

Implementation of Learner-Centred Teaching and Learning Approaches in Advanced Mathematics in Secondary Schools in Tanzania: Achievements and Challenges

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ABSTRACT

This study investigated the implementation of Learner-Centred Teaching and Learning Approaches (LCTLAs) in advanced mathematics at Jangwani secondary school in Ilala Municipality, Dar es Salaam. The study used a qualitative approach using in-depth interviews, Focus Group Discussions, classroom observations and review of relevant documents to collect data. The study employed a total of 32 participants including 30 students studying advanced mathematics and two (2) advanced mathematics teachers. Data were analyzed using thematic content and descriptive analysis techniques. Results revealed that students were not made aware by their teachers regarding LCTLAs different from teachers who had adequate awareness of LCTLAs. Teachers believed LCTLAs to improve students' academic performance in advanced mathematics subject. However, teachers had rigidity to change from being transmitters of knowledge to thirsting students to facilitators indicating acquisition of less experience of applying it in their daily classroom teaching and learning. Further, the study revealed challenges impeding effective implementation of LCTLAs in teaching and learning advanced mathematics. The common challenges that were revealed included lack of relevant teaching and learning resources, overloaded advanced mathematics syllabus, learners' inability to pursue advanced mathematics subject, limited time allocated to classroom teaching lessons, lack of teachers' in-service training and poor cooperation among students themselves. The study then recommended that the implementation of LCTLAs in teaching and learning advanced mathematics is very crucial in enhancing students' performance and achievements. Therefore, the study calls for all education stakeholders to advocate for proper implementation of LCTLAs in Mathematics subject by reducing the challenges impeding their effective implementation in secondary schools.

Keywords: *Learner-centred teaching and learning approaches, advanced mathematics*

INTRODUCTION

The Learner-Centred Teaching and Learning Approaches (LCTLAs) rely on the constructivist philosophy which conceptualizes that knowledge is constructed through interaction with the environment, dialogue with others and reflection – all within culture and language. Thus, knowledge, from this perspective, is created by interacting new information with the existing one and experience of learners (du Plessis & Muzaffar, 2010). This is contrary from the traditional approach of learning “the teacher-centred approach” in which a teacher’s task is to ‘transmit’ knowledge to students, who ‘receive’ it with little critical reflection on how it came to be (Vavrus *et al.*, 2011). It is believed that the concept of LCTLAs originated from developed countries (Schilling and Koetting, 2010), appearing firstly in the USA by 1970s (Bowden, 2000; Mulder, 2004; Schilling and Koetting, 2010). According to Cobb and Hodge (2007), during these periods, there were many public debates criticizing the quality of education in the country which necessitated the formation of performance-based teacher education movements. Learner-centred education was introduced in German by 1970s and in the United Kingdom and Australia by 90s Marzano (2010).

In africa, learner-centred education has appeared in most education policies (Schweisfurth, 2011; Sriprakash, 2010). However, it has been revealed that learner-centred approaches failed in many cases (Schweisfurth, 2011). This has been caused by teacher professional capacity, limited resources, cultural factors and learner background and experience (O’Sullivan, 2004). In recent years, many African countries have been reforming the historically common teacher centered curriculum, which employs a lecture style, “learning by rote” method of teaching. Botswana, Kenya, Senegal, and others seek to promote creativity, critical thinking, and problem-solving skills in their students (Vavrus *et al.*, 2011). Schweisfurth (2011) asserts that the implementation of learner-centred approach in different Africa contexts have been riddled with stories of failures grand and small. It is argued that in order students to become successful academically, the learner-centred teaching approaches should be effectively implemented (Schweisfurth (2011). The introduction of the LCTLAs in Tanzania dates back in 2005 when the competency-based curriculum was introduced (Mtitu, 2014; Kafyulilo, 2014). It has been revelard by various researches that the approach plays an incredibly important role to students competences and academic performance (Mavumba, 2016; Kafyulilo *et al.*, 2014; Mtitu, 2014; Shemelekwa 2008; Kahwa (2009). Despite its reconised importance, evidences show that students performance in mathematics is minimal over time (Shemelekwa, 2008). Teachers’ perceptions and experiences towards the

LCTLAs (Mtitu, 2014), the implementation of competency-based curriculum in secondary schools (Mavumba, 2016), others have investigated the link between LCTLAs and individual subjects for example Geography (Mtitu, 2014) Mathematics (Shemelekwa, 2008), Biology (Kahwa, 2009). Therefore, there is dearth of information about the role of LCTLAs in enhancing performance in advanced mathematics in Tanzania. This study intended to fulfill this gap.

The Purpose of the Study and Research Objectives

The purpose of this study was to explore the implementation of learner-centred teaching and learning approaches and challenges that teachers and students face in teaching and learning through the learner-centred approaches. The study was guided by the following objectives.

- (i) To assess the Implementation of Learner-Centred Teaching and Learning Approaches in Advanced Mathematics, and
- (ii) To examine the Challenges that Impede an Effective Practice of Learner Centred Teaching and learning Approaches in Secondary School Students' Advanced Mathematics Performance

Literature Review

For any education approach to be successful, teachers are required to be professionally well-prepared to satisfy the demands of the curriculum (Shen *et al.*, 2010). In other words, educational administrators must be sure that teachers, prior to engaging themselves in teaching, possess sufficient pedagogical skill, as well as content knowledge, as to how to transform classroom into a place where learners can learn effectively. Therefore, the reviewed literature addressed on the following study objectives. Assess the implementation of LCTLAs in teaching and learning advanced mathematics and examine challenges that impede an effective practice of learner centred teaching approaches on secondary school students' advanced mathematics performance.

Learner-centred teaching and learning approaches (LCTLAs) encouraged collaboration, face to face interaction between a student and the teacher especially when using classroom discussion. In this way the student gains more of what is being taught by a teacher as well as the teacher gains from the student as well through continuous teaching experiences; thus leading into shared commitment, understanding, creativity and innovations (Mtika & Gates, 2010). According to Wohlfarth *et al.*, (2008) in learner-centred classrooms students perceive as a vehicle to promote critical thinking about conceptual questions underlying the field, instead of memorization. Further stated that

students noted that in a learner-centred approach there is deeper critical thinking skills namely integration, application, and evaluation and not only memorization. One student when interviewed said: *"I had truly enjoyed this class and the way it was designed as a learner-centred experience. I feel that it was the first time I was treated as a competent and intelligent person who could be trusted with her learning experience."* Equally, (Treesuwan & Tanitteerapan, 2016) revealed that learner-centred approach enabled students to interact better with others and teachers by sharing and discussing concepts related to classes, unlike teacher-centred approach where teachers controlled the whole learning process. Learner-Centred Approach is perceived differently from various perspectives. Many studies had shown that LCTLAs were perceived positively by both teachers and students. In the study by Treesuwan and Tanitteerapan (2016) in Thailand, it was revealed that LCTLAs were perceived positively as learners vividly propounded that learner-centred approach enabled them to interact better with others and teachers by sharing and discussing concepts related to classes, unlike teacher-centred approach where teachers controlled the whole learning process. On the other hand, in the same study, it was propounded that LCTLAs boosted students' confidence in articulating their feelings and sentiments about a certain topic dealt with in the class discussion.

A similar positive perception is shown by Machemer and Crowdford (2007), who emphasises that active learning experiences placing the student at the centre of the teaching-learning process. Active learning provides opportunities for students to reflect, evaluate, analyze, synthesize, and communicate on or about the information presented. Machema and Crowdford (2007), also, argued that interactive learning prepares students better as they are exposed to the thinking approaches of class-mates foreshadowing the interdisciplinary teams of a real-world situation. Nevertheless, Damon (2008) argued that active involvement (LCTLAs) was much more effective than the traditional lecture method (Teacher-centred approach). Then, he stressed that students' effort and involvement, such as hours spent studying, determined how much they learned; students learned more through positive reinforcement and interactions with other students and faculty, and the instructor and learning environment affected students' motivation to learn. Some studies have underscored many limitations which face teachers in implementing the LCTLAs (Makunja, 2016). Some studies have indicated that there have been two categories of teachers, i.e. those who were trained on student centred approach while there was in colleges and those who were not. The finding showed that in-service teachers trained and untrained at colleges were aware and had qualification but

possessed low experiences on learner-centred approaches under competency-based curriculum (Mavumba, 2016). Responses obtained from education stakeholders confirmed that lack of in-service training for teachers after introduction of learner-centred teaching and learning approach was one of the major drawbacks that affect implementation of the learner-centred approach (Makunja, 2016). Lack of knowledge about new change may result into failure to implement the programme. (Makunja, 2016) stressed that lack of knowledge was a big challenge that face teachers in implementing learner- centred teaching and learning approaches. One of the respondents stressed that;

“Teachers are eager to implement (LCTLAs) under competency based curriculum (CBC), but the big challenge which the majority of teachers face was lack of knowledge...most of them do not understand clearly the competence-based approaches because they did not get any training. I am sure if teachers get orientation on LCTLAs under CBC, they would successfully implement it with confidence (Head of School, E)” (Makunja, 2016)

Mtitu (2014) observed that the teacher’s teaching practices were constrained by three main challenges including the students’ incompetence in speaking English, overcrowded classes, and limited funding for field and project activities. During classroom observation, it was noted that when students were given opportunities to share their experiences regarding some aspects in the instructional topic, volunteering students struggled to present their thoughts. The teacher also revealed that most students, especially in the lower classes, had not mastered spoken English. As such, many of them felt shy to share their experiences in the instruction processes since they were unable to communicate in English (Mtitu,2014). Chimwanga (2014) observed that the learner-centred approach was indeed adopted in the teaching-learning of French in O-level state secondary schools in Dar es Salaam. The study aimed at finding out the extent to which French language teachers put in place the LCTLAs which was adopted in 2005, envisioned ascertaining teaching techniques that teachers use in the French language teaching (FLT). The roles of the teachers in the French language teaching (FLT) and how the teacher organize learning tasks in the FLT. The study was conducted in Dar es Salaam region and was covered 50% of the state O- level secondary schools found in Ilala district. The study found that teachers largely used teacher-centred approaches (TCAs) as they encountered transitional challenges such as insufficient instructional materials, overcrowded classes and poor proficiency of French which seemed to prevent them from effectively applying the LTCAs. Besides, it was found that, although many

teachers had received training in the LTCLAs, their actual understanding of the approach was questionable. Literature (Kafyulilo *et al.*, 2014; Komba, 2015; Mavumba, 2016; Makunja 2015; Msuya 2016; Nihuka 2012; Nihuka 2004; Mtitu, 2014) have assessed LCTLAs in different perspectives. However, there are scant literatures have investigated the link between LCTLAs and students' performance in advanced mathematics subject, therefore, there is a dearth of information (gap) in existing literatures on LCTLAs and students performance in advanced mathematics that need to be filled by this study.

Methodology

A qualitative approach was used. This is because the approach was appropriate in this study due to its distinguish features of the philosophical view point as presented by Curtis (1978) as cited in Cohen *et al.*, (2000) that: (i) it places more belief on the importance, and in a sense for the primacy, of subjective consciousness, (ii) it helps the researcher to understand consciousness as active, and meaning-bestowing (iii) its power to claim that there are certain essential structures to consciousness of which we gain direct knowledge by a certain kind of reflection, (iv) its ability to enable the researcher to explore a problem and developing a detailed understanding of a central phenomenon, (v) it is a tool through which the researcher is able to state the purpose and research questions in a general and broad way so as to capture the participants' experiences and (vi) its power that allows the researcher to collect data based on words from a small number of individuals respondents with the purpose of obtaining their views. According to Creswell (2009), qualitative approach allows researcher to make interpretation of the data by developing descriptions of the events and processes, analyzing data for category and theme development, that ultimately lead to conclusion that are based on trustworthiness and credibility about theoretical and individual's meanings, stating the lessons learned and offering questions for further research. Qualitative research is, therefore, exploratory, inductive and emphasizes processes rather than ends (Mason, 2002; Creswell, 2005). It also provides an insight into how people make sense of their own experiences, which cannot be easily provided by other research methods (Merriam, 1998). The justification of using qualitative approach is due to their facility to describe and display phenomena were experienced by the study population, in fine-tuned detail, and in the study participants' own terms. The approach therefore, offer the opportunity to 'unpack' issues, to see what they are about or what lies inside, and to explore how they are understood by those connected with them. Case study design was adopted in this study. Robson (2002:178) defines case study as

“a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence”. Yin (2003) also highlights the importance of context, adding that, within a case study, the boundaries between the phenomenon being studied and the context within which it is being studied are not clearly evident. Single case study design was appropriate for this study since the study used one secondary school (case) to obtain data (Yin, 2014). This study was conducted at Jangwani secondary school that found in Ilala Municipality. The choice of this school was made purposely to single out only advanced secondary schools offering advanced mathematics subject. Two (2) advanced mathematics teachers were purposively selected and thirty (30) students studying advanced mathematics. The teachers were interviewed on their understanding of the concept and objectives of learner-centred teaching and learning approaches, the implementation and challenges they face when implementing the learner-centred curriculum. Additionally, a total of two (2) lesson plans from advanced mathematics teachers were reviewed. The purpose of reviewing these documents was to establish if their contents reflected the qualities of the learner-centred curriculum. On the other hand, two (2) classroom observations were made to explore teachers’ competencies and students’ participation in the teaching and learning process in the classroom. Focus group discussions and reviewed documents were analysed using thematic content analysis while open ended questions were analysed using qualitative techniques.

Findings and Discussion

Implementation of Learner-Centred Teaching and Learning Approaches in Teaching and Learning Advanced Mathematics

To achieve this objective several data collection methods were used, such as in-depth interviews with teachers, FGDs with students, classroom observations and documentary review in order to obtain information. In this item, teachers’ and students’ practices in the classroom were assessed. Classroom observations were made using observation schedules where some items were planned to be observed. Results showed that most teachers’ practices in classrooms were, teacher asks pertinent questions and respect students’ ideas, the teacher encourages student questions and engagement in the learning process, and the teacher invites students to make demonstration on the blackboard. Also, results showed that two teachers observed during classroom teaching were not follow the lesson plan. The results showed that Teachers’ and students’ practices in classroom teaching and learning were somewhat not relevant to the learner-

centred approaches. Learner-centred teaching and learning requires students to interact, collaborate and discuss various issues pertaining to the subject but regrettably, students were found seating on desks passively and were arranged in rows facing the blackboard. This could not allow them to interact with one another. During interview, researcher revealed that teachers' practices in classroom were not conforming with LCTLAs. One respondent arrated;

"It is difficult to follow all procedures of learner-centred teaching and learning approaches, sometimes we teach in a traditional way i.e. teacher-centred approach because advanced mathematics requires time and has many topics that need to be covered within a year. We have scheme of work and lesson plans but for me I cannot follow all steps or time allocated for each item because I have to finish the syllabus early and do revisions before annual examinations commenced at the end of academic term. (Interview A, Jangwani Secondary School, 2019)

On the other hand, the study found that some learner-centred methods are sometimes implemented despite challenges faced. One respondent explained some methods he used to facilitate students, he narrated that;

What I do is that I give them (students) materials or tell them materials they have to pass through before a new topic begins. Sometimes I give them questions to go and find answers themselves and when they come to class, I pass through their answers and correct the most difficult ones (Interview B, Jangwani Secondary School, 2019)

Results above gave a clear insight of the extent to which LCTLAs were implemented partially by advanced mathematics teachers at Jangwani secondary school. Results from this study conform to what other researchers revealed in different areas and time, Mtitu (2014), Shemelekwa (2008) and Kahwa (2009) found that teachers implemented the use of lecture methods per se as the mode of their day to day teaching. Similarly, UNESCO (2004) posited that despite the introduction of the learner-centred approach in their education system, teachers continue to teach in a traditional way of chalk and talk. In this regard, students are not performing enough experiments and the learning process was not learner-centred. The researcher reviewed teachers' lesson plans to assess their abilities to prepare learner-centred lesson plans according to the competency-based curriculum format. In order to achieve this item, through documentary reviews, the researcher reviewed lesson plans from two purposely selected advanced mathematics teachers from Jangwani secondary school. The researcher had prepared indicators basing on the requirements of

the competency-based curriculum. The indicators included; whether teachers' lesson plans clearly stated learning objectives; lesson plans clearly stated learning outcomes; the plan provided an opportunity for the teacher to use multiple teaching and learning methods; the teacher had clearly shown teaching aids to be used in teaching and learning; the contents reflect real-world situation; the lesson plan provides an opportunity for continuous assessment of activities in groups or individually to find out whether students have developed the intended skills/competencies; the lesson plan describes the teaching and learning activities that reinforce students' understanding of the topic; the lesson plan provides an opportunity for the teacher to find out what students already know about the topic.

It was revealed that one teacher had prepared lesson plans prior to lesson while the second teacher was found to have no lesson plan, however, the one who had found have lesson plan was implemented poorly. Teacher was not following stages of lesson paln as stated. Teaching methods and learning aids stated were not shown and the teachers assessment and evaluation of the lesson were not taken into account. The findings agree with those of Kafyulilo et al., (2012) who found that although the pre-service teachers learned about competence based teaching approaches theoretically at the respective colleges, they had limited abilities to demonstrate the approaches in classroom situations.

Challenges Impeding an Effective Practice of Learner-Centred Teaching Approaches in Secondary School Students' Advanced Mathematics Performance

Overcrowded Classes and seat Arrangement

Classroom observations at Jangwani secondary school evidenced a few number of advanced mathematics students in the classes. The seating arrangement was not okey for the learner-centred approaches. Students were observed seating in rows facing the teacher and the blackboard. Such a classroom environment cannot favour students to participate or discuss since they were dictated by such an environment. It is posited that classroom seating arrangements have a profound impact on students' achievement and performance. Therefore, students should be allowed to sit in an arrangement that allows student-centred approaches such as cluster/group, or horseshoe/U-shaped to allow student-student interactions as well as student-teacher interaction in the class (Cunninggim, 2015).

Overloaded Syllabus

Individual interviews also revealed the same that, teachers lamenting that advanced mathematics syllabus was too long to cover. One advanced mathematics teacher narrated that;

.....there is another problem of covering the syllabus. Advanced mathematics syllabus is too long. It is difficult to cover within given time and other teaching commitments..... (Interview B, Jangwani Secondary School, 2019). The findings above conform to Mwangi (2014) who found that heavy teaching load and pressure to cover syllabus was a challenge facing implementation of LCTLAs.

Lack of Enough Classrooms

FGDs, and interview sessions students and teachers identified challenges that impede their learning practices and performance in advanced mathematics subject in relation to learner-centred approaches. This evidenced during FGDs;

Here at school, we do not have enough classes, we do not have school library, we do not have an assembly hall for doing examinations, we usually conduct our studies at laboratory, Most of classes are occupied by ordinary level students, this hinders us to collaborate and make discussions among ourselves (FGD 1, Jangwani Secondary School, 2019)

The findings above conform Makunja, (2016), who found that classroom space gives room to students to make discussions and interact.

Poor Students' Background in Mathematics

Teachers evidenced that some students selected to join their schools to study advanced mathematics had poor background in mathematics making it hard to perform well at an advanced level. The following was an account of one of the respondents during the interview;

Students selected to study advanced mathematics should have high scores at ordinary level i.e. those with A or B grades. These at least can fit to undertakeadvanced mathematics. When you select students let say with C or D grades, it means you are bringing a big load to advanced mathematics teachers because the subject has many topics which are to be covered within a short period of time. Therefore, I advise that only students with high grades should be selected. (Interview B, Jangwani Secondary School, 2019)

The above narrative conform to Michael (2015) who posited when assessing factors that lead to poor performance in mathematics. His study found that inadequate self-practice and students' poor background in mathematics were key challenges facing students' performance. Similarly, Mwangi (2014), found that the major challenges that affect implementation of the learner-centred strategies were insufficient time, large class size, heavy teaching load and pressure to cover syllabus. The results also conforms to Msuya (2016), his study found that the learner-centred curriculum was challenged by insufficient teaching and learning resources including inadequate library space. Low ability of students was revealed by Makunja (2016), her study that investigated the challenges facing teachers in implementing competence-based curriculum in secondary schools in Tanzania found that low ability of students joining secondary education hampered the implementation of the learner-centred approaches.

Poor Cooperation Amongst Students

The study revealed that there were poor cooperation among students. This was also one of the key challenges facing the implementation of learner-centred teaching and learning approaches in classrooms and out of classroom activities. Learners themselves evidenced that some of them held materials which could be shared to others but they were not sharing them. Additionally, some learners lamented that fellow students had high ability in solving different advanced mathematics questions but they were not willing to help their fellow. The following was a narrative from one respondent;

.....Here at schools, there are students with high ability to solve difficult advanced mathematics questions but when you asked them to help you they do not respond in a positive way. Sometimes they have good reference books but they do not able to borrow other fellow students, simply they are selfish (FGD 2, Jangwani Secondary School, 2019)

Another participant narrated that;

.....Some of us came from well-off families, so their parents buy them study materials, and they attend tuition after class hours but when they came to school, they do not share that knowledge or books with fellow students. This situation hinders most of the students to perform badly in advanced mathematics (FGD 3, Jangwani Secondary School, 2019)

Lack of In-Service Training

Lack of in-service training is also evidenced in this study as a challenge impeding effective implementation of the LCTLAs. Although teachers had stated to have received LCTLAs education in colleges, they, however, had not received any professional development programmes during their employment since the introduction of the learner-centred teaching and learning approach. One of the interviewees narrated that;

....Since I was employed here, I have had attended only one training which was organized by a certain NGO. I remember I was selected together with one colleague to represent other teachers, upon completion of the training we were supposed to come back to sensitize our fellow teachers. These training were very important for us to be updated on matters pertaining to teaching and learning. When a system was introduced, there should be training to enable teachers to cope and adopt it. (Interview A, Jangwani Secondary School, 2019)

In-service training has been evidenced to have a profound impact on teachers by many researchers over time. Komba (2015) recommended that regular training for in-service teachers should be conducted in order to enable them to acquire up-to-date teaching skills as required by the changes introduced in the school curricula. Similarly, Nsengimana (2017), revealed that teachers had limited practical skills and knowledge of learner-centred techniques that could help them to implement the learner-centred approaches, therefore, the only way to address this problem was through building capacities for in-service teachers by providing in-service training opportunities.

Lack of Time

Given the limited time for subjects every day, it was revealed that learner-centred approaches requires a lot of time. It was time-consuming to allow students to construct their own knowledge through learner-centred classroom activities. One of the teachers interviewed stated that;

Learner-centred teaching and learning approaches require time. Teaching and learning activities cannot be accomplished within the given time to cover the whole advanced mathematics syllabus. Therefore, learner-centred approaches such as group discussion method are wastage of time since there were a lot of topics to be covered within the given time (Interview B, Jangwani Secondary School, 2019).

Learning in a learner-centred class, time is required but given limited time allocated to mathematics subject makes it hard to finish the syllabus. Further, the study revealed that advanced mathematics has a long syllabus to cover. Bataineh and Tasnimi (2014) observed that competence learner-centred approach is very expensive and requires a lot of time to teach one aspect of the subject content. Therefore, it was hard for a teacher to finish the syllabus on time or follow all aspects of the lesson plan.

Lack of Teaching and Learning Resources

Another identified challenge was lack of teaching and learning resources. Learner-centred classrooms require a variety of resources such as books, materials, computers, software, projectors, and projects designed to attract learners' interests on a number of topics. This study found that there was an insufficient number of teaching and learning resources in the classrooms. One of the research participants noted;

Here I had only two advanced mathematics books which I used in classroom lessons, there were no computers or projectors in the room that can enable me to demonstrate some aspects of the topic. This gave me a hard time to make students understand the topic easily (Interview B, Jangwani Secondary School, 2019)

Then, during FGDs, one participant remarked;

We lack books, learning aids in the school library, lack computers and we were not allowed to own laptops, Ipad and smart phones. These were devices that can be use to find materials online or study and download materials online so as to eassy the process of teaching and learning inside and outside classroom (FGDs 2, Jangwani Secondary School, 2019)

A similar result was revealed by Anderson (2004) who recommended that ICT tools, books and improved the physical environment of the classroom affects students' behaviour's and their attitude towards classroom learning., hence if made available could improve the level of understand of the learners.

Conclusions

In the light of findings from the study, the following conclusions were made: Firstly, the study had revealed that teachers are somewhat aware of the concept of learner-centred approaches and practice some of the teaching and learning methods in teaching and learning advanced mathematics despite being still

practising teacher-centred (traditional) approaches where advanced mathematics students were not aware of LCTLAs. In practice, learner-centred teaching and learning strategies are not practiced for the majority of teachers during classroom teaching and learning but all accepted that effective implementation of LCTLAs enhance advanced mathematics performance. Secondly, results also showed that teachers and students were not effectively implementing the learner-centred approaches in teaching and learning advanced mathematics because of some challenges they faced such as, lack of enough time, poor students' background in mathematics, lack of teaching and learning resources, lack of in-service training, poor cooperation among the students themselves, poor classroom seating management and shortage of advanced mathematics teachers. Furthermore, due to ineffective implementations of LCTLAs at jangwani secondary school caused low performance of students in advanced mathematics.

Recommendations

Based on the results, several issues need to be addressed to improve the implementation of LCTLAs to enhance students' performance in advanced mathematics. This study recommends that the education policy and advanced mathematics syllabus should be reviewed. The reviewing process should involve stakeholders and implementers of LCTLAs so that they can provide their insights on how LCTLAs can be implemented in secondary schools. The study also, recommends that in order for Tanzania schools to attain the desired quality education and achievement for its young generation, having advanced mathematics teachers who think critically and innovative, the government ought to ensure that learner centred- curriculum is implemented effectively by providing in-service training on LCTLAs for advanced mathematics teachers. The government should plan and establish pilot schools which are well equipped with learning resources (books, internet, computer labs) and train the teachers on how to integrate information communication technology (ICT) in teaching and learning advanced mathematics, this may help teachers to implement LCTLAs easier. Motivation plan should be established to teachers and students in order to increase efficiency and enhance students' performance.

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