In Kenya, there has been public outcry over the dismal students' performance in Mathematics at Secondary school level over the years. The deteriorating performance in Mathematics at national examinations has been a major concern to students, teachers, educationists, politicians and other stakeholders. Several measures have been put in place through workshops, seminars, refresher courses and in-service training of teachers through Strengthening of Mathematics and Science in Secondary Education In-service of Teachers (SMASSE INSETS). However, the impact of SMASSE training on Mathematics performance had not been established. This scenario raises basic policy concern about the impact of SMASSE training programme on Mathematics performance in Secondary schools in Kenya and specifically in Bomet District. To this end, the main purpose of this study was therefore to investigate the impact of SMASSE training on Mathematics performance in Secondary schools in Bomet District, Kenya. The specific objectives of the study were: to investigate extent to which Mathematics teachers implement what was learnt during SMASSE INSET; to assess the impact of SMASSE training on Mathematics performance in National Examinations and to examine the challenges fared by Mathematics teachers in implementing what was learnt during SMASSE INSET. The study adopted a descriptive survey conducted in 16 Public secondary schools in Bomet district. The researcher used purposive sampling to select 16 teachers out of 112 teachers. Stratified random sampling was used to select 16 public secondary schools in the study district validity and reliability determined by split half or co efficient of stability using Spearman's Rank Order method. The data collected from the 16 respondents were organized, edited and analyzed using descriptive statistical methods such as mean, frequencies, percentages and variability. The findings of this study revealed that: SMASSE training contributes to the understanding of Mathematics topics to a larger extent. Teachers of Mathematics benefited from SMASSE training by sharing experiences amongst them. The use of locally improvised teaching materials improved Mathematics performance and that SMASSE training equipped teachers of Mathematics with knowledge and skills for setting and marking of Mathematics. This study further found that, teachers of Mathematics conceptualized the child-centred approach as presented during SMASSE training. The conclusion of the study was that: SMASSE training impacted positively on the teaching of Mathematics and that the most effective teaching method is child-centred approach using locally improvised teaching materials. The study recommended that a similar study be conducted in Mathematics in another district with a large of sample for comparison of the findings.