



RESEARCH ARTICLE

PERCEPTIONS OF SECONDARY SCHOOL MATHEMATICS TEACHERS TOWARDS SECONDARY SCIENCE AND MATHEMATICS TEACHERS (SESMAT) PROGRAMME IN MBARARA DISTRICT, UGANDA

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ARTICLE INFO

Article History:

Received 12th, September 2015
Received in revised form
30th, October 2015
Accepted 27th, November 2015
Published online 30th, December 2015

Keywords:

Mathematics,
Secondary school.

ABSTRACT

This study aimed at finding out the perceptions of secondary school mathematics teachers who had attended in-service training under Secondary Science Mathematics Teachers' programme. A mixed methods approach was used in this study and data was collected using a survey questionnaire and focus group discussion. Findings from this study indicate that most teachers perceive the programme to have positively impacted on their teaching skills i.e. towards the implementation of the main objectives of SESMAT in-service training. For in-service training to be effective and greatly impact on teachers, their welfare needs to be taken care of in terms of allowances. New innovations for instance, area of ICT need to be incorporated in the training programme.

INTRODUCTION

In-service training programmes within the educational sector are intended to raise the quality of education. Thus, in-service training should be considered as a constant and indispensable part of any country's system of continuous education. Ramatlapana (2009) defines in-service training as "structured activities designed primarily to improve performance... It may lead to the acquisition of some professional qualification, securing a particular type of appointment or there may be no expectations of financial or academic reward (p. 154)". This definition gives an idea of what an in-service training constitutes. The training takes place in different contexts and this means that the effectiveness of the in-service training will depend on some factors.

These factors are important since they determine the outcomes of such in-service training programmes. In-service teacher education and training focus on identifiable learning activities in which practising teachers participate. Activities are provided in form of seminars, workshops, conferences, short courses and long courses (Villegas-Reimers, 2003). In-service teacher training differs according to the educational tradition and contexts (Komba and Nkumbi, 2008). In educational systems most especially in developed countries where teacher education programmes are well established, in-service training is described as a process embracing all activities that enhance professional growth (Rogan and Grayson, 2004 cited in Komba and Nkumbi, 2008).

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The assumption here is that the teacher is sufficiently knowledgeable about the subject matter and has successfully completed a bachelor's degree. In the context of developing countries, in-service teacher education is often for upgrading the skills of unqualified and underqualified teachers (Courtney, 2007).

Background of the SESMAT Programme

The desire by the government of the Republic of Uganda to improve science and mathematics education as the bedrock of the Ugandan economy and dissatisfaction of how these subjects are taught in the country was the major rationale for the introduction of the current Secondary Science and Mathematics Teachers' (SESMAT) programme (UNEB, 2014). The main objective of the SESMAT programme is to equip science and mathematics teachers with new teaching approaches where the emphasis is on the learner, while teachers facilitate the learning process. Emphasis on the learners here implies learners will be in the centre of the teaching process and will be made to participate actively in the learning process. In the year 2005, the Government of Uganda through the Ministry of Education and Sports- (MoES), with technical assistance from the Government of Japan through Japan International Cooperation Agency (JICA) established the SESMAT programme. The main aim of the programme was to enhance the quality of teaching and learning of Science and Mathematics through In-service Education Training (INSET) for serving teachers of science and mathematics in Uganda. The overall goal of the programme is to improve the performance of students in Science and Mathematics education.

The SESMAT programme operates on a two-tier cascade system. The district trainers are trained at the National INSET centre within Kololo Secondary School. The district trainers, based on the training they had, then train the science and mathematics teachers at the district INSET centres.

SESMAT aims to strengthen teacher's competence by addressing these areas of concern through the content and activities of the INSETs. The themes outlined for the training cycles were:

- Positive Attitude to Enhance Quality Teaching and Learning of Science and Mathematics.
- Strengthening Hands-on and Minds-on activities to Enhance the Teaching and Learning of Science and Mathematics.
- Actualization of ALEI/PIEI Principles to Enhance the Quality of Teaching and Learning of Science and Mathematics.

The SESMAT INSETs are short-term residency programmes which are normally conducted during school holidays and are delivered in the form of workshop-type sessions in which the trainers are the experts who establish the content and the flow of activities. During these INSETs the teachers are: exposed to carefully selected activities that enhance interest, understanding and retention; given opportunity to work together and come up with more activities; and demonstrate how to use the same through peer teaching. Therefore, this programme gives teachers time to rethink about their teaching practices in science and mathematics and put what they learn during the cycles in practice and see its effectiveness in their school settings.

On-going and end of in-service education training monitoring and evaluation is carried out to assess the quality of the training and its impacts. The monitoring and evaluation programmes are done at the national and district levels. Occasionally, an independent team of specialists, from a sister programme, Strengthening of Science and Mathematics in Secondary Education (SMASSE), from Kenya are invited to monitor and evaluate the national in-service education training programme. The Education and Sports Ministry of the government of Uganda together with the national trainers then performs the monitoring and evaluation at the district level. The purpose of the programme is to improve the quality of teaching skills of science and mathematics teachers at the secondary level.

Empirical studies on in-service training

Komba and Nkumbi (2008) analysed the perceptions and practices of head teachers, primary school teachers, ward education coordinators, district education officers, school inspectors and members of the school committee in Tanzania. Questionnaires, interviews and observation check lists were used to collect data on the nature, importance, organization, adequacy of and support for teacher professional development. The study found that the majority of the respondents perceived Teacher Professional Development (in-service training) as being important because it improves the teacher professionally, academically and technically. Ozer (2004) in a study on in-service training in Turkey observes that three quarters of teachers expressed their desire to attend an in-service training

while less than one third were prepared to attend professional development courses. The areas they were interested in having professional development included general: educational issues; subject content; and teaching methods. Yan (2005) found that both teachers and administrators were positive about the in-service training they saw as beneficial to day-to day teaching as there was a notable improvement in confidence and competence of teacher trainees about their teaching.

According to Palenzuela (2004), teachers' perceptions are effective outcomes that are influenced by the teachers' needs, values and expectation. Satisfied teachers often want to comply with the norms of the programme. Further, Palenzuela argues that age and experience influence teachers perception of satisfaction as well as attitudinal and behavioural compliances. Ma and MacMillan (1999 cited in Palenzuela 2004) found that more experienced teachers were less satisfied with their professional roles than less experienced teachers, but they were satisfied with supervisory relationship.

All these can be considered as internal factors of the teacher which influence their perception on in-service training. External factors also influence teachers' perceptions and these are: the type and the location of the school, the supervision (that is the role played the teachers' superiors), monetary and non-monetary incentives attached to the in-service training, class size and work load. The main focus of any in-service training is to improve the quality of the input and this inevitably relies on the professional skills of the teacher trainers. Reasons for not being prepared to go on courses were those of cost, a lack of rewards to motivate attendance and lack of appropriate in-service activities.

Similarly, Yan (2005) in the study to explore practical constraints that prevent teachers from participating in INSET courses for their continuing professional development in one region in China found that 58 percent of teacher trainees thought that the in-service course had partly met their expectations. One of the main concerns that really stood out was the lack of valuable qualification to acknowledge teachers' experience and the value of the training. This was the concern of both teachers and administrators. If both teachers' and administrators' practical concerns are ignored, could lead to undermining of the overall quality of the INSET.

In-service training mostly developed faces criticisms of simply focusing on narrow aspects of teacher activities, for example, a simple presentation on subject matter. In developing countries constraints of in-service training include: lack of appropriate structures for training, curriculum development and innovation management, geographical and communication problems (Peacock, 1993); the technical skills and the pedagogical and subject understanding of teacher trainers were often identified as a constraint in the development of effective in-service teacher training programmes (Courtney 2007); inadequate support in terms of finance at national, district and other administrative units (Komba and Nkumbi, 2008).

Statement of the Problem

Government of Uganda has been spent huge sum of money on the SESMAT programme.

The cost went into the allowances of the national trainers and the district trainers. Other costs went into the development of the training materials and the feeding cost of the participants at different training centres across the country. Also, students contribute certain amount of money towards the activities of the SESMAT programme. Rigeway and Passey (1995) state that, "In any change process, it is essential to have a view of where different key agents are, in terms of both their actions and beliefs" (p.60). One can speculate that if the teachers have positive perceptions towards the impact of SESMAT on their content and teaching skills, students are likely to be successful with mathematics. Unfortunately not much has been done by way of documenting the effectiveness of these initiatives. This prompted the need to investigate perceptions of mathematics teachers' on the SESMAT programme.

Research objectives

This study sought to:

- investigate teachers' perceptions on SESMAT programme
- find out the improvements teachers would like to be made for SESMAT programme to be effective.

MATERIALS AND METHODS

Johnson and Christensen (2004) identified three major research paradigms currently used in education and these are: qualitative, quantitative and mixed research. This study employed a mixed method because its appropriateness in the nature and its data collection tools which allow the researcher to infer only about that which she or he is examining (Borkan, 2004). Also, considering the objectives set for the study, mixed methods was considered appropriate to achieve them. Mixed methods combine the features of both quantitative and qualitative designs. Quantitative deals with the numeric values while qualitative design deals with non-numeric. The study used descriptive design to describe the perceptions teachers hold with respect to the SESMAT programme.

Sample

The target population for this study is the secondary school mathematics teachers who have taken part in SESMAT training. The study used a sample 26 mathematics teachers who were purposively selected. The questionnaires were administered to as many teachers as possible in government aided secondary schools in Mbarara District, until the target number of respondents was reached.

Instruments

Teachers were asked to complete a survey questionnaire that was developed by the researcher and comprised of two parts. The first part included closed-ended items that examined mathematics teachers' perceived impact of SESMAT while the second part comprised of open-ended items eliciting teachers' views about the improvement they would like to be made on SESEMAT programme. Responses to the items in the first part were recorded on a five point Likert scale that ranges from "strongly agree" to "strongly disagree".

Data analysis

The data collected was analysed using quantitative approaches which included the use of descriptive statistics such as numbers, and percentages. The mean scores and standard deviations for the teaching strategies were reported because the mean is a result of finding the average of all the values, so it includes all the reported responses. But it is affected by the extreme values, that is, why the standard deviation was used.

RESULTS

Mathematics Teacher's Perceptions on SESMAT programme

A major purpose of in-service training is to improve teaching and student learning outcomes. Teachers were asked to respond to each of the eight statements in terms of whether their skills had been improved following participation in the SESMAT in-service training programme. The results of their responses were as shown in the Table 1.

It can be deduced from the teachers' responses that they are positively perceive the program in terms of content and teaching skills. The means to all the items are greater than 3 which indicates that majority of the teachers either agreed or strongly agreed with the items. The item with the highest mean (Mean= 4.20) is "SESMAT Programme has helped to improve my improvisation skills" with 90.9 percent of the teachers either agreed or strongly agreed with the item. 79.4 percent of the teachers either agreed or strongly agreed with the item "My skills in developing "hands on and minds on" activities for effective teaching of mathematics have improved after attending SESMAT Programme" (Mean = 4.08).

Table 1. Perceived impact of SESMAT programme in-service training on teachers' skills

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
SESMAT Programme has helped me improve my level of content knowledge	23.5%	44.1%	17.6%	11.8%	2.9%	3.81
SESMAT Programme has helped to improve my skills of involving students during lessons	38.2%	44.1%	11.8%	-	5.9%	4.00
My skills in preparing lesson plans have improved after attending SESMAT programme	23.5%	58.8%	5.9%	-	11.8%	3.92
My skills in developing "hands on and minds on" activities for effective teaching of mathematics have improved after attending SESMAT Programme	38.2%	41.2%	14.7%	2.9%	2.9%	4.08
My skills in developing effective and efficient worksheets to tap learners' potential have improved after attending SESMAT Programme	29.4%	47.1%	14.7%	5.9%	2.9%	3.96
I have concretised ALEI principles after attending SESMAT Programme	14.7%	55.9%	23.5%	-	5.9%	3.81
SESMAT Programme has helped to improve my improvisation skills	39.4%	51.5%	3%	3%	3%	4.20
SESMAT Programme has helped to improve my skills to have students work in cooperative learning groups	23.5%	55.9%	14.7%	2.9%	2.9%	3.96

Source: Field data, 2015

The items with least mean of 3.81 are related to the improvement of the level of content knowledge and concretisation of ALEI principles after attending SESMAT program. 67.6 percent of the teachers either agreed or strongly agreed with the item "SESMAT Programme has helped me improve my level of content knowledge" while 70.6 percent of the teachers either agreed or strongly agreed with the item "I have concretised ALEI principles after attending SESMAT Programme"

The areas where teachers hold positive perceptions on SESMAT programme are: involving students in mathematics lessons; preparing a lesson plan; improvisation; and developing efficient and effective work sheets. During the focus group discussion, the above mentioned areas consistently comprised the teachers' responses when they were discussing how the programme impacted on their teaching practices. Below are some of the teachers' comments

"...after attending SESMAT it has helped us to design some models we can use in case we are teaching in the form of visual aids and those help students to easily interpret the concepts..."

"...SESMAT helped me and I believe the rest of the teachers of mathematics at least to improve on how to prepare schemes of work and lesson plans and in that we are now able to plan our lesson in advance and look for the visual aids and the models before the lesson, it helps in understanding the subject by the learners"

"...I appreciate what I learnt because I learnt how to improvise. You see we teachers in the secondary schools have a tendency that if you are to use something [teaching material] it must be provided by the school, but sometimes there is a situation where you find there are some things which are not in the school but you need to improvise, so I learnt how to improvise"

Table 3. Teachers' suggestions for program improvement

Response	Number of responses
Facilitation and welfare	11
Content	9
Incorporation of ICT	6
Mode of delivery during in-service training cycles	7

The above comments support and confirm the responses given by teachers in the questionnaire about the most improved skills in their teaching.

Suggested areas of improvement

Much as most of the teachers either strongly agreed or agreed that the SESMAT programme has had an impact on their skills in involving students, preparing lesson plan, improvisation, developing efficient and effective worksheets, they expressed the need for some improvements to be made. The teachers' responses on the improvements to be made were categorised and their number of responses noted as shown in Table 3 below: From Table 3 and the responses noted above, it can be observed that facilitation (teachers' allowance) and welfare of the teachers at the training centres is the area where most teachers would like to see an improvement, followed by the content being delivered during the in-service training.

Though all the teachers are from schools with well stocked computer laboratories, only 6 teachers were interested in the in-corporation of ICT in the SESMAT in-service training.

DISCUSSION

The training seems to be impacting both the content and the methodology of teachers, but the impact on the pedagogical skills seems to be more prominent than the content, as teachers felt that the programme had a little impact on their level of content knowledge and concretisation of ALEI principles. The reason for this could be the fact that the SESMAT in-service training concentrates more on the pedagogy and affective aspects such as changing the attitudes of teachers concerning mathematics and the teaching of mathematics. This may account for the fact that 91% of the teachers felt that the programme had helped them to improve on their improvisation skills. Another reason could be that teachers tend to easily adopt new teaching strategies such as the use of manipulative materials or cooperative learning (Pang, 2005)

On the other hand the little perceived impact on the content by the teacher can be attributed to the nature of subject matter, its impact is immediate and therefore its success or otherwise can easily be evaluated. The other reason why the teachers feel the programme has not greatly impacted on their content could be of the fact that the content covered during teacher training in Uganda is not aligned with the subject matter a teacher is going to teach in the classrooms, this is line with the observation made by Benson *et al* (1996) that the impact of in-service training on teachers is related to their previous knowledge of the subject. Most of the teachers in study were from the best government schools in Mbarara District, Uganda, and this could be one of the explanations to why teachers see little impact in terms of content and this seem to support Guskey (2002) argument that teachers from schools which have enough resources to attract and retain teachers who are well trained may see little impact in terms of content.

Teachers should be encouraged and be given some night out allowances by the school administration to attend SESMAT in-service training. This may motivate the teachers hence improving on their perception on the programme. As observed by Makewa *et al*. (2011) teachers who were well fed during the residential training and were given transport allowances at the end of two weeks' training were active during training. All the facilitators are secondary school teachers. Some of the experienced teachers and those from best performing schools may look down at the facilitator if they are from less performing schools. There is need to ensure most of the facilitators are respectable teachers with experience of teaching and producing good grades in the National examinations.

Conclusion

Overall, the findings from this study indicate that most teachers perceive the programme to have positively impacted on their teaching skills i.e. towards the implementation of the main objectives of SESMAT in-service training. For in-service training to be effective and greatly impact on teachers, their welfare needs to be taken care of in terms of allowances. Also, new innovations in the area of ICT need to be incorporated in the training programme. When planning in-service programs consideration should be given to areas of most pressing needs identified as well as broader policy direction.

Rather than only emphasising better way of using older methods of teaching mathematics, some aspects about modern methods like use of technology should be include in the in-service training. In summary, there remains a lot to be studied as far as the implementation and the impact of SESMAT are concerned especially on how it impacts on the performance of students in the national examinations.

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