problems.

Correspondingly the teacher who is the sole in charge of his class should play the crucial role in making sure the four principals of cooperative learning are applied to ensure effective teaching and learning is taking place in cooperative group work. According to research by Cohen (1994), Hintz (1990), Rich (1990) the employment of new teaching methodology can only come through the teacher. The success or failure of new educational idea depends greatly on the role of the classroom teacher. If the teacher is well versed and trained on the use of cooperative learning, implements the cooperative learning with dedication for sure improvement will be noted in the mathematics class. Learning is identified as being social in nature and the teacher functions as a catalyst not the main source of learning. Student’s participation should be encouraged and they are motivated to learn from each other (Cohen, 1993).

In Cooperative learning teachers are to encourage students to discuss, explain, listen, encourage and provide academic help top their peers (Johnson and Johnson, 1983). In a prudent structuring of cooperative learning students are “cognitively, physically, emotionally, and psychologically actively involved in constructing their own knowledge” (Johnson at all., 1992 p.1.11)

Moreover Johnson & Johnson (1991) have stated that there are specific roles that teachers need to follow in order to employ cooperative learning. The objective of the lesson needs to be specifically stated by mathematics teacher prior to the class, a well thought out plan need to be created by teachers to group students. Finally the teachers have to monitor and guide group interaction which is followed by teacher’s assessment of group collaboration and student performance. Cooperative learning in mathematics offers pleasant learning situation for all students , all students have equal opportunity, competition is amended as friendship, the spirit of cooperation and participation is reinforced and all students are entitled to be thoughtful and creative (Keramati, 2001, Lavasani Khandan,2011).

Metzler (2011) defines cooperative learning as a methodology in which “students learn with, from and for their peers. “A cooperative classroom should not be teacher centered and “ideally teachers are trained to take their existing lesson and restructure them to be cooperative as cooperative

learning is the instructional use of small groups so that students work together to maximize their own and each other's learning" (Johnson& Johnson,2008;Marashi& Dibah,2013).

1.5 Teacher's Role in Implementing Cooperative Learning in the Mathematics Class

In order to have effective cooperative learning to take place in mathematics classroom teachers play a very crucial role in the classroom during the implementation of cooperative learning approach. Thus to organize an effective cooperative learning group teachers should know their students very well. According to Bettenhausen (2002) the teacher's role in cooperative learning generally includes: grouping students, specifying objectives, explaining tasks, monitoring group work and evaluating achievement and cooperation.

Grouping of students can be a difficult process and must be done with care. In a normal classroom there are students who come from different family background, with different cultural values and beliefs, the children are of different learning abilities, gender and personalities. Thus to have a well-balanced and structured group teachers should divide groups accordingly. In other words cooperative learning groups in mathematics class should have a mixture of different ethnic groups, different learning abilities so that students can work interpedently with their peers sharing mathematics ideas from different cultural perspective and same time, the smarter ones could be classified as more knowledgeable others (MKO) in the group who could provide scaffolding to his or her group members to reach a common goal of a group. Thus in organizing an effective cooperative group students tend to learn from their peers and teacher should act as a good facilitator.

Thus according to Rogoff (1990) scaffolding refers to a specific mechanism used by adults and children during guided participation, comprising a variety of physical and or verbal aids, aiming to facilitate the children's progress towards competence. Cohen (1994) emphasized that if teachers do not provide clear and explicit assistance when students need it, students are unlikely to engage in task-specific learning. That lack of teacher assistance was the most important reason for the low achievement of students in group-learning settings (Webb, 1989).

In lesson planning any lesson the teacher takes, the lesson plan acts as a good road map to achieve what is expected in that lesson. Thus in mathematics class teachers should devote ample time to prepare effective lesson plan for cooperative learning. Thus in planning a cooperative mathematics lesson plan a teacher should see that he or she has included relevant teaching aids, which will be used by the students to practice hands on activity which will be connected to real life situation in our local context. Thus a well-planned cooperative lesson will have a space where children in the groups will be given an opportunity to teach themselves and each other in the same group. By teaching and helping each other in the groups it will be more students centered learning in which students will actively involved with their peers. Secondly mathematic teachers should take note that relevant specific measurable objectives are stated which will provide a sense of direction towards attainment of the common goals. As a result through assessment oral questioning, observation and group activity if the objectives are not met the teacher has to re-plan and re-teach the same concept.

During group-work monitoring, a teacher is "both an academic expert and a classroom manager" (Johnson & Johnson, 1990, p. 112). However, researchers in earlier studies emphasized the role of classroom manager. For example, Johnson and Johnson (1991) stated, the teacher monitors the functioning of the learning groups and intervenes to teach collaborative skills and provides task assistance when it is needed. The teacher is more a consultant to promote effective group functioning than a technical expert. Typical statements a teacher may make are, "Check with your group"; "Does anyone in your group know"; "Make sure everyone in your group understands." (p. 61)

Kagan (1985) suggested that teachers should be freed even more in group investigation to allow students to assume responsibility for learning. Teachers typically consult with groups and suggest ideas or possibilities for exploration. Cohen (1991, 1994) suggested minimizing monitoring to help students become more interdependent, autonomous, and self-directed. Cohen observed that students reduced the amount of cooperation and communication between each other after the teacher intervened. Therefore, Cohen preferred to use the quick- response strategy in which teachers provide brief comments and questions, then move away from the group so that students can continue their discussion.

Johnson and Johnson (1990), Kagan (1985), and Cohen (1991, 1994) encouraged teachers to monitor the group's on-task behavior and cooperative skills and to provide task assistance when necessary. Therefore, the teachers' role in cooperative-learning classrooms is "more like a consultant who helps improve effective group functioning than an instructor who contributes information or scaffolds students' learning" (Meloth & Deering, 1999, p. 244). The importance of the teachers' role as indicated in these studies was underestimated.

Finally in the evaluation phase or at the end of a cooperative mathematics lesson mathematics teachers need to evaluate students learning and give feedback as how their work compares with the preset criterion of excellence. (Johnson and Johnson,1986) The cooperative mathematics group then process, or assess how well they have worked together and plan how to improve their effectiveness in the future.

Moreover according to Hannon & Ratliffee (2004) in cooperative learning there is a shift from teacher centered to student centered where students are given opportunity to teach other, share ownership of content and construct new knowledge. In cooperative learning mathematics classroom teachers should take an important role in organizing and managing the classroom. Consequently a well-organized teacher will make sure that relevant teaching and learning materials are made available so that students need not to run around and search for them. Classroom should be well set up, and is safe and conducive towards learning. As a result Johnson and Johnson (1990) have justified that teachers are both academic experts and classroom managers. In addition to this Barkky, Cross and Major (2005) also support the traditional role of teacher as a subject matter expert and classroom authority.

Teachers need to understand the essential elements of cooperative learning to enable them employ effective methods in mathematics classroom. Thus according to Slavin (1986) the three essential elements in an effective cooperative learning method are as follows:

Firstly the role of the teacher here is to provide some type of meaningful reward to group members to encourage the desirable behavior to occur again. Salvin(1987) in one of his research has stated in order to have positive effect of cooperative learning taking place in a classroom , students must be motivated that is intrinsic motivation the desire to learn and achieve the most that comes from the leaner himself. Secondly looking at the extrinsic motivation, here the teacher as the facilitator of cooperative learning plays a very crucial role by motivating students using rewards and praises to enable them to maintain their interest and desire to learn what is being taught. Jolliffe (2007) has described for positive development of the necessary classroom culture mathematics teachers need to include receptiveness to student’s ideas, equality, not just control or domination and honesty, warmth and friendliness such as smiling, eye contact, reassuring gestures, not on a stage but walking around the classroom. In addition to this teachers need to respect the pupils feelings (empathy) putting themselves in the pupils shoes.

Secondly individual accountability: the teacher here should make sure that each member is given equal opportunity to demonstrate knowledge learned in the group without the help of other group members. Thus a good teacher should assign individual responsibility to students in groups which will encourage students to perform their given responsibility. Students in groups can take the role of explainer, recorder, checker and encourager. Thus with the assigned roles students will feel part of the group and participate effectively.

Moreover Killen (2007) supports that teachers need to ensure that every student has an opportunity to talk about their learning, exchange ideas, think critically and help others to learn. Teachers need to train students to record and describe member's behavior in their group. In addition to this Graves and Graves (1990) stated that teachers should change students behavior where teachers should help students to see the need to use the skill, the teacher should help students to believe that they will be better off if they work together productively, the teacher should help students to understand the skills and the teacher should give students opportunities to practice skills regularly.

Cohen (1994) also suggested that teachers should teach students how to do each of the assigned group task, how to help friends without doing the job for them and how to check on what their friends are doing by listening, encouraging and suggesting, rather than taking over.

The third essential element of cooperative learning in mathematics is that teachers should encourage equal opportunities for success by forming heterogeneous groups in mathematics class. Looking at the students in the normal classroom students are not of the same learning ability, some are slow learners; some learn skills and concepts just through teacher explanation and some need more scaffolding to move on with the task. As a result to assist this slow learners teachers need to prepare task that take into reflection of each group member's strengths and weaknesses. In addition to the above Corden (2000) also supports that in designing the task structure of learning activities and social skills, mathematics teachers need to consider the cognitive ability and social skills required to undertake activities cooperatively.

1.6 Conclusion

Based on the research article of many researchers it must be taken into consideration that for successful implementation of cooperative learning in mathematics classroom, mathematics teachers must have a good understanding of cooperative learning and its elements and good classroom management skills to control time and students work towards effective learning and teaching. Moreover cooperative learning in mathematics would eliminate teacher talking time and give more opportunities to students to learn through social interaction. The teacher should plan and prepare the mathematics activities appropriately to obtain remarkable learning experience on the part of learners. As a good mathematics teacher clear lesson objective stated for each mathematics lesson will provide the students a sense of direction towards attainment of the common group goals. In any cooperative group work everyone is a part of the team and each member's active participation is required. The teachers should set a conducive classroom environment, prepare adequate learning resources, manipulative, motivate and encourage students for active participation to achieve the academic performance. The safety of the students during the activity should also be given due consideration by the teacher.

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